CIVIL AVIATION AUTHORITY

UK AIRPROX BOARD

Analysis of Airprox in UK Airspace

Report Number 6

January 2001 to June 2001

A joint Civil Aviation / Ministry of Defence service

Report by the UK Airprox Board,

‘Analysis of Airprox in UK Airspace’

(January 2001 to June 2001)

produced jointly for

The Chairman,
Civil Aviation Authority

and the

Chief of the Air Staff,
Royal Air Force

FOREWORD

This is the UKAB's sixth report on Airprox within UK airspace. Like all of the others that have preceded it, this document is aimed at pilots and air traffic controllers, both civil and military. Its prime purpose is to promote air safety awareness and understanding by sharing widely the lessons to be learned from UK Airprox incidents in the first six months of 2001. If this is to succeed, this book needs to be made freely available to pilots and controllers at the working level, in the working environment – perhaps in crew rooms and rest areas as judged appropriate.

There were 101 incidents during the period under review, an increase of 6 compared with the first half of 2000. This slight rise was almost wholly accounted for by more Military ~ Military encounters. Beyond that, however, the overall picture is one of relative stability in numerical terms. Civil ~ Military Airprox reduced by 2 but this was counterbalanced by Civil ~ Civil cases, which went up by the same small number. A slight upward shift took place in the more serious risk categories at the expense of the *no collision* one. Finally, there was an unusual jump in situations where formal investigation - extensive in most cases - was still unable to expose sufficient information on which to assess *risk*. The complete record is set out in the table below:

	(January to June)		
	2000	**2001**	
Risk Category A	14	16	*(Collision risk)*
Risk Category B	20	23	*(Safety not assured)*
Risk Category C	61	57	*(No collision risk)*
Risk Category D	0	5	*(Insufficient information available)*
Totals:	95	101	

More detailed information on all of these results can be found in the statistics section starting at page 11, in the individual reports later in the book and also on the UKAB web site at www.ukab.org.uk. What needs to be borne in mind, however, is that the data presented in the various tables and charts cover half-year figures only. Although these 'snapshots' can be interesting they do not represent the bigger picture and must not be used to make predictions on what might happen next. We must wait until full year results are to hand and then compare these with like periods over the last decade or so to extract any meaningful trend analysis. That, and more, will be the subject of UKAB Report Number 7.

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. Each member is 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:

- All of the Air Traffic Control disciplines
- 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 ac

The Director UKAB reports directly to the Chairman CAA and Chief of the Air Staff, Royal Air Force.

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.

SAFEGUARDING ANONYMITY

Names of individuals or Companies are never published in reports. Safeguarding anonymity is a deliberate policy to encourage an open and honest reporting environment. Furthermore, the UKAB has no legal powers and does not apportion blame or liability; its sole purpose is to assess what took place in the interests of enhancing flight safety.

AIRPROX DEFINITION

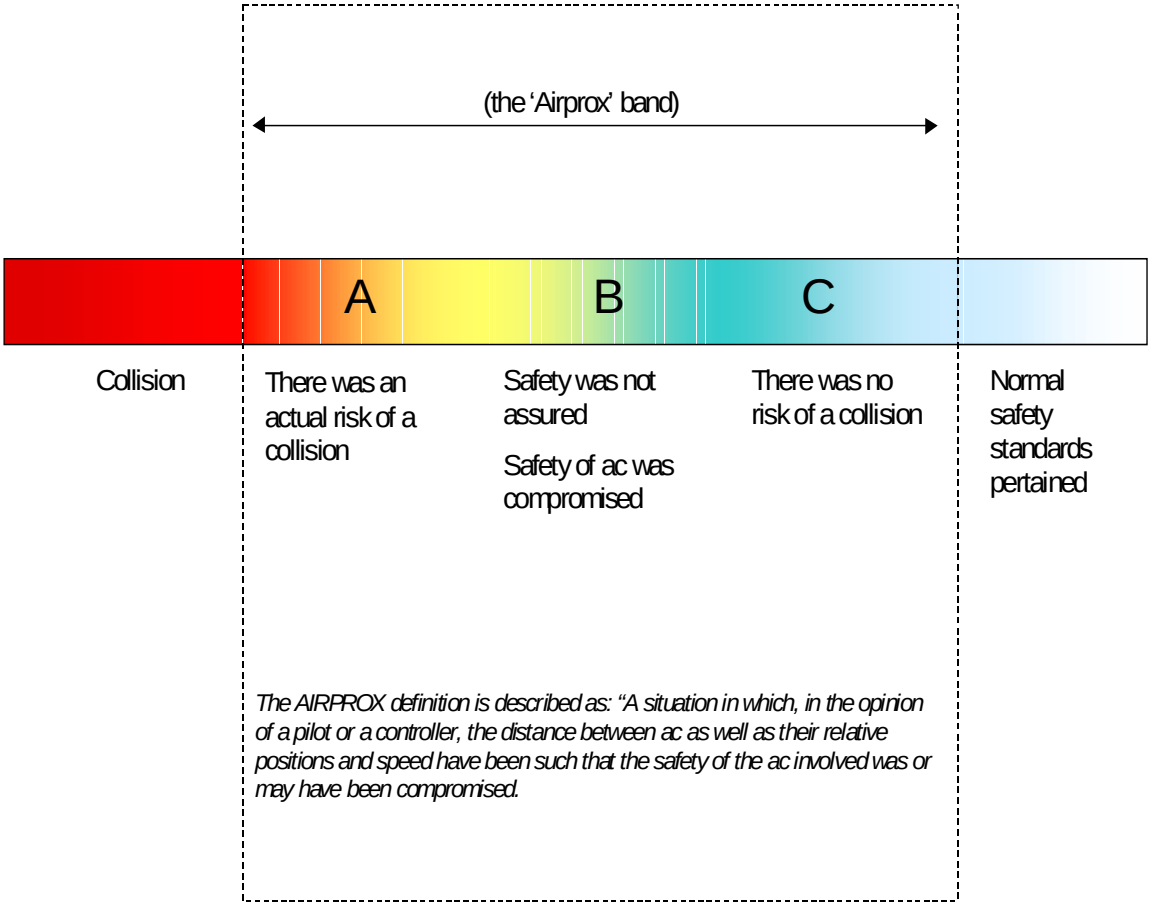
The agreed definition of an Airprox is a situation in which, in the opinion of a pilot or a controller, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved was or may have been compromised.

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 Airprox risk band is shown below:



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 5 and lists new ones.

39/00 Shorts 360 and an F3 20 Mar 00 Risk Category: A

RECOMMENDATION: That the MOD considers including a 'Minimum risk corridor/s' for non exercise traffic, including Commercial Air Transport, as a standard part of the planning process for major exercises.

Status - Not Accepted - Closed

MOD Action: The MOD feels that much more needs to be done to integrate civil and military traffic in as safe a way as is reasonably possible during military exercises. However, it does not believe that Minimum Risk Corridors (MRC) are an acceptable way forward for the following reasons:

a. CAT ac use multiple routes to and from regional airports and a single MRC would be overly restrictive.

b. The extent of multiple MRCs would rule out effective exercise play for considerable distances round regional airports.

c. Attaching difficulties with notification arrangements for MRCs. Airspace Co-ordination Notices (ACN) are issued prior to exercises and are then published by a NOTAM that refers to the ACN. Unfortunately, ACNs cannot be circulated to all ac operators.

d. MRCs would reduce the size of exercise areas and would severely restrict the operational freedom required by military aircrews.

149/00 BAC 1-11 and a B747 16 Sep 00 Risk Category: B

RECOMMENDATION: That the CAA considers:

a. A review of the way that ATC instructions are given in sequence to aircraft so that a change of frequency is not given in the same transmission as an instruction requiring an acknowledgement.

b. Adopting as policy that controllers should issue either a landing clearance or a go around instruction by 2 NM finals at Manchester and other busy airports.

Status - a. Accepted

CAA Action: The CAA accepts this Recommendation and will review the appropriate procedures and instructions through the SRG ATC Procedures Group and Phraseology Working Group. This review is expected to be complete by December 2001

Status - b. Accepted

CAA Action: The CAA accepts this Recommendation. The Safety Regulation Group's Air Traffic Services Standards Department has considered the policy guidelines relating to the point at which a landing clearance or go-around instruction is issued at Manchester and other busy airports. The review determined that current guidelines are in accordance with ICAO requirements and are sufficiently robust to ensure a safe and expeditious flow of air traffic.

159/00 A330 and an A340 2 Oct 00 Risk Category: A

RECOMMENDATION: That the CAA considers putting forward recommendations to the appropriate international bodies:

a. To review overtaking procedures, taking into account the different lateral separations used in radar and non-radar ATC environments.

b. To consider adopting lateral track offset procedures that are independent of wind direction, with a view to introducing them as standard.

c. To reconsider the need for aircraft commanders to inform ATC of all lateral offset manoeuvres of less than 2 NM in Oceanic airspace, irrespective of the reason for the manoeuvre.

d. That the 'turbulence induced' capture of a prot law (in circumstances such as those encountered in this Airprox) should be introduced in Airbus flight simulator training, firstly to establish a norm for the size of level deviations across the Airbus pilot population, and secondly to train pilots to cope promptly with the situation.- Accepted (a, b and c); Not Accepted (d).

CAA Action: The CAA accepts Recommendations a, b and c and will extend the scope of its ongoing work on AAIB Recommendation 2000-67 to take account of the different lateral separations used in the radar and non-radar ATC environments. Recommendation (d) is not accepted by the CAA. The CAA is not aware of a device that would be able accurately to reproduce circumstances such as those described in the incident. It is possible to simulate turbulence and this can vary from light to severe, but the effect is normally to produce fluctuations of height and airspeed around a mean. It would be difficult to introduce a scenario where the aircraft encounters an updraft that induces a climb of 1000+ feet and at the same time reduces airspeed sufficiently to activate alpha prot and alpha floor. However, training is already given during conversion training on the affects of alpha prot and alpha floor. These items may not be a specific part of recurrent training but will be regularly encountered as part of other recurrent training and checking items such as GPWS and windshear.

192/00 B757 and an F15 22 Nov 00 Risk Category: A

RECOMMENDATION: The UKAB supports the conclusions reached by the AAIB and asks the CAA and the MOD to consider the following for action:

a. Military and civil aircraft should each transmit SSR information, particularly in controlled airspace, to enable STCA and/or TCAS equipment to warn controllers and pilots of conflicting flight paths that hold the potential for a mid-air collision.

b. Introduce procedures that provide safety assurance, based on the use of SSR, for aircraft operating in formation.

c. Introduce specific procedures that prevent transponding aircraft, flying in formation in controlled airspace, from triggering unnecessary STCA warnings owing to the proximity of their SSR returns.

Additionally, it is recognised that a full technological answer to resolve all the problems involved may be some way off. Therefore, the UKAB supports strongly any interim solution on procedures for aircraft formations flying in controlled airspace under radar control that *ensures both the controller and the formation leader knows jointly the height or flight level of each aircraft within that formation.*

Status - Accepted

CAA and MOD Action:

Following discussions between the CAA, the Ministry of Defence (MOD) and the National Air Traffic Services Ltd (NATS), new military ATC procedures for formations of military aircraft crossing controlled airspace have been agreed and introduced, subject to the constraints imposed by the limitations inherent in current ground based radar equipment. These procedures will reduce the risk of elements of military formations not being at their assigned levels, and will complement the protection given to all aircraft by ACAS and STCA. Additionally, the MOD and NATS have independently but co-operatively commissioned research to consider whether further enhancement of the protection can be obtained within those constraints to allow all elements of a formation to be allocated individual SSR codes - for full protection provided by ACAS/STCA.

201/00 A319 and an A320 9 Dec 01 Risk Category: C

RECOMMENDATION: That the MOD and the CAA considers a review of mandatory checks to be carried out by controllers, on communications continuity, whenever Sectors/Control positions are bandboxed or split.

Status - Acceptance by the MOD and Partial Acceptance by the CAA.

MOD Action: The MOD accepts this recommendation and has prepared new orders to cover all aspects of bandboxing and splitting control positions. These orders will be introduced into JSP318A at the next amendment (Approximately February 2002).

CAA Action: The CAA Safety Regulation Group has reviewed the issue of mandatory under the recommendation and has concluded that the guidance contained in the Manual of Air Traffic Services (MATS) Part 1 is sufficient for providers to produce detailed local instructions for controllers. In the context of the subject Airprox, the situation at Terminal Control (TC) Heathrow was exacerbated by a lack of specific written procedures in the relevant MATS Part 2. This has been rectified by the publication of TC Supplementary Instruction 19/01 on 12 March 2001.

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 has directed military Operating Authorities to review operating procedures at their stations, in order to ensure that the conduct of any simultaneous operations of fixed and rotary wing aircraft is considered to be acceptably safe.

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.- Open

CAA and MOD Action: The CAA and the MOD are currently processing this Recommendation.

STATISTICS

JANUARY – JUNE 2000 and 2001

THE UKAB DATA SET

The graphs and tables in the pages that follow provide see-at-a-glance comparisons on Airprox recorded between the first six months of 2000 and the same period for 2001. In either case the statistical sample is too small to extract any meaningful trends, but these 'snapshots' can be interesting nonetheless.

Information is presented first to show the 'big picture', followed by separate sub-sections covering:

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/balloons
- Aerial work

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

HALF YEAR COMPARISONS 2000 and 2001

There were 101 Airprox between January and June 2001, compared with 95 in the same period last year. Broad percentage changes in the 'mix' can be seen from the pie charts at *Fig 1 and Fig 2* below, while *Tables 1 and 2* provide the detail. Note that up to the end of March, totals were the same in both years. Slight reductions in Civil~Military and Civil~Civil encounters were absorbed by a larger 'slice' depicting Military~Military incidents

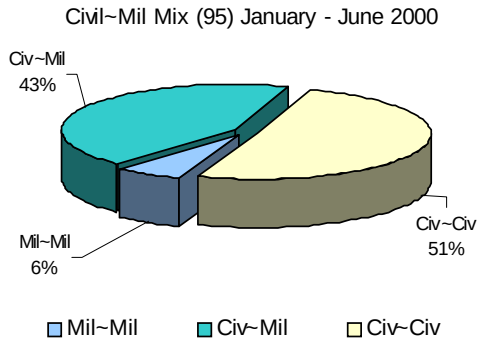


Figure 1

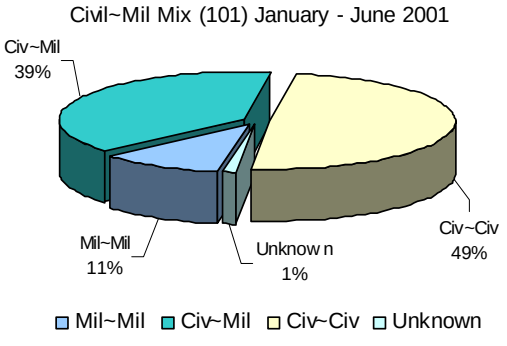


Figure 2

2000	Jan	Feb	Mar	Apr	May	Jun	Totals
Mil~Mil	1	0	1	1	0	3	6
Civ~Mil	6	5	11	4	7	8	41
Civ~Civ	6	5	11	9	2	15	48
Unknown	0	0	0	0	0	0	0
Totals	13	10	23	14	9	26	95

Table 1

2001	Jan	Feb	Mar	Apr	May	Jun	Totals
Mil~Mil	0	2	3	0	3	3	11
Civ~Mil	6	4	7	6	10	6	39
Civ~Civ	6	11	7	3	11	12	50
Unknown	0	0	0	0	0	1	1
Totals	12	17	17	9	24	22	101

Table2

A further breakdown of results is shown in the pie charts at *Fig 3 and Fig 4*. These allow a comparison in percentage terms of how the three groups interacted with each other.

Most change can be seen in CAT aircraft involvement, which reduced by 14 points from 55% to 41%. Smaller 'slices' in the pie, against both GA and Military elements, depict this shrinkage in pictorial terms.

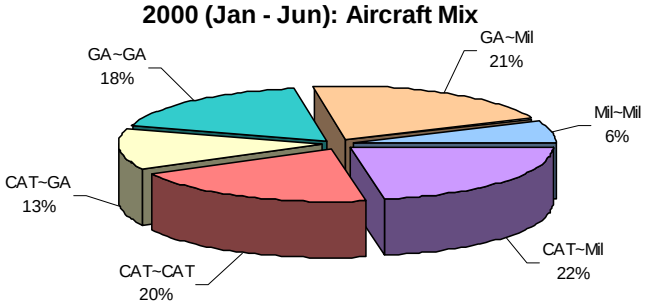


Figure 3

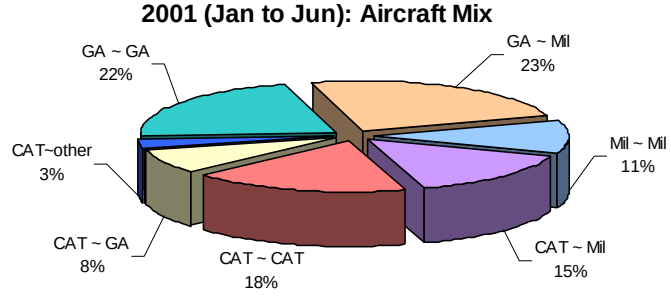


Figure 4

In contrast, there was little change to the overall results for GA involvement. This went up 1 point only after taking into account some plus and minus adjustments against the other 2 groups.

While Military pilots' involvement with CAT aircraft reduced, the reverse held against GA and other military aviators. The outcome, however, meant no change to the 2000 figure of 49%.

RISK RESULTS

Fig 5 shows CAT results for both years, which allows 'snapshot' comparisons to be made. *Tables 3 and 4* (below) give added detail.

CAT incidents fell by 15%, but the monthly CAT profile did not mimic the 'All Airprox' total as it did in 2000. Of note, there were no Risk A cases, while Risk B findings rose by 2. Most encounters ended without any collision risk although, unusually, there were 4 where risk could not be determined owing to insufficient information.

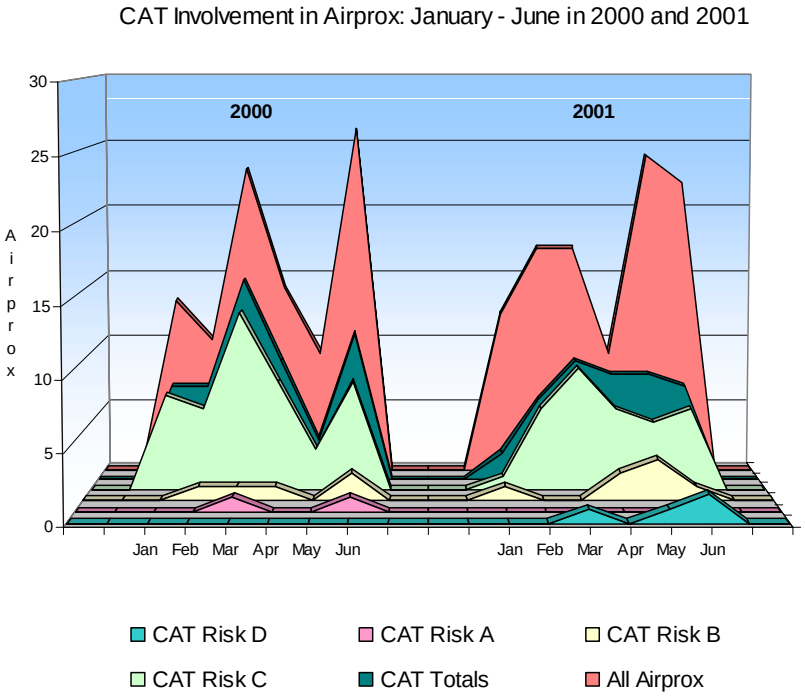


Figure 5

2000	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	1	0	0	1	2
Risk B	0	1	1	1	0	2	5
Risk C	7	6	13	8	3	8	45
Risk D	0	0	0	0	0	0	0
Totals	7	7	15	9	3	11	**52**

Table 3

2001	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	0	0	0	0	0
Risk B	1	0	0	2	3	1	7
Risk C	1	6	9	6	5	6	33
Risk D	0	0	1	0	1	2	4
Totals	2	6	10	8	9	9	44

Table 4

CAT CAUSAL FACTORS

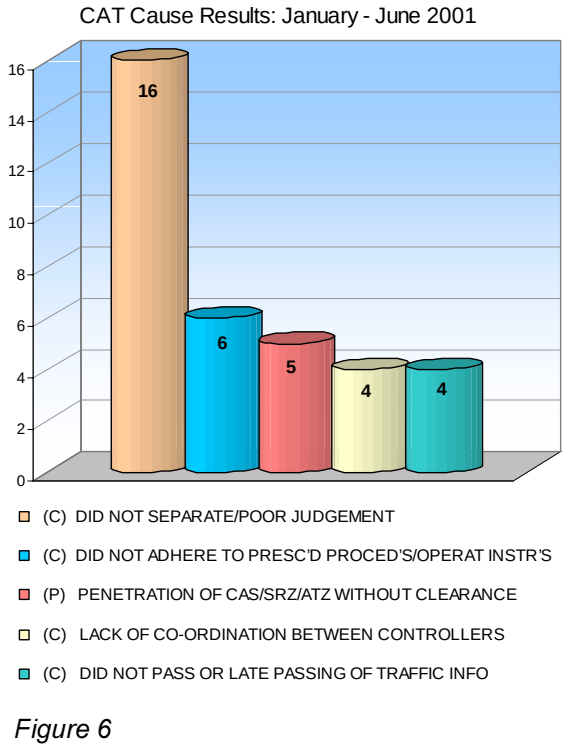


Figure 6

86 causal factors emerged from the 44 CAT encounters during the period. Various failures in airborne and ground systems each accounted for 2 factors and 7 other miscellaneous reasons also featured. However the majority was attributed either to controllers or pilots where the split was 49 to the former and 26 to the latter.

Fig 6 depicts the leading 5 causes and only those factors with 4 or more examples are shown. The most common reason remains unchanged from last year, but 'level busts' have dropped out of the picture, together with factors connected with incidents outside controlled airspace. Their places have been filled instead with more 'controller' involvement.

RISK RESULTS

Fewer incidents during March and April 2001 produced the curious bite in the GA total profile shown at *Fig 7*. Figures then adjusted sharply upwards in May accompanied by a sudden and unwelcome increase in Risk A incidents. These peaked at 8 before falling back again equally abruptly and correlate closely with Military results.

Throughout the period Risk B and Risk C returns were very much in line with those experienced during the first half of 2000; unlike 2000 there was one Risk D case.

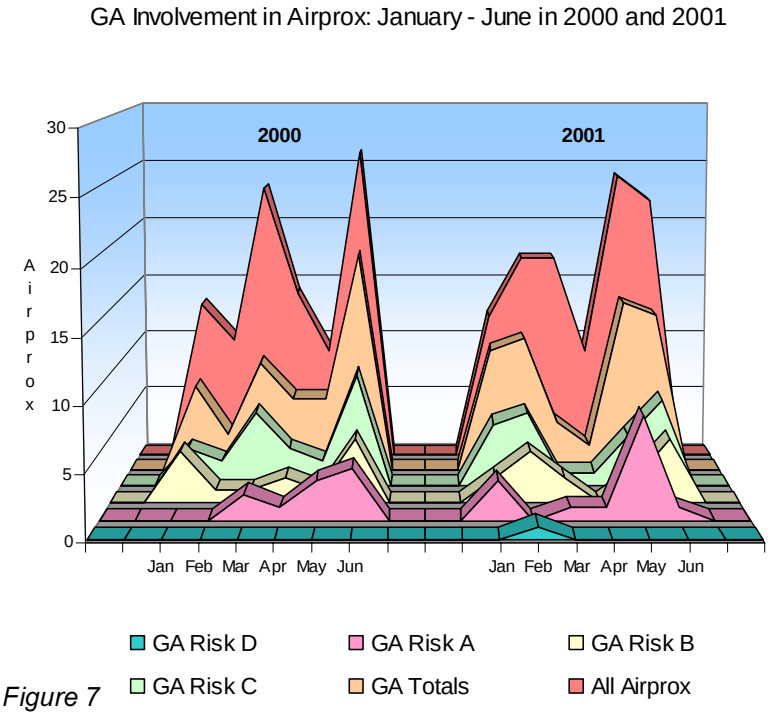


Figure 7

2000	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	2	1	3	4	10
Risk B	4	1	1	2	1	5	14
Risk C	3	2	6	3	2	9	25
Risk D	0	0	0	0	0	0	0
Totals	7	3	9	6	6	18	**49**

Table 5

2001	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	3	0	1	1	8	1	14
Risk B	2	4	2	0	2	5	15
Risk C	5	6	1	1	4	7	24
Risk D	0	1	0	0	0	0	1
Totals	10	11	4	2	14	13	**54**

Table 6

CAT CAUSAL FACTORS

Fig 8 shows the main reasons for encounters involving GA pilots - and who caused them.

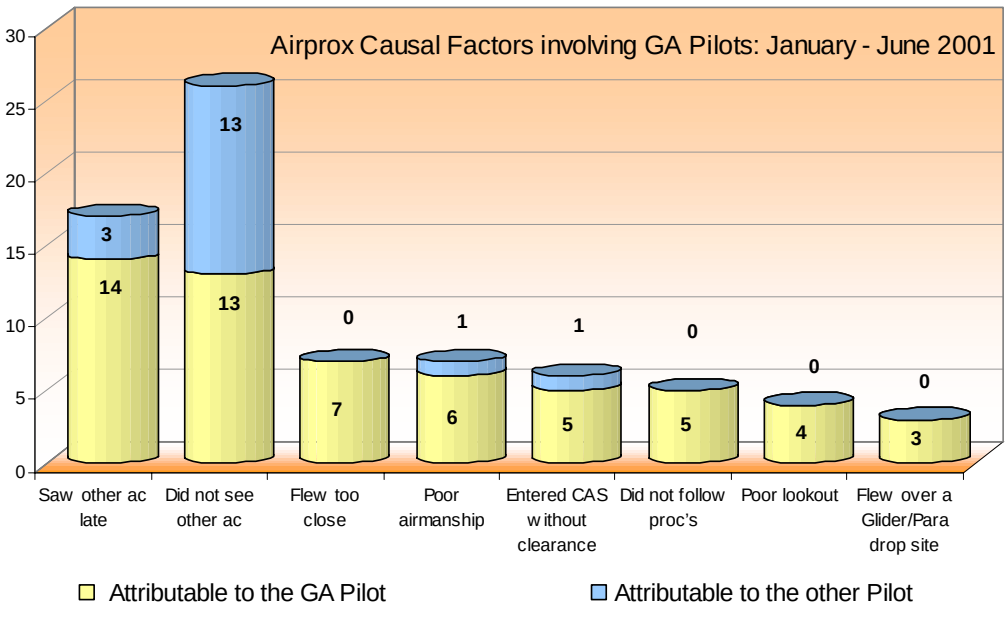


Figure 8

MILITARY SECTION

RISK RESULTS

Fig 9 illustrates half-year results, while further detail is set out in *Tables 7 & 8.* Military totals (up 3) accounted for half the 'All Airprox' tally and *Military risk* distribution shifted.

May 2001 was a critical month in which Risk A numbers displaced Risk C returns; both the 'A' spike and the 'C' 'plateau' stand out on the chart. Interestingly, a similar jump in *collision risk* figures shows up in the GA chart (*previous page)* and had much to do with improved weather at the time. One encounter attracted a Risk D assessment.

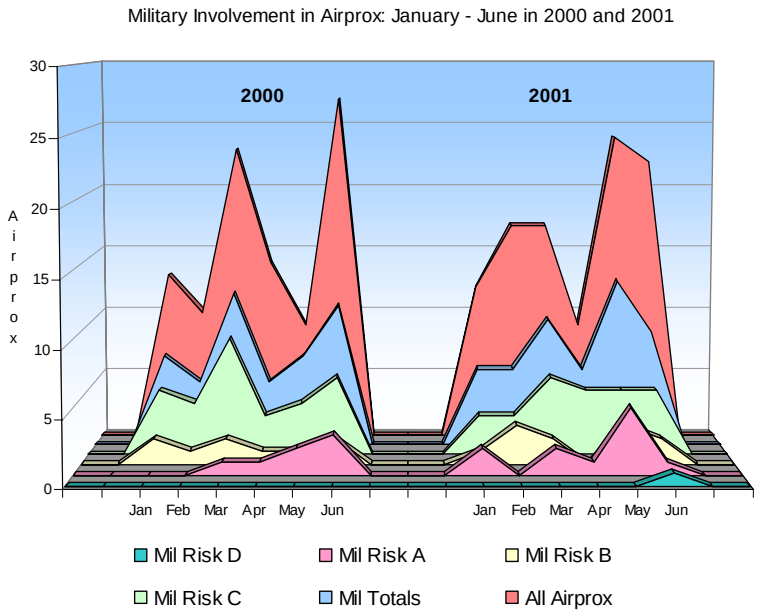


Figure 9

2000	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	1	1	2	3	7
Risk B	2	1	2	1	1	2	9
Risk C	5	4	9	3	4	6	31
Risk D	0	0	0	0	0	0	0
Totals	7	5	12	5	7	11	**47**

Table 7

2001	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	2	0	2	1	5	1	11
Risk B	1	3	2	0	3	2	11
Risk C	3	3	6	5	5	5	27
Risk D	0	0	0	0	0	1	1
Totals	6	6	10	6	13	9	**50**

Table 8

CAT CAUSAL FACTORS

Fig 10 shows the most common reasons for encounters involving Military pilots with a proportional indication on cause.

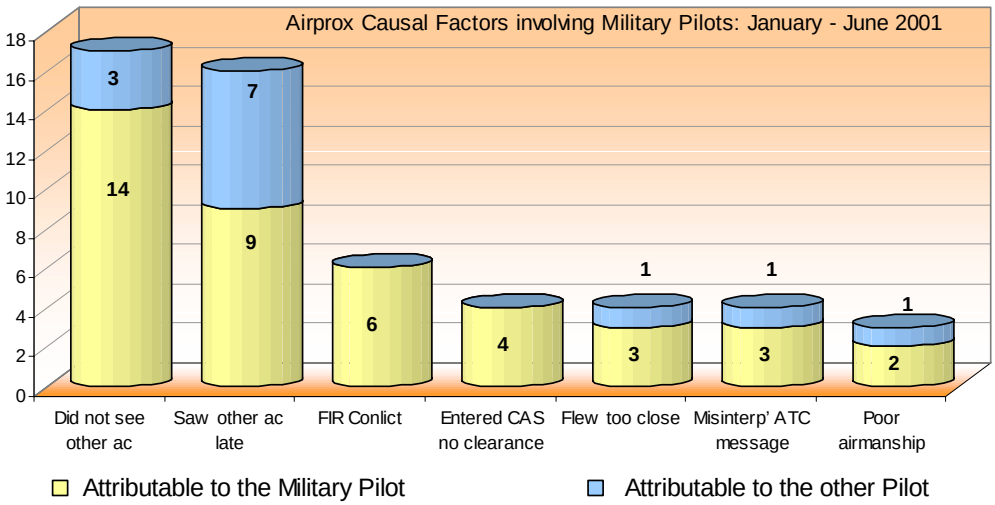


Figure 10

AIRPROX GRID: ENCOUNTERS BETWEEN JANUARY AND JUNE 2001

The grid at *Fig 11* summarises all of the information shown in preceding tables and charts, but presents the data in a way that indicates the type of activity each participant was engaged in when their unexpected encounter took place. Aircraft groups listed down the left-hand side of the grid depict the first aircraft (generally they reported the incident), while the 'other' aircraft groups are tabled on the top axis of the grid (generally those being reported against).

January - June 2001	CAT (HELO)	CAT (NON-SCHED PAX)	CAT (SCHED. CARGO)	CAT (SCHED. PAX)	GA (HIRE & REWARD)	GA HELO	WEATHER BALLOONS	GA PRIVATE OR CLUB	GA TRAINING	Mil FIXED WING	Mil HELO	UNKNOWN	UNTRACED Mil Ac	UNTRACED GA Ac	TOTALS
CAT (NON-SCHED. PAX)		1		1						5					7
CAT (SCHED. CARGO)										1					1
CAT (SCHED. PAX)	1	1	2	12	2	3	1	3		4	1	2	1		33
GA (HIRE & REWARD)						1		1	1	3	1				7
GA (COMPANY Ac)										1					1
GA GLIDER					2	1		2	1	1					7
GA HELO										2					2
GA PRIVATE OR CLUB					1			8		3				1	13
GA TRAINING								2	1	1					4
Mil FIXED WING		1		2	2	1		4	1	7				1	19
Mil GLIDER								3		1					4
Mil HELO										3					3
	1	3	2	15	7	6	1	23	4	32	2	2	1	2	101

Figure 11

The most common groups to meet during the period were CAT aircraft on scheduled passenger flights (12 times). All but one of these happened in controlled airspace and most (9) turned out to have no risk of collision. In the 3 remaining cases, where safety had been compromised, 1 happened in unregulated airspace.

Next of the most common groups to meet were GA aircraft, Private or Club owned (8 times) and here all but one incident took place outside controlled airspace. Two of the encounters resulted in Risk A assessments and a further 2 attracted Risk B grades; the others were Risk C and a single Risk D.

Close behind the GA pilots - and in third place - were pilots of Military fixed wing aircraft (who met 7 times). All of these were in unregulated airspace and produced 2 Risk A, 1 Risk B and 4 Risk C cases. Of interest and unlike any of the other group elements, Military fixed wing aircraft were the only ones that interacted with everyone else.

Some other points can be extracted from the grid. GA Gliders were mostly involved with other GA aircraft, whereas Military Gliders met GA and CAT aircraft in equal measure. Military and GA helicopter pilots reported exclusively against Military fixed wing aircraft, as did one CAT pilot on a cargo flight. While interesting, none of these statistics on their own point towards conclusions one way or the other. Rather they reveal the complex way in which aircraft tended to meet unexpectedly; in the vast majority of cases one or more 'safety nets' came into play and prevented any collision.

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

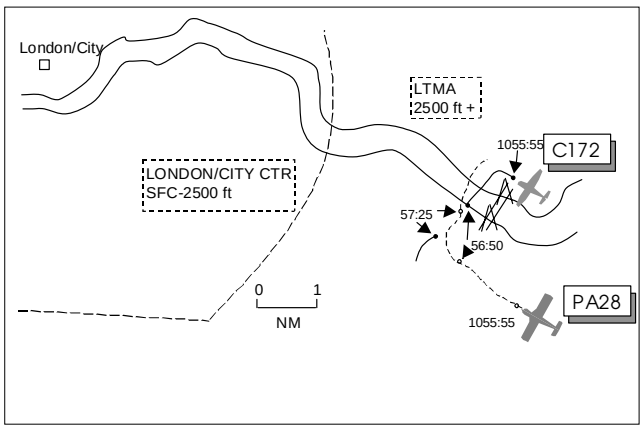
AIRPROX REPORT No 1/01

Date/Time: 6 Jan 1057 (Saturday)

Position: 5128 N 0014 E (1 NM W QE2 DARTFORD BRIDGE)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA28	C172
Operator:	Civ Trg	Civ Trg
Alt/FL:	2350 ft (QNH 1000 mb)	2000 ft (QNH NK mb)
Weather:	VMC CLOC	VMC CLNC
Visibility:	>20 km	>10 km
Reported Separation:	150 ft V, 50-100 ft H	<150 ft V H
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28 PILOT reports flying on a PPL handling sortie during an ac type check from Redhill. The visibility was >20 km with no significant cloud in VMC and he was receiving a FIS from Redhill on 119.6 MHz. The ac was coloured white with dark blue underside and his anti collision beacon and wing strobe lights were on. The ac was also fitted with a transponder but was not switched on. When 1 NM W of the QE2 Dartford Bridge heading 270° at 105 kt, he instructed his student to commence a R turn onto heading 030° to avoid entering the London/City CTR. A lookout scan to the R was completed by both pilots and a 30° banked level turn was commenced. After 40-50° of heading change, the instructor saw a Cessna, 150 ft away, in a wings level attitude heading straight at them; he increased bank angle to 60° for avoiding action. One second after the sighting, the Cessna entered a 60° banked turn to his R and passed 50-100 ft horizontally down his LHS; 3-4 seconds later after levelling his wings he passed through the Cessna's wake. He assessed the risk of collision as high.

THE C172 PILOT reports flying on a dual training sortie (1st flight) from Biggin Hill. The visibility was >10 km with no cloud in VMC and he was listening out with Biggin Hill on 129·4 MHz. He was squawking 7000 with Mode C switched off. After turning overhead the QE2 bridge returning to Biggin Hill heading 180° at 95 kt, he saw a low wing single engined ac 250 ft away to his L. Momentarily, he thought the PA28 pilot had seen him but as this was not the case he commenced a R turn and descended for avoiding action; the other ac passed slightly above and behind by <150 ft. He assessed the risk of collision as high and he believed this was a late sighting owing to the conflicting ac being obscured by his ac's wing strut.

UKAB Note: Replay of the Heathrow radar at 1055:55 shows a primary response, believed to be the PA28, 1·75 NM S of the Dartford Bridge tracking NW with another primary only response, believed to be the C172, 0·5 NM N of the bridge in a L turn passing NW. At 1056:50, the C172 fades from radar W Abm the bridge steady on a SW track as the PA28 commences a R turn 1 NM SW of the bridge. The close encounter is not observed on radar except for the PA28, at 1057:14, executing a tight R turn towards the NE before turning L onto a N track; this is believed to be the Airprox avoiding action manoeuvre as described by the reporting pilot. 10 seconds later, the C172 reappears on radar 0·65 NM SW of the PA28.

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 noted that this had been a close encounter between 2 ac on instructional sorties, in busy Class G airspace that was used by local operators as a 'training area'. This region is traversed by many ac on tracks that are planned to remain outside the London/City and Gatwick CTRs as well as being a natural sightseeing 'honeypot' over or near the QE2 Bridge. Even though both pilots were not in receipt of an ATC service, the Board was dismayed that the C172 had squawked Mode A with Mode C switched off whilst the PA28's transponder was switched off; this was at odds with the recommended Flight Safety ethos of squawking during such flights for conspicuity purposes. It was suggested that perhaps both pilots should have been in contact with Thames Radar for an ATC service but it was noted that this incident did occur on a Saturday when traffic levels are high and ATC would probably be busy. Pilot members agreed that late sightings by both pilots had led to this Airprox but the question of maintaining an adequate lookout was raised. When turning, the C172's lowered wing obscures the view in the turn direction but these 'cockpit blind spots' on light ac are well known and should be taken into account.

Much debate took place when looking at the risk. Whilst the encounter had not been seen on radar, both pilots agreed that the subject ac had flown in very close proximity to each other. The PA28 pilot had seen the C172 only 150 ft away and increased his bank to 60° to avoid. One second later the C172 carried out an avoiding action R turn which, from its pilot's report, was delayed slightly whilst he assessed the PA28's actions. The subject ac passed abeam each other by a very small distance with the PA28 pilot reporting that he then passed through the Cessna's wake. The Board wondered whether the late turning actions, taken almost simultaneously by both pilots, had only just been effective in preventing collision. On the balance of probability, the majority of members concluded that there had been an actual risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by both pilots.

Degree of Risk: A

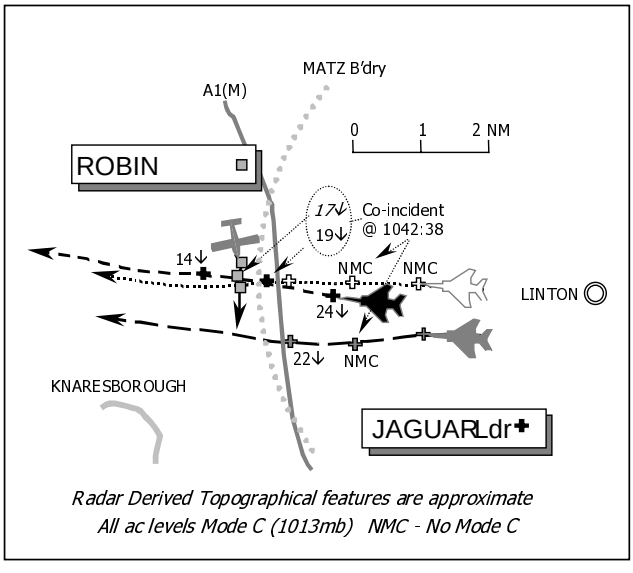
AIRPROX REPORT No 2/01

Date/Time: 11 Jan 1042

Position: 5404 N 0125 W (5¼ NM W of Linton-on-Ouse)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Robin HR200-120B	Jaguar
Operator:	Civ Trg	HQ STC
Alt/FL:	1700 ft↓ (RPS 1017 mb)	2000 ft↓ (Rad Alt)
Weather Visibility:	VMC CLBC 30 km	VMC NR >10 km
Reported Separation:	50-100 ft V, nil H	Not reported
Recorded Separation:	200 ft V, Contacts merged	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ROBIN HR200 PILOT, a QFI, reports he was airborne on an instructional sortie with a student and operating in Class G airspace between the Linton on Ouse MATZ and the town of Knaresborough. The ac livery is red, white and blue and HISLs were on. Linton ZONE had assigned a squawk of A4530, which was selected with Mode C, whilst under a FIS on 129·15 MHz.

They were heading 160° (M) about 2 NM NE of Knaresborough close to the A1 'Motorway' at 75 kt, whilst instructing a descending exercise. During his instructional 'patter', descending through 1700 ft 1026 mb), he suddenly spotted a Jaguar at 9 o'clock flying directly towards his ac, so he dived the Robin in an immediate avoiding action descent. The jet passed about 50 – 100 ft directly above his ac, he thought flying straight and level and then descended toward the Pateley-Bridge area, whereupon he spotted two more Jaguars, which he thought passed ahead of his ac. He reported an Airprox to Leeds-Bradford ATC by telephone after he had landed.

THE JAGUAR PILOT reports he was leading a formation of 3 grey Jaguars descending into low level through the Linton-on-Ouse overhead at 450 kt; HISLs were on. Passing 2000 ft in descent, just W of Linton heading about 290°, he saw another ac in front of and below his ac. The sighting was so brief he could not determine the type nor estimate the separation and it was seen too late to initiate any avoidance manoeuvre before he overflew it. Straight afterwards, the other ac was called by one of the rear elements of the formation who flew safely above it.

MIL ATC OPS reports that the Robin pilot free-called Linton ZONE at 1012:30 on VHF, and advised he was conducting a GH sortie in the Knaresborough area between 1 - 2000 ft and requested a FIS. ZONE placed the flight under FIS, confirmed the Barnsley RPS (1017 mb) and instructed the pilot to squawk A4530. At 1038:30, following a radar handover from London Mil, the Jaguar formation leader contacted ZONE on UHF for a descent to low level from FL 160. ZONE placed the formation under RIS and following the leader's request agreed a descent to 3000 ft RPS at 1039:52. During this period, ZONE had a number of other ac on frequency under a mix of RIS/FIS and the workload was assessed as medium to high. At 1041:27, when the Jaguar formation was about 5 NM E of Linton, ZONE transmitted *"(formation C/S) limited traffic information from ahead for the next ten miles as you pass through Linton's overhead"* which was acknowledged. At 1042:00, ZONE transmitted *"(formation C/S) as you descend, traffic right, two o'clock, five miles manoeuvring, two thousand feet."* This call, which referred to the Robin, was acknowledged and shortly afterwards, at 1042:14, the formation leader indicated that they were *"..happy to go en-route"*, which they did 10 sec later. At 1046:46, the Robin pilot changed frequency to Leeds Bradford without any comment about the incident. Linton-on-Ouse ATC were first informed of the Airprox the following day.

The LATCC radar recording shows the Robin, squawking A4530, manoeuvring about 5-6 NM W of Linton-on-Ouse at an indicated 1900 ft Mode C (1013 mb). The Jaguar leader's ac is shown, squawking 4537 with the other 2 ac in 'vic', the northerly ac 1 NM in trail of the lead, tracking about 265º and descending as they pass through the Linton overhead. At 1041:58, the time of ZONE's traffic information call, the Robin is in the lead Jaguar's 1 o'clock range 5·5 NM, with the Jaguar passing an indicated FL 51 in descent. The lead Jaguar's squawk changes at 1042:24, as they change frequency, by which time the Robin is southbound at 12:30 - 2·5 NM indicating 1800 ft Mode C. The CPA occurs about 15 sec later as the lead, followed shortly by the northerly 'trailer', pass through the position of the Robin from L to R. The lead ac's Mode C indicates 1900 ft before and 1400 ft after the merge, whilst the Robin indicates 1700 ft and then 1300 ft as the second non squawking Jaguar passes fractionally behind it.

The Airprox occurred within Class G airspace at a time when the Robin was receiving a FIS and the Jaguar formation had proceeded en-route, having previously received traffic information about the Robin; thus, all the ac involved were operating in a 'see and avoid' environment. ZONE's traffic information call at 1042:00 was about 0·5 NM out and 2 o'clock was called when the Robin was actually at 1 o'clock. This may possibly have led the Jaguar leader to consider that the Robin was

further R of his track than it actually was. Placing this in perspective however, the Jaguars were very close to the radar overhead at the time of the call, and a limitation had already been placed on the quality of the traffic information. Therefore, realistically the information ZONE provided was a reasonably good estimate. Furthermore by the time that it would have been clear to the controller that the Robin was actually starting to track S and hence toward the flightpath of the Jaguars the jets had left the frequency. In hindsight, passing some form of warning to the Robin pilot about the proximity of the Jaguars may have reduced the surprise element of the encounter. While controllers could be praised for showing such awareness, there is currently no requirement within the ATSOCAS definition of FIS for them to do so.

Linton-on-Ouse ATC were first informed of the incident some 24 hours after the event. Had the Robin pilot made it known at the time that an Airprox had occurred, the effort expended in tracing action and assessment of controller workload and circumstances by the ATC Supervisor would have been much more effective. The controller reported that he was 'close to capacity'; however, without an independent assessment at the time, it is difficult to confirm this in anything other than a very general statement about the activity during the period.

HQ STC comments that this incident occurred whilst the Jaguars were letting down to low level and, although the cockpit workload would have been relatively high, the need for good lookout during the transition to the less benign low-level environment is essential. By his own admission, the Jaguar pilot saw the Robin late and with insufficient time to take any avoiding action. The potential for collision was clearly high and it is possible that only a very sharp reaction by the Robin instructor pilot did anything to resolve the confliction.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Robin pilot and the Jaguar leader, transcripts of the relevant RT frequencies, radar video recordings, and reports from the appropriate ATC and operating authorities.

Members endorsed the comments expressed by Mil ATC Ops, in that it would have been more helpful if the Robin pilot had made an Airprox report to ZONE on RT at the time of the occurrence. This would have allowed a more thorough understanding to be gained of the ZONE controller's traffic scenario and operating conditions.

Some pilot members questioned whether conducting a training exercise so close to the Linton MATZ boundary was wise. Whereas the Robin instructor pilot was perfectly entitled to fly his training flight where he did just outside the MATZ boundary, members pointed out that Linton is a very busy training aerodrome. Consequently, some thought it would have been wiser to have given this location a wider berth and operate further to the W. Those familiar with the local airspace mentioned it was also a favoured low-level entry point as illustrated here. A GA member however, expounded another view that it is safer to operate in good radar coverage close to an aerodrome and under an appropriate service from the ATSU. In this instance, however, the Robin pilot was only receiving a FIS; members recognised that no traffic information would normally be provided under this ATS by a military ATSU and there was no compunction on ZONE to do so. Neither would the Robin pilot have been able to glean any traffic information from just listening on the VHF frequency as the Jaguars were communicating with ZONE on UHF. Alternatively, if the Robin pilot had requested a RIS he could reasonably have expected traffic information about the Jaguars and may not have been caught out by their sudden appearance. Nevertheless, members understood the difficulties of teaching under the high RT load that is common with a radar service and it was indeed fortunate that the Robin pilot saw the Jaguar leader when he did and was able to take robust action to avoid it.

On a related more general point, a GA member explained that some civil pilots may think they are entitled to receive traffic information under a FIS from a military ATSU, which is a frequently encountered misconception and one which the CAA and MOD are trying to eradicate through wider publicity.

In this incident, the controller reported he was working "close to capacity" and therefore he

probably had no time for lower priority tasks, within which the provision of a FIS may have laid at the time. Whilst the Board understood that ZONE had fulfilled his responsibilities under the ATS requested by the Robin pilot and therefore any criticism was unwarranted, the Airprox might have been avoided if ZONE had managed to pass traffic information to both pilots instead of just the Jaguar leader. This was easy to say with hindsight but it might have prevented the Robin pilot from turning S into the path of the Jaguars. The HQ STC member thought that the actions of the Jaguar leader were somewhat hasty. He seemed intent on clearing to his enroute frequency as soon as possible and appears to have paid scant regard to the traffic information provided about the Robin. Pilot members agreed with this perspective and the although the Jaguar leader had seen the Robin it was extremely late, at close quarters and he was unable to take any avoiding action before he overflew it – effectively a non-sighting. Members concluded, therefore, that this Airprox resulted because the Jaguar leader flew into conflict with the Robin, which effectively he did not see despite traffic information and whose pilot saw the Jaguar late.

Turning to risk; the Robin pilot had reported that the Jaguar leader passed 50-100 ft above him after he dived to avoid it. The radar recording revealed that when the contacts had merged the vertical separation was no more than 200 ft and certainly in line with that reported. Although the Jaguar leader saw the Robin, members thought it unlikely that he could have taken any action to increase the miss distance as he overflew it. Whereas the Robin pilot just managed to dive below the lead Jaguar, the late sighting had allowed very little time to change flight path and as such the outcome was fortuitous. Finally, although the Robin had been spotted by the trailing ac in the formation, the sighting was too late to warn the leader. Weighing all these factors together the Board concluded that an actual risk of a collision had existed.

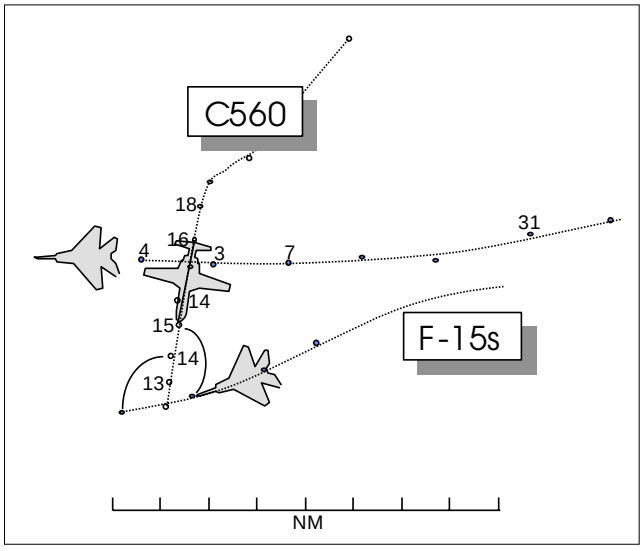
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Jaguar Leader flew into conflict with the Robin, which effectively he did not see despite traffic information and whose pilot saw the Jaguar late.

Degree of Risk: A.

AIRPROX REPORT No 3/01

Date/Time:	11 Jan 1743	NIGHT
Position:	5155 N 0215 W (4 NM NW of Glos Airport - elev 95 ft)	
Airspace:	FIR/LFS	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Citation V	F15
Operator:	Civ Exec	Foreign Mil
Alt/FL:	1700 ft ↓ (QNH 1022 mb)	500 ft (agl)
Weather	VMC CAVK	VMC CLNC
Visibility:	10 km+	nk
Reported *Separation:*	*0·25 NM, 1-200 ft* 2NM, 2000 ft	
Recorded Separation:	1 NM	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CITATION PILOT reports heading 180° at 170 kt while positioning for a left base to RW 09 at Gloucestershire Airport. He was receiving a RIS from Gloucester on 125·65 but without warning he saw a fast moving ac crossing left to right ahead and slightly below. It took no avoiding action so he checked his descent at 1700 ft and turned 15° left to avoid it, as it passed 0·25 NM ahead and 1-200 ft below. It was a very clear night and he saw all 3 of the other ac's nav lights.

THE F15 PILOT reports heading 270° at 450 kt in a tactical formation in unlimited visibility, his No 2 was 60 deg aft of line abreast, to the south, and 2 NM behind the lead ac. He radar locked and saw an ac at approx 4000 ft MSL, 8 NM range crossing from right to left. It was a small transport, twin engine ac, very brightly lit with Nav lights and anti-collision strobes. He leaned to the north at 45° AOB and stayed on TFR at 500 ft AGL to give the maximum vertical separation. He passed visually underneath and behind approx 2-3000 ft below and 2-3 NM horizontally. Both ac and all 4 aircrew were on NVG. The other ac had to be at least 2000 ft above at 2 NM or the TFR system would have attempted to fly the F15 over it, which it did not.

His No 2 confirmed flying on the left side of the formation about two miles back from lead. He was at 500 ft AGL and on NVGs. He saw the traffic about 40 degrees to the right for about 10 miles. The traffic was about 2000 ft above and passed behind. Visually he thought he was no closer than 2 NM.

THE GLOUCESTER APPROACH controller reports that he was providing the C560 with a limited RIS (using an ACR 430) after its handover from Brize Radar, and radar vectors to base leg. He did not explain the service or its limitation to the pilot. He turned the ac onto 180° and, having ascertained that he was in sight of the ground, cleared the pilot to 1600 ft (QNH 1022 mb), informing him he was responsible for terrain avoidance. When 4 NM NW of the airport the pilot reported that he had an ac "*just coming through our 10 o'clock 11 o'clock low level*"; no other ac was painting on the radar whose aerial he had set to just below 4°. He explained that the traffic, probably at low level, was not showing on radar. The pilot replied *"It should be*" and that it was about 150 ft below him. The pilot advised after landing that he would be filing an Airprox. (UKAB Note (1): The ACR 430, '70s technology, has a narrow vertical beam.)

UKAB Note (2): LATCC radar recordings show the C560 descending through 1600 ft Mode C as the leading F15 approaches close in its 10 o'clock at 300 ft Mode C and passes beneath. The No 2 F15, which is not squawking, is then in the C560's 9:30 and crosses its 12 o'clock as it descends between 15-1400 ft Mode C about 1·5 NM to the N.

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 agreed that it was difficult to judge the distance of airborne lights at night and that in this incident the F15 seen by the Citation pilot had passed well ahead and well below and that there had been no confliction or risk of collision. The Board concluded that the incident was filed as a result of a mistaken impression of separation at night by the C560 pilot.

There were other points of interest: the F15 pilots had also mis-assessed their separation from the C560. Although the radar recording showed that the lead F15 had passed 1200 ft below the C560 (unseen by the latter's pilot), the F15's TFR did not fly the ac over the C560. Members noted the lack of an agreed service between the controller and the C560 pilot (MATS Pt 1, p 1-40 refers); had this been actioned with an explanation of the limitation of the ACR 430 the C560 pilot might not have been surprised that the F15s did not show on the radar's narrow beam whose angle had been optimised to show the C560.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Mistaken impression of separation at night by the C560 pilot.

Degree of Risk: C

AIRPROX REPORT No 4/01

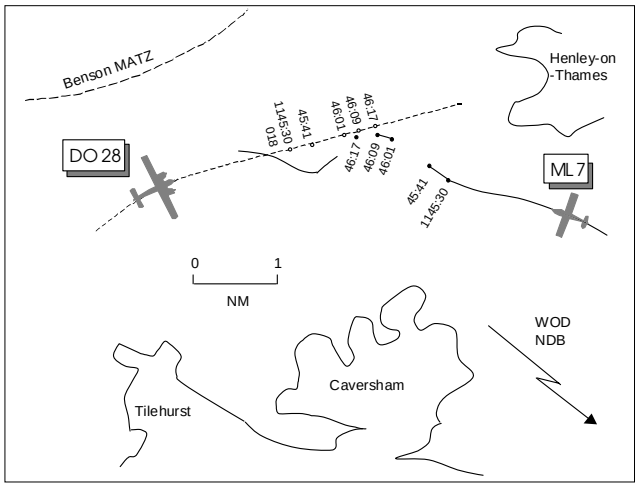
Date/Time: 14 Jan 1146 (Sunday)

Position: 5131 N 0059 W (7 NM SE Benson)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	DO28	MAULE ML7
Operator:	Civ Pte	Civ Pte
Alt/FL:	2300 (RPS 1033 mb)	NK
Weather:	VMC HZNC	VMC NK
Visibility:	8 km	NK
Reported Separation:	300 ft V 0 H	NK

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DO28 PILOT reports flying between Thruxton and North Weald at 2300 ft RPS 1033 mb, he thought, at 115 kt. The ac was coloured white and red, anti collision light was switched on and he was attempting to establish RT communication with Benson 120·9 MHz but without success. He was squawking A7000 with Mode C and the visibility was 8 km in slight haze, sky clear in VMC. After passing CPT VOR, intending to track towards BNN, he turned onto 085° to route S of the Benson MATZ as he was unable to establish RT contact. About 2 minutes after establishing on his new track, he saw a high wing single engine ac 200 m away and 300 ft below, late, as it appeared out of the considerable glare, almost directly out of sun, on his RHS. He identified the ac as possibly a Citabria or Maule type, coloured white with blue radial stripes on the wing upper surface; he turned R 20° to pass slightly behind, the other ac passed almost underneath. No manoeuvring by the other ac was noted and he felt that the safety of his ac had been compromised with some risk of collision with the converging flight paths.

UKAB Note (1): The DO28 pilot confirmed during a subsequent telephone conversation that the conflicting ac appeared to be tracking approx. 060° on a converging/crossing track and his R turn was executed to give some lateral separation.

UKAB Note (2): Met Office archive data shows the Heathrow QNH for 1120Z and 1150Z as 1035 mb and the Chatham RPS 1100-1200Z as 1028 mb.

THE MAULE ML7 PILOT reports flying on a local sortie from White Waltham on the day of the incident but believed he was airborne between 1200-1240. He couldn't remember his sortie profile but thought he may have been in the incident area on a typical local country route to the N of Reading. He was concerned that he, as well as his co-pilot and two rear seat passengers, had not seen an ac in a near encounter but surmised that the other ac must have approached from behind and above from a position where the wing of the Maule ac would have obscured their view.

AIS (MIL) reports that a radar trace to identify the reported ac shows a radar return first appearing close to White Waltham at 1140 which passes close to the DO28's track at 1146 and fades from radar adjacent to White Waltham at 1205. These times do not correlate with the booking out times of the Maule on the White Waltham log sheet. However, the ML7 was the only ac at White Waltham that flew, at about the time of the incident, and fitted the description from the reporting pilot i.e. a high wing single engine type, Maule/Citabria, coloured white with radial stripes on the wing upper surface. However, there is some doubt whether the event recorded on radar is the reported Airprox and also whether the ML7 is the reported ac.

UKAB Note (3): Although a time discrepancy exists, the booking out system is open to errors of this nature, particularly with respect to the onus placed on the pilot to submit ETD/ETAs on the log sheet prior to flying and to then update these times post flight.

UKAB Note (4): Analysis of the Heathrow radar recording at 1145:30 shows a 7000 squawk, believed to be the DO28, at 1800 ft Mode C (2400 ft QNH 1035) tracking 085° 6·5 NM SE of Benson with a primary only return, believed to be the ML7, 2 NM to its E tracking 315°. The ML7 fades from radar 11 seconds later and pops up again at 1146:01 in the DO28's 1 o'clock range 0·6 NM on a converging track. The ML7 again fades from radar 8 seconds later 0·25 NM SE of the DO28 and intermittently appears at 1146:17, 0·25 NM behind the DO28. The encounter, as described by the DO28 pilot, is not observed on radar.

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.

Some doubt was expressed by the Board initially whether the reported ac was the ML7. The discrepancy over the flying times recorded on the daily log sheet at White Waltham (WW) remained unresolved, but radar tracing by AIS Military showed the conflicting ac departing and returning from that airfield. Also, the DO28 pilot reported that the other ac appeared to be on a converging track of approx. 060° which did not correlate to the general W track of the WW traffic. However, that traffic had faded from radar during the critical period and may, for example, have manoeuvred round a ground feature before reappearing again behind the DO28. Whatever, the reporting pilot was clear that the other ac was a high wing type (Citabria/Maule) with radial stripes on the wing's upper surface; the ML7 was the only high wing ac reported to be airborne from WW at about the time of the incident. On the balance of probability, although it could not be said for sure, however, the ML7 was thought to be the reported ac and members made their findings on that basis. The Board was clear that the sudden appearance of the ML7 at a range of just 200 m, from out of the sun's glare and only 300 ft below, had been a late sighting by the DO28 pilot, who turned R to pass above and slightly behind. Whilst taking this action, the DO28 pilot did not observe any manoeuvring by the ML7 whose pilot reported not sighting the DO28. These points combined led the Board to conclude that the safety of the subject ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the DO28 pilot and a non-sighting by the ML7 pilot.

Degree of Risk: B

AIRPROX REPORT No 5/01

Date/Time: 11 Jan 1415

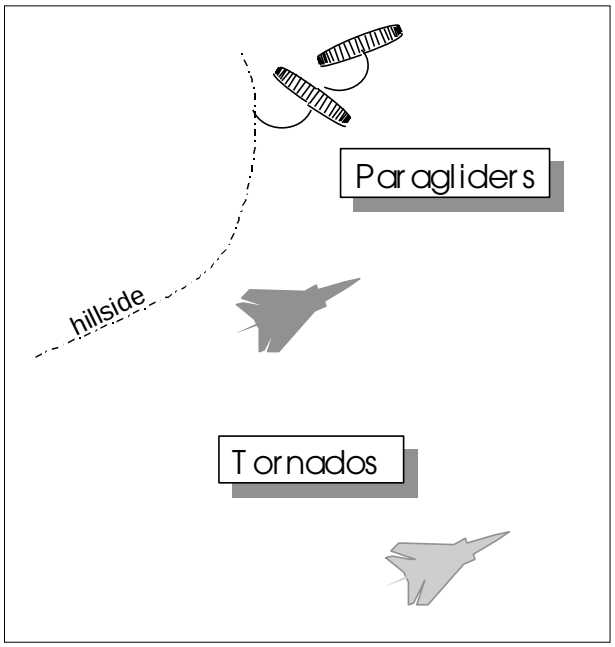
Position: 5638 N 0453 W (14 NM SE of Ft William

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

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	Paraglider x 2
Operator:	HQ STC	Civ Pte
Alt/FL:	290 ft (agl)	500/2000 ft (QNH)
Weather Visibility:	VMC CAVK 10 km+	VMC CLNC 10 km+

Reported Separation: 350-400m, 150 ft 200 m, 300 ft

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR PILOT reports heading 057° at 398 kt as No 2 of a 2 ac formation tracking along a valley at 290 ft agl. His leader was following the base of the valley and he was some 500 m to the left and higher up the side of the valley with the steep shoulder of a mountain to his left. As he came past the end of the shoulder his navigator saw 2 paragliders orbiting together close to the rock face. They passed some 350-400 m to the left and up to 150 ft above; since they were already abeam, no avoiding action was required. He could not have seen them earlier because of the intervening shoulder of rock.

THE PARAGLIDER PILOTS report orbiting adjacent to the ridge and would have been out of sight to the approaching jets. The Tornado closest to them was some way up from the valley floor and passed 200 m away and about 300 ft below as they turned away. They did not assess the risk of collision but observed that the incident generated some ill-informed comment in the press.

HQ STC comments that the position of the Tornado and the paragliders close to the mountainside meant that it was impossible for either to be in sight of the other until they were about 800 m apart and the sudden appearance of the 2 Tornados no doubt caused the paraglider pilots considerable alarm.

Whilst paragliders are clearly free to operate without restriction in this airspace, military crews can only avoid notified sites. Greater protection is therefore afforded to paragliders if they stay within the plotted boundaries. In this particular incident, the Tornado formation's avoidance of a plotted site on the other side of the valley, by 2 NM, brought the wingman closer to the activity.

BHPA comments that following a later accident involving these paraglider pilots, an inaccurate Police press release conjectured as to the cause; this highlights misconceptions about para- and hang glider operations which the BHPA and military LFS managers are constantly striving to correct.

A joint review of the mechanics of the system used to notify the military of mid-week para- and hang gliding activity is under way. The adjacent site depicted on the LFC on the other side of the valley is not one afforded compulsory avoidance status, had not been notified as being active, and could not be used on the day due to unfavourable wind. The paraglider pilots assessed a smaller separation distance than the Tornado crew, but did not specify

a risk of collision and accepted the presence of the Tornados as a function of cross country flying in an area known to be used for military low flying training.

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.

While the Tornados had flown closer than they would have wished to the paragliders, the geometry of the incident and the intervening hillside meant that they could not have conflicted directly; members agreed that there had been no possibility of the ac actually colliding. The Board concluded that the incident was no more than an encounter in the LFS.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Encounter in the LFS.

Degree of Risk: C

AIRPROX REPORT No 6/01

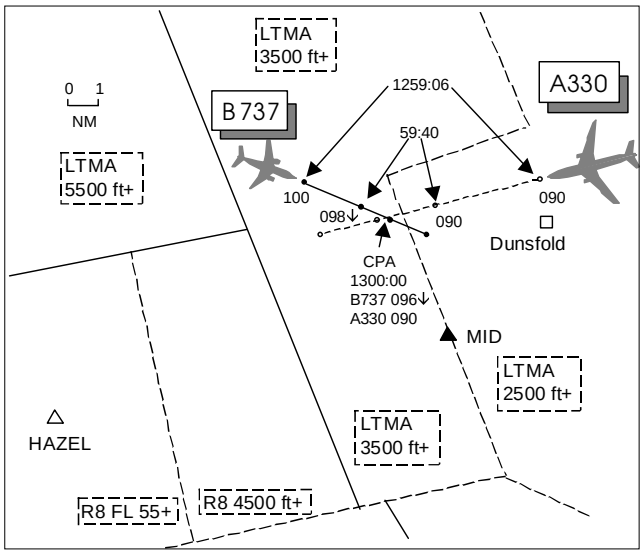
Date/Time: 16 Jan 1300

Position: 5107 N 0040 W (4 NM NW MID VOR)

Airspace: TMA (*Class:* A)

Reporter: LATCC TC

	First Aircraft	*Second Aircraft*
Type:	B737	A330-200
Operator:	CAT	CAT
Alt/FL:	↓FL 90	FL 90
Weather	NK	VMC CLOC
Visibility:	NK	GOOD
Reported Separation:	NK	800 ft V 0.5 NM H
Recorded Separation:		600 ft V 0·3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC TC WILLO SECTOR CONTROLLER reports he descended the B737 to FL 100 inbound to Gatwick having agreed coordination with the Ockham SC who was climbing the A330 to FL 90. He then descended the B737 to FL 90 prematurely and this, coupled with the speed of the B737, resulted in an erosion of standard separation against the A330.

THE B737 PILOT reports that he remembered nothing of the incident during the flight; nothing was seen nor said by ATC. He was unable to add anything to the investigation.

THE A330 PILOT reports departing Gatwick RW08 on a non standard "straight ahead to 3.5 NM DME then a L turn heading 265°". He was given further climb on that heading with no ATC speed restriction so he accelerated on completion of the turn. The weather was good, flying clear of cloud in excellent

visibility. On approaching his cleared level, he requested further climb but ATC instructed him to "maintain level" owing to crossing traffic in his 1-2 o'clock, 1000 ft above. He saw the B737 at range 5 NM on TCAS and acquired it visually at 4 NM as he levelled off. He was then surprised to see the TCAS altitude difference reduce which resulted in a TCAS TA, "traffic" but he did not think this unusual when flying at high speed or during high climb rates. The traffic passed over and above; the minimum separation was assessed at 0·5 NM horizontally and 800 ft vertically. He did not consider there was a risk of collision as he had the other ac in sight, but he was surprised that the other ac had started its descent early.

ATSI reports that the controller considered that both the workload and traffic loading were light to moderate at the time of the Airprox. However, he commented that owing to working duties as a temporary Group Supervisor, he had only carried out 5 controlling duties on the South Bank between October 2000 and the Airprox on the 16th Jan 2001. Nevertheless, he did not consider that this had affected his competence or was a contributory factor to the Airprox.

The A330 was outbound from Gatwick to Orlando under the control of the TC Ockham Sector Controller (SC), having established contact at 1253:20. It was climbed progressively to FL 90, a level agreed between the Ockham and WILLO SCs, and placed on a radar heading of 255°. The pilot reported reaching FL 90 at 1258:20.

The B737 was inbound to Gatwick from Dublin and established contact with the WILLO SC at 1254:20, when in the vicinity of WOD, descending to FL 110 and on a radar heading of 120°. In accordance with the co-ordination agreed earlier, the WILLO SC would descend the B737 to FL 100, and further once the pass had been achieved, against the outbound A330, which was climbing to FL 90.

At 1255:10, the WILLO SC instructed the B737 pilot to descend to FL 100 and, 30 seconds later, to reduce speed to 220 kt. The reason for the speed reduction was to position the B737 behind two other ac inbound to Gatwick.

At 1259:20, the WILLO SC instructed the 737 to descend to FL 90, the release level agreed with Gatwick. At that time the A330 was still maintaining FL 90, 5·6 NM E of the B737 on a converging heading.

The WILLO SC stated initially that he believed the ac had passed when he issued the descent instruction to the B737 and that the Airprox was caused by the prompt and expeditious descent of the B737, which had been facilitated by the reduction in speed to 220 kt. However, when he was shown the radar pictures, he accepted that his initial explanation was not valid. He recalled seeing some "garbling" of SSR labels, which could have been those of the B737 and another Gatwick inbound. Examination of recorded radar pictures indicated that the other ac could have been one just to the N of the B737. The WILLO SC thought that he may have perceived, erroneously, this to be the B737 and the A330 passing each other. At 1259:40, when the Mode C readout on the B737 indicated FL 98, the crew was instructed to contact Gatwick Director; the A330 was still converging 2·4 NM E of the B737.

UKAB Note: The CPA occurred at 1300:00 after the subject ac had crossed; the B737 was 0·3 NM E of the A330, 600 ft above, and descending.

At 1300:05, the Short Term Conflict Alert (STCA) triggered 'red' as the B737 descended through FL 95. By the time that the B737 crew had established contact with the Gatwick Director, at 1300:10, the two ac had passed and separation was increasing. It was, therefore, too late for the Gatwick Director to take any appropriate action. The Ockham SC, who was controlling the A330, stated that he had not taken any action as the "garbling" of labels prevented him seeing the actual level of the B737. He remained of the opinion that the B737 would be maintaining FL 100 until it had passed the outbound.

Neither traffic information nor avoiding action were passed to the B737 crew by the WILLO SC as he remained unaware of his error, and was under the impression that the B737 had only commenced its descent once the two ac had passed. Because of his mistaken beliefs that the subject ac had passed and the B737 had descended expeditiously owing to its speed reduction, had the B737 been on his frequency when the STCA activated, the WILLO SC would not have passed traffic information.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the A330 pilot, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Board members were surprised that the WILLO SC had descended the B737 into conflict with the A330 after having agreed co-ordination with the TC OCKHAM SC. ATSI confirmed that the WILLO SC had been convinced that the subject ac had passed each other but was in disbelief after he had been shown radar pictures of the incident. He had seen garbling of SSR labels, which he had erroneously perceived to be the subject ac crossing, and had convinced himself that the agreed co-ordination had been complied with. Looking for possible reasons behind the mistake, members wondered whether 5 controlling duties within 2·5 months on the S Bank Sectors may have affected his performance. However, during this period, the ATCO may have, apart from working as a Group Supervisor, carried out OJTI (mentor) duties as well as SC duties on other sectors. Moreover, the WILLO SC had not considered ATC currency to be a factor in this incident. Similarly, military ATCO members commented that their Supervisors also could encounter problems maintaining currency at control positions whilst they carried out their supervisory duties. Taking these points into account, the Board were unable to identify the root cause for certain, but on the balance of probability thought that the SC had perceived the subject ac had crossed by seeing some 'garbling' of SSR labels before issuing the descent clearance that led to the Airprox.

Pilot members commented on an apparent misapprehension by the WILLO SC which might extend further within ATCO fraternity with respect to ac speed versus rate of descent (ROD) topic. The WILLO SC had thought that reducing the speed of the B737 had allowed the pilot to increase the ROD whereas the reverse was true.

In assessing the risk, whilst no avoiding action was passed by either controller during the conflict, the A330 pilot had been step climbed and levelled off 1000 ft below the crossing B737, on which he was passed traffic information at a range of 10 NM. The A330 crew had seen the B737 on TCAS at 5 NM and then visually from 4 NM and had maintained contact throughout the encounter whilst receiving a TA alert as the separation eroded. This led the Board to conclude that, as the A330 crew were always in a position to avoid the B737, there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The WILLO SC descended the B737 into conflict with the A330.

Degree of Risk: C

AIRPROX REPORT No 7/01

Date/Time: 17 Jan 1253

Position: 5221 N 0032 E (3NM N of Bedford)

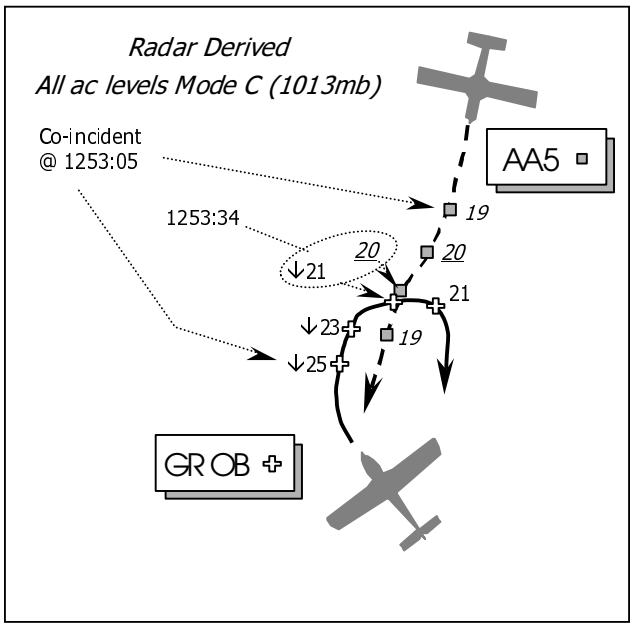
Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	GROB Tutor	AA5
Operator:	HQ PTC	Civ Pte
Alt/FL:	2500 ft ↓ (RPS 1014 mb)	2400 ft (QNH 1014 mb)
Weather	VMC HAZE	VMC HAZE
Visibility:	5 km	2 – 5 km

Reported Separation:

Nil H, 50-100 ft V not seen

Recorded Separation: Contacts merged 100 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GROB TUTOR PILOT, a QFI, reports conducting an instructional sortie with a student who was occupying the RHD seat. The ac colour scheme is white with a blue flash, HISLs were on and a squawk of 7000 selected with Mode C, whilst operating under a FIS from Wyton TOWER.

During a practice forced landing, he thought about 3 NM NE of Bedford, in a R turn through 100°, descending through 2500 ft RPS (1014 mb) at 80 kt, the student pilot suddenly stopped the turn and reported to him that another ac had just passed beneath their Grob. He looked in the direction indicated by the student, but saw nothing initially. The other ac then appeared from behind the student, about 150-200 ft away opening straight and level after it had directly underflown his ac by about 50 – 100 ft. No indications of sighting the Grob were apparent from the pilot of the other ac, so a report was made to Wittering on RT. He assessed the risk as "high".

THE AA5 PILOT reports that the ac has a red/white livery; HISLs and rotating anti-collision beacon were on whilst inbound to Cranfield VFR, under a RAS he thought, from Cottesmore ZONE on 130·20MHz, squawking A7000 with Mode C. He was flying level at 2500 ft QNH, (he thought 1014mb), and heading 210° at 100 kt. There was no cloud, the visibility was about 3 - 5000 m in haze, reduced down to about 2000 m whilst flying into sun but he did not see the Grob at all. He was accompanied by the ac owner/operator and they were both looking out all the time, he added that he was shocked that they had seen nothing of the other ac and he will endeavour to effect a more vigilant lookout in future.

MIL ATC OPS reports that the pilot of the Grob Tutor free-called Wittering DIRECTOR (DIR) on 388·52 MHz and at 1258:33, reported an Airprox. The Grob pilot reported his position to DIR and requested details on the other ac, with which he was still visual 3 miles ahead. DIR suggested that the Grob pilot call Cottesmore ZONE on 130·2 MHz for further information, which was acknowledged. ZONE suggested that the other ac could have been an AA5, whose pilot had been provided with an ATS by ZONE about 10 min before, but had subsequently terminated service and switched to an en route frequency. ZONE passed brief details of the AA5, including a contact number for Cranfield, before the Tutor pilot also switched frequency.

The AA5 pilot had been transiting Cranfield - Fenland and back to Cranfield at FL 40 whilst receiving a limited RIS from ZONE. The AA5 pilot had conducted some general handling (including

a PFL) during the transit and had received traffic information on ac in his immediate vicinity. The AA5 pilot left ZONE's frequency at 1251:28, about 2 min 6 sec before the Airprox occurred.

UKAB Note: The LATCC Debden radar recording reveals that this Airprox occurred broadly as described by the reporting pilot about 3 NM N of Bedford. The AA5 is shown tracking SSW and indicating 1900/2000 ft Mode C (1013 mb). The Grob is shown turning R through E and overflew the AA5 just after 1253:34; the contacts merge with the Grob indicating 2100 ft Mode C (1013 mb), 100 ft above the AA5 indicating 2000 ft Mode C.

HQ PTC comments that regrettably, this would appear to be another example of inadequate lookout. It is all too easy for instructors to become absorbed in teaching to the exclusion of lookout, whereas they should be particularly vigilant in case their students' lookout is not all it should be. PFLs can cause particular problems, since the cockpit workload tends to peak when the ac is turning and descending slowly through the 2 – 1000 ft height band, which is arguably the area of greatest risk of confliction with other airspace users. HQ EFT have issued a reminder to all of their QFIs on the need for good lookout 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 a report from the appropriate ATC authority.

The AA5 pilot thought he was receiving a RAS from Cottesmore ZONE at the time of the Airprox, but it was evident that he had left the ZONE frequency some minutes before the Airprox occurred and had switched, the Board was advised, to Cranfield. Clearly, the AA5 pilot should have given way under the rules of the air - if he had seen the Grob. In the event, deprived of any advance warning of the presence of the Grob from a radar equipped ATSU, the AA5 pilot directly underflew the Grob without spotting it. Similarly, the Grob crew had not seen the AA5 at all until it had underflown their ac. Although it appeared odd to some pilot members that the student Grob pilot was occupying the RHS, it was explained that this is usual because of the ac's instrument layout. Whilst engrossed in the PFL and turning R the AA5 would have quickly disappeared from the student's view, but members agreed that the QFI might have been able to spot it earlier. The Board agreed wholeheartedly with HQ PTC's comments and here was a salutary lesson for instructors on the dangers of becoming too engrossed monitoring the student to the detriment of all-round lookout. Members concluded unanimously that the cause of this Airprox was a non-sighting by the AA5 pilot and effectively a non-sighting by the Grob crew.

Turning to risk, as neither the AA5 pilot nor his companion had seen the Grob at all and the Grob crew only saw the AA5 after the event, none of the pilots was able to effect the outcome of this extremely close encounter. The radar recording revealed that barely 100 ft separated the two ac when the contacts merged and in accord with the Grob QFI's report. This was purely fortuitous and led the members to agree unanimously that an actual risk of collision had existed during this occurrence.

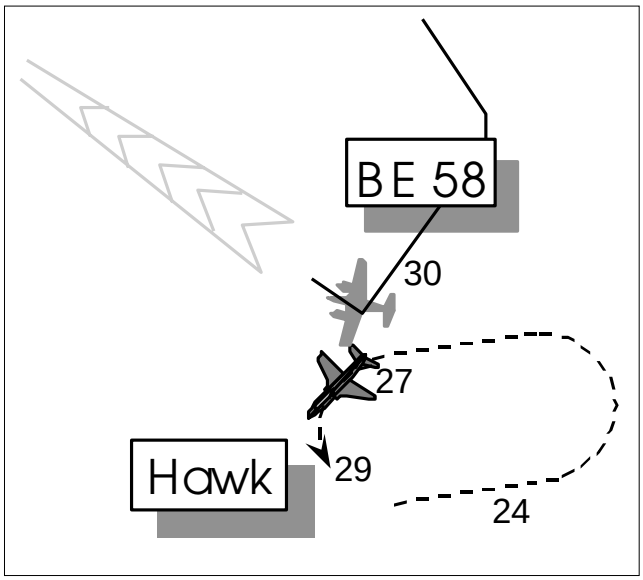
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the AA5 pilot and effectively a non-sighting by the Grob crew.

Degree of Risk: A.

AIRPROX REPORT No 8/01

Date/Time:	24 Jan 1512	
Position:	5525 N 0418 W (11 NM SE of Prestwick)	
Airspace:	FIR	(*Class:* G)
Reporter:	Prestwick APR	
	First Aircraft	*Second Aircraft*
Type:	Beech 58	Hawk
Operator:	Civ Pte	HQ STC
Alt/FL:	3000 ft (QNH 981 mb)	2-3000 ft (RPS)
Weather	IMC CLBC	VMC NK
Visibility:	10 km	NK
Reported Separation:	2·5 NM	NK
Recorded Separation:	1 NM, 300 ft	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PRESTWICK APPROACH RADAR CONTROLLER (APR) reports that the Beech 58 was being vectored at 3000 ft for an ILS to RW 31, under a RAS. On base leg (RH) a 7001 squawk was seen in the vicinity and traffic information passed. Once the Beech was turned onto a closing heading the 7001 turned back towards it and climbed to the same indicated altitude. He again passed traffic information but the pilot did not see the other ac so he passed avoiding action. The 7001 passed 0·5 NM S of the Beech 58 and at this stage the pilot reported visual with a military jet.

THE BEECH 58 PILOT reports heading 300° at 120 kt under 'radar control' from Prestwick while carrying out a practice ILS to RW 31; he was IMC about 200 ft below cloud and the visibility was about 10 km but not in all directions. He was given traffic information about another ac and ultimately turned R off the localiser to avoid it. He saw the other ac afterwards when it appeared to be about 2·5 NM away. He did not know what the risk of collision was.

THE HAWK PILOT reports flying VFR on a LH E/W racetrack to the S of Cumnock at 2-3000 ft while waiting for some Harriers with whom he was operating. He did not see the Beech 58.

UKAB Note: ScACC radar recordings show the Beech 58 approaching the localiser at 3000 ft alt on a track of 210° while the Hawk had been flying a racetrack as described by its pilot, at altitudes between 2400 ft and 2900 ft for some minutes. The Beech 58's track points towards the start of the Hawk's turn from W onto E and at that point, as the Beech 58 turns NW onto the localiser, the Hawk passes 1 NM to the S, starting its L turn at 2700 ft, in a climb from 2400 ft to 2900 ft.

ATSI reports that the controller placed the ac under a RAS and vectored it towards the ILS for RW 31 at Prestwick. The controller called the traffic on several occasions and when it started to close on the Beech 58, he gave avoiding action and continued to pass traffic information. It would appear that the slow speed of the Baron and the higher speed of the Hawk made if difficult, if not impossible, to increase the separation by the avoidance manoeuvres given.

HQ STC comments that the Hawk was operating VFR at medium level in Class G airspace and, although he did not see the Beech 58, there is very little to indicate in either captain's report that any

risk of collision existed. That said, the position of the Hawk's VMC hold was considerably less than ideal given the proximity to the Prestwick approach lane. At the very least, a courtesy call to Prestwick may have eased the situation.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

This incident provoked a lengthy discussion of the ATC aspects. Firstly, members agreed that this was Class G airspace in which the Hawk or any other ac was entitled to operate and military ATC members, whose airfields were surrounded by GA and other military traffic not in communication with them, considered that the controller in providing a RAS, could and should have done more to resolve the confliction earlier. Whether or not the controller was aware that the Hawk was orbiting in a constant position, the point was that he had no way of knowing if it would either stay there or depart in any direction. Given that he should have been aiming to provide 5 NM separation, and eventually gave the BE58 an orbit, some members considered that the Prestwick controller should have given advisory avoiding action earlier by turning the BE58 towards the airfield (glidepath intercept is given as 7·4 NM at 2800 ft) or orbited the ac earlier.

But there was more to it than that. When the RT and radar recordings were replayed together, they showed that as soon as the Hawk appeared, the controller had passed traffic information and had established that the BE58 pilot was VMC. Although the pilot gave his conditions in his report as IMC (as technically they may have been) he advised the controller on RT on 3 occasions that he was VMC. When the Hawk started its turn from its easterly track the controller then gave further traffic information, established that the pilot was VMC but could not see the Hawk, and turned the BE58 immediately onto 270°. However the ac did not take this turn and as the Hawk steadied on a westerly track the controller next turned the BE58 onto 310° and continued to advise its pilot, again establishing that he was VMC. Eventually the pilot reported seeing the traffic as it passed abeam on the radar recording. Members concluded that the controller was put in a tricky position (a BE58 cannot outrun a Hawk) and had done what might be expected. They thought albeit with hindsight that he might have alleviated his position, having established that the BE58 pilot was VMC, by offering him a RIS if unable to fulfil the requirements of a RAS. This last point was made, not as a criticism, but more as a consideration to adopt in any future like circumstances.

The Board concluded that the Hawk had passed a reasonable distance from the BE58, for VFR operations, and that there had in the end been no risk of the ac colliding in this incident which they agreed was a confliction of flightpaths on the Prestwick RW 31 extended centreline.

Members agreed with HQ STC that the Hawk pilot had not chosen a sensible position/height for his hold with regard to the Prestwick instrument approach, the unrestricted use of which in IMC he was effectively blocking. A call to Prestwick while he was waiting, explaining what he was doing, would have enabled the problem to be resolved, and the Board agreed that this positioning and lack of a call were adverse factors in the Airprox.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths on the Prestwick RW 31 extended centreline.

Degree of Risk: C

AIRPROX REPORT No 9/01

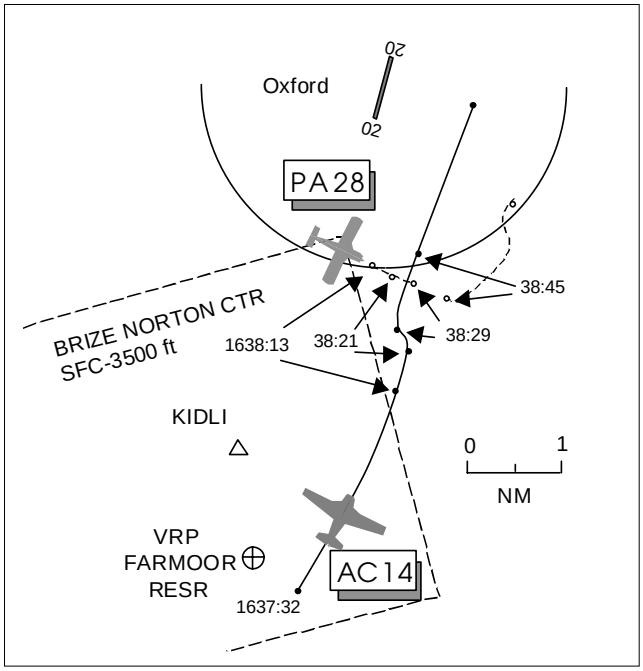
Date/Time: 24 Jan 1639

Position: 5148 N 0118 W (2·5 NM S of Oxford Airport – elev. 270 ft)

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

	Reporting Aircraft	*Reported Aircraft*
Type:	PA28	AC14
Operator:	Civ Trg	Civ Pte
Alt/FL:	1500 ft (QNH 989 mb)	1500 ft (QNH NK mb)
Weather Visibility:	VMC CLBC >10 km	VMC CBLC GOOD
Reported Separation:	0 V 500 ft H/300 ft V 800 ft H	

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28 PILOT reports flying a dual circuit training detail at Oxford RW 20 and he was receiving an ADC service from Oxford TOWER on 118·87 MHz. The visibility was >10 km in VMC and the ac was coloured white/orange and his strobe lights were on; the transponder was switched off. After having completed 4 successful circuits, he turned crosswind onto heading 110° at 80-100 kt and levelled off at 1500 ft QNH 989 mb (he thought) on the commencement of his final circuit. The student immediately alerted him to a low wing ac coloured blue/white with strobe lights on, extremely close (less than 500 ft) in his 5 o'clock position which was about to pass behind them at the same level. He assessed the risk of collision as high and stated that he had not heard any RT calls from the other ac's pilot until it passed behind.

UKAB Note (1): The Oxford 1650 METAR was SW 10-15 KT 9999 RA SCT3000 08/02 QNH 0993 QFE 0983. Strong Wind and Thunderstorm Warnings were in force and the wind direction indicator was unserviceable.

THE AC14 PILOT reports flying solo inbound to Oxford from Wroughton VFR squawking 7000 with Mode C. The visibility was good in VMC and the ac was coloured white/blue with strobe lights on. He initially routed through the Brize Norton CTR via Farmoor Reservoir whilst under a RIS and was cleared by Brize, who co-ordinated with Oxford, to position for an expected downwind join for RW 20 LH. He descended to 1500 ft QNH at a range of 6-7 NM from Oxford in an early downwind position and passed close to Farmoor Reservoir which is 5NM from the aerodrome. He contacted Oxford TOWER, not APPROACH, at their request and he was cleared to join the circuit downwind LH for RW 20. He reported at range 6 NM and was passed TI; his position in traffic was No 3 with 1 ac on final, 2 ac late downwind (2 ac in formation) and one ac departing; he looked for the traffic and saw the ac ahead of him in the circuit. When about 1·5 NM from the 'downwind' position heading 020° at 120 kt and whilst completing his landing checks, he saw an ac in his 10 o'clock, heading approx. 110°, at least 2000 ft away on a crossing track, approx. 250 ft above (1750 ft QNH). He monitored the ac's track for 15-20 seconds to "fathom out" its pilot's intentions. As the ac's heading and level did not change, he took avoiding action by turning L and descending in order to pass behind and below. This manoeuvre was executed without panic as it was his intention merely to adjust his altitude and heading early enough so that the situation did not develop where abrupt action would be required.

He estimated that he passed no closer than 800 ft laterally and 300 ft below the PA28 whilst still flying on a good downwind track albeit slightly closer to the RW than normal. At this point, when he was about to report downwind, the PA28's pilot reported an Airprox; the PA28 was now positioned in his 3 o'clock still heading 110°.

He believed there had been no risk of collision as he had seen the other ac from a long way out and thought the other pilot had not seen him already established on the downwind leg until very late. He also stated that with Oxford being his 'home' airfield, he was familiar with its operations and procedures.

ATSI reports that the Oxford ADC described his workload level and traffic loading as light at the time of the incident. The Airprox occurred within the Oxford ATZ, which is categorised as Class G Airspace.

The PA28 had been operating in the LH circuit, for RW 20, for approx. twenty minutes when, at 1634, it reported on final approach and was cleared for a touch and go as requested. Shortly afterwards, two ac, another PA28 and a CAP 10, using local operator callsigns, reported joining deadside as a formation. The ADC said that he could see the two ac at the northern edge of the airfield and commented that they appeared to be in very close formation. He added that, in his experience, it is very unusual for formation flying to take place at Oxford. He instructed them to report downwind and passed TI on the PA28 i.e. "*.... there's just one in the circuit that's just getting airborne staying in the circuit".* He did not pass information, concerning these ac, to the pilot of the PA28, as he did not consider it necessary because of their respective relative positions in the circuit.

Prior to the AC14 contacting Oxford Tower, at 1636, the flight had been co-ordinated between Brize Norton ATC and Oxford Approach. It was agreed, with the ADC's approval, for the AC14 to make a non-standard join directly downwind LH for RW 20. Consequently, when the pilot established communication on the ADC frequency, he reported at Farmoor Reservoir, which is situated approximately 5 NM S of Oxford Airport, with a clearance relayed by Brize Norton to join downwind LH for RW 20. The ADC passed the AC14 TI on the PA28 in the circuit that was just airborne and on two others which were just joining at the northern edge of the aerodrome and would be turning downwind shortly (the formation). This information was acknowledged by the pilot, who commented, "*I'll keep a good lookout*".

UKAB Note (2): Oxford ADC RT transcript shows TI passed to AC14 at 1636:30 *"AC14 c/s, there's one P A Twentyeight dedicated the circuit that's just got airborne, two others are just joining, they're just to the Northern edge of the Aerodrome at this time they'll be turning downwind very shortly".*

The ADC explained that he offered the formation flight an early turn downwind in a position where, if the pilots had accepted it, he would have been able to keep them in visual contact from the VCR. In the event, the pilots continued on heading for a few more seconds before turning downwind overhead the VCR, momentarily out of sight of the ADC.

The AC14 reported visual with the airfield at 1637 and was instructed to report downwind LH. TI was updated, with the formation flight "late" downwind and the PA28 about to go crosswind. The pilot acknowledged the call and stated he would report abeam the Tower. No TI was passed to the pilot of the PA28 on the AC14 joining downwind.

As the formation flight commenced the downwind leg, the ac split, in order to carry out individual landings. After the first of these was cleared to land, the pilot of the PA28 reported that he would be filing an Airprox on an ac just about to go overhead the Tower. The pilot of the AC14 reported that he had been visual with the traffic a long way out and had turned L to avoid it. The PA28 was, subsequently, instructed to report final number two to the AC14.

From the time the formation flight made its initial call on his frequency, the ADC said that he concentrated almost 100% of his attention on the formation. Because, in his estimation, they were so close, he thought that the potential existed for a mid-air collision. Consequently, he wanted to ensure that if this was the case, he wanted to be in a position to take appropriate action straight away. Therefore, he admitted, he did not monitor the progress of the AC14 joining downwind against the

PA28 in the circuit. He last saw the PA28 as it completed its touch and go. Normally, he added, in the circumstances of this traffic scenario, he would have passed TI, not only to the pilot of the AC14 but also to the PA28's pilot. He considered that the distraction posed by the formation flight precluded him passing complete TI on this occasion. In any case, he believed that the AC14 would be ahead of the PA28 and because of the TI he had provided its pilot, he assumed the latter would integrate himself safely into the circuit. Additionally, he reasoned that, as the PA28 was on the frequency when the AC14 was passed its joining details and was given TI about the circuit traffic, its pilot would have been aware that the AC14 was about to join downwind and would have been keeping a lookout for it.

In response to a previous incident at Oxford Airport, a Temporary Operating Instruction was issued, valid from 13 July 2000, titled "ATC Procedures". Part of this instruction included the following: "Good look out is essential in determining the traffic order and ATCOs **must** continually assess the situation especially when higher performance ac are likely to overtake/pass slower ac. The pilot must be in no doubt as to his/her traffic order in the circuit sequence".

The MATS Part 1, Page 2-1 states that: "Aerodrome control is responsible for issuing information and instructions to ac under its control to achieve a safe, orderly and expeditious flow of air traffic and to assist pilots in preventing collisions between: a) ac flying in, and in the vicinity of, the aerodrome traffic zone". The ADC did not completely fulfil his responsibilities in this respect.

UKAB Note (3): Met Office archive data shows the 2000 ft wind was 210-240/25-30 kt, 5000 ft wind 35-40 kt.

UKAB Note (4): Analysis of the Clee Hill radar at 1637:32 shows the AC14 squawking 7000 with no Mode C passing SE abeam Farmoor Reservoir tracking 030°. At 1638:04 the AC14 is seen to commence a 20° L turn. 9 seconds later a primary only return appears, believed to be the PA28, 2 NM S of Oxford Airport tracking 110° with the AC14 in his 2 o'clock range 1·3 NM. At 1638:21 the AC14 is seen to turn L a further 40° as the PA28 continues on its 110° track 0·8 NM to its NNW. The PA28 is last seen at 1638:29, before fading from radar, 0·53 NM NNE of the AC14 which then turns R back onto a 020° track. The CPA is therefore not seen on radar as the AC14 passes behind the PA28 which reappears on radar at 1638:45, 0·55 NM SE of the AC14.

UKAB Note (5): The groundspeed of the AC14 during the encounter was measured as 170 kt.

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 were concerned that the AC14 had attempted to join the visual cct at Oxford at a speed which was perhaps higher than necessary, not conducive to the situation, and was not helped by the strong tail wind. The circuit was active and the onus was on the AC14 pilot to integrate safely, giving way to the traffic already established in the circuit pattern. With his high speed differential, the pilot denied himself the option of 'slotting in' behind traffic and was faced with manoeuvring behind the crosswind PA28. Members felt that the AC14 pilot appeared surprised when he visually acquired the PA28 in his 10 o'clock, as he monitored its track to 'fathom out' its intentions. However, he had been passed TI by the ADC twice, firstly on initial contact when the PA28 was just airborne then again when he reported 'visual' the aerodrome and the PA28 was turning crosswind. Members opined that he had not assimilated the cct traffic to the TI that he had been passed and which he had acknowledged. The PA28 instructor had, for whatever reason, not maintained a close listening watch to the frequency as he had not heard any calls from the joining AC14. It was noted too that the ADC had not passed any TI to the PA28 crew on the AC14 joining downwind, assuming instead that the Oxford based instructor, used to this busy cct environment, would have heard the RT exchanges and would have been looking out for the traffic from his R. Such an assumption was ill founded and TI ought to have been passed. The Board was unanimous in agreeing that the AC14 pilot had not integrated into the cct safely but the situation had been

compounded by the lack of TI to the PA28 pilot.

Looking at the risk element, the AC14 pilot had seen the PA28 early enough to watch its flight path and then turn L to pass behind. He had maintained visual contact with the other ac whilst manoeuvring and was always in a position to adjust his flight path to pass clear. The Board concluded that these factors had removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The AC14 pilot did not integrate safely into the cct compounded by lack of TI to the PA28 pilot.

Degree of Risk: C

AIRPROX REPORT No 10/01

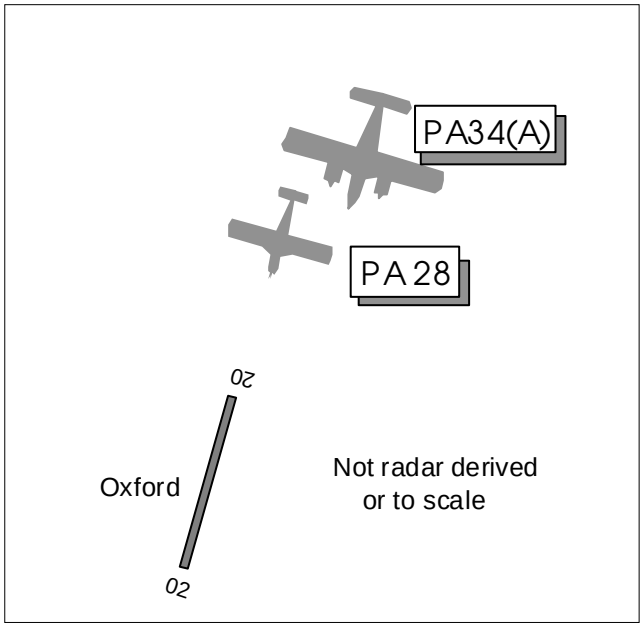
Date/Time: 24 Jan 1452

Position: 5152N 0118 W (2 NM NNE Oxford Airport – elev. 270 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA28	PA34(A)
Operator:	Civ Trg	Civ Trg
Alt/FL:	900 ft ↓ (QNH 993 mb)	1500 ft (QNH 993 mb)
Weather Visibility:	VMC CBLC >10 km	VMC CBLC 8 km
Reported Separation:	400 ft V 0 H	400 ft V 0 H

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28 PILOT reports flying a dual training sortie from Oxford and he was receiving an ADC service from Oxford TOWER on 118·87 MHz. The visibility was >10 km below cloud in VMC and his transponder was switched off. The ac was coloured white/blue/yellow and its strobe lights were switched on. On final approach to RW 20, whilst descending at 80 kt through 900 ft QNH 993 mb, he initiated a go around, as his flight path was baulked by another ac, and climbed on the RW centreline. After passing 1100 ft QNH, his student in the LH seat, alerted him to a twin engined ac, a PA34 in their 8 o'clock high which had also gone around but from a base leg position. The PA34 flew 400 ft overhead their ac so the instructor stopped the climb to avoid an imminent collision; he assessed the risk as high.

UKAB Note (1): There is no dead-side at Oxford.

THE PA34(A) PILOT reports flying dual training sortie from Oxford and he was also receiving an ADC service from Oxford TOWER on 118·87 MHz. The visibility was 8 km, 2000 ft below cloud in VMC and his transponder was set to standby. The ac was coloured white/orange and its strobe lights were switched on. At the end of the downwind leg, it was clear that, owing to congestion ahead, he would be unable to complete the circuit for a planned touch and go. He elected to go around

early and informed ATC "*c/s, going around from base leg, maintaining circuit height*". The student climbed 100 ft to regain 1500 ft QNH circuit altitude and executed a L turn onto the runway heading; the PA28 was in sight ahead in his 1 o'clock, >500 ft below almost underneath him.

He requested from ATC an early turn downwind to increase lateral separation as the PA28 had also reported executing a missed approach. This clearance was delayed and he lost sight of the PA28 and thought he may have overflown him by about 400 ft; his request was then granted and he promptly turned L onto the downwind leg. He was satisfied that the height separation which existed when the PA28 commenced his go around combined with his overtaking speed, >35 kt, would maintain a safe, but less than ideal, distance until better lateral separation could be obtained by turning downwind. He assessed the risk of collision as low.

ATSI reports that the ADC described his workload level as medium - high at the time of the incident. The weather was reported as SW wind of 15-25 kt, visibility 10 km and the cloud was scattered at 3100 ft.

The PA34 (A) was cleared for take-off from RW 20 at 1446 to join the LH circuit. Shortly afterwards, the PA28 reported rejoining crosswind for RW 20 and, approx. one minute later, another ac, PA34 (B) also reported on a crosswind join for RW 20, at a DME range of 2 NM. Both pilots had requested a crosswind join on the Approach frequency and this had been approved, following co-ordination between APP and ADC. The ADC could not recollect whether the ac's respective ranges were passed to him at the time. The APPROACH RT transcript reveals that the PA28 reported at 4 NM DME at 1445, shortly after the PA34 (B) had reported at 7.5 NM DME to the N. The pilot of PA34 (B) was informed of the PA28 joining crosswind ahead. Both flights contacted the Tower frequency in the correct sequence. The ADC explained that, in his experience, ac joining crosswind at Oxford could approach anywhere in a wide sweep from N to W and did not tend to join in a recognised crosswind position. He mentioned that he was able to see the PA28 some distance from the airfield but was rather surprised that he did not see PA34 (B). He added that he did not register the fact that PA34 (B)'s pilot reported at 2 NM DME. Both ac were instructed to report LH downwind RW 20 and were informed of three ac in the circuit and two to depart.

The PA28 pilot reported downwind at 1449 and was instructed to report final number three to follow the twin that was downwind, another ac, PA34 (C). The number one ac was, by this time, on final approach. Approx. one minute later the ADC received a call from an ac reporting downwind. Because he was expecting a call from the PA34 (A), which he realised was in the downwind position, he responded to that ac, using PA34 (A)'s callsign, advising the pilot that he was number three and to follow the PA28 downwind. However, the RT recording shows that the transmission, which appears rather indistinct, was made by the PA34 (B) pilot. One clue to the identity of the source was the significant difference in accents between the pilots of PA34 (A) and PA34 (B). However, the ADC said that he had no recollection of any such variance. Neither the pilot of PA34 (B) or PA34 (A) responded to the ADC transmission. In fact, the PA34 (A) pilot reported almost immediately that he was downwind for a touch and go. The ADC repeated the previous message, assuming that the pilot had missed his first reply. He believed that the circuit order was now: Number 1 - the PA34 (C); number 2 - the PA28; number 3 - the PA34 (A). The ADC commented that he could not see the PA34 (B), even though he continued to carry out an all-round lookout.

The next call from the PA34 (B) was its pilot reporting on base leg. As soon as this call was acknowledged, the pilot of the PA28 also stated that he was on base leg. Before the ADC could respond to this transmission, the PA34 (A) pilot reported going around from base leg. The ADC said that he expected PA34 (A) would remain on the "live" side of the RW during its go-around but, subsequently, he noticed the ac flying towards the final approach area at circuit height. When the PA34 (B) pilot reported on final, the ADC explained that he could see two twin ac on approach i.e. PA34 (C) followed by PA34 (B). He did not acquire the PA28 visually and communicated this information to its pilot when he called turning finals in "the correct position". On receipt of this message the PA28 pilot reported going around and was instructed to report again downwind.

The ADC said that he did acquire the PA28 when it commenced its go-around and did not consider that there would be a potential confliction between this ac and PA34 (A), especially as the latter was faster and, he assessed, ahead of the PA28. Therefore, he did not pass traffic information (TI) to either ac. The ADC stated that, subsequently, he lost sight of PA34 (A). Consequently, when the PA34 (A)'s pilot asked for an early turn it was refused as he was unsure of its position, relative to the PA28. As soon as he observed the PA34 (A) again, he approved an early turn as there were no flights to affect its turn. A short while later, the PA28 pilot announced his intention of filing an Airprox report. The ADC's initial reaction was that it was being filed against the PA34 (B), as he did not appreciate, at the time, that it was the PA34 (A) which had flown into close proximity. The pilot of the PA28 stated that his student alerted him to the presence of a twin ac above him, in his eight o'clock position. He stopped his climb at 1100 ft, with the PA34 (A) at circuit altitude of 1500 ft.

The ADC explained that he could not readily understand why he had not noticed PA34 (B) join the circuit and continue onto base leg. He could only surmise that the ac must have made a tight oval circuit, positioning overhead the VCR.

The MATS Part 1, Page 2-1, states that: "Aerodrome control is responsible for issuing information and instructions to ac under its control to achieve a safe, orderly and expeditious flow of air traffic and to assist pilots in preventing collisions between: a) ac flying in, and in the vicinity of, the aerodrome traffic zone". Clearly, the ADC did not completely fulfil this responsibility.

UKAB Note (2): Replay of the Clee Hill radar between 1450 and 1453 shows several ac in the Oxford circuit and surrounding area. Although a traffic sequence, as described by ATSI, can be seen, albeit intermittently, the incident can not be seen as ac on a base leg for RW 20 LH descend below radar cover.

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 discussion focused on the cycle of events that occurred within the cct. Members deduced that the orderly flow within the cct environs started to change with the joining of the PA28 and PA34 (B). PA34 (B) positioned crosswind following the PA28 but this was not observed by the ADC; PA34 (B) may have overflown the VCR on a tight visual pattern. Whatever, the PA34 (B) pilot's position report was mistakenly answered by the ADC with PA34 (A)'s c/s; the ADC had responded to an expectation - he knew PA34 (A) to be downwind – rather than to what was said. However, neither PA34 pilots (A) or (B) acknowledged or queried the ATC transmission and this lack of an appropriate response contributed to events that led to the Airprox. Subsequently, PA34 (A) pilot reported downwind and the ADC repeated his previous instruction in the belief that the pilot had missed his first reply. It only became obvious to the ADC that the cct order was not as he thought when the pilot of PA34 (B) reported on base leg, which he acknowledged, followed immediately by the PA28 pilot's base leg call. During this period, whilst the confused ADC was trying to match in his mind the cct order according to the RT calls, PA34 (A) commenced a go around, which was followed by PA34 (B)'s pilot reporting on final approach. The ADC saw PA34 (B) but not the PA28 when its pilot made his 'finals' report; on learning that the ADC could not 'place' him, the PA28 pilot decided to commence a missed approach. By this point, control of the cct had been lost.

Members made a number of critical observations. This was usually a busy cct in which ac used local RT c/s (prefix/number suffix), but the ADC should have, with the aid of the ATC circuit pin-board, been able to maintain control of the situation. However, PA34 (B) had surprisingly flown the visual cct without an acknowledged sequence/position order and had consequently positioned on base leg/final approach in confliction with the other cct traffic. Members opined therefore that the PA34 (B) pilot had not integrated safely into the cct and that the ADC had not exercised positive control of the traffic. Moreover, the pilot of PA34 (A) on his missed approach had not followed the stipulated local go-around procedure of easing L onto the 'live side' of the cct to maintain visual contact with traffic on final approach or the RW; this was the flight path that the ADC would reasonably have expected the

overshooting PA34 (A) to have flown. Instead, PA34 (A)'s pilot turned onto the RW C/L and, as the PA28 pilot commenced a go-around, lost sight of the PA28 as he overflew it. Finally, the ADC had not passed TI to either the PA34 (A) or the PA28 because he had assessed the PA34 (A) had been ahead of the PA28 and both ac were clear of each other.

As to risk, the PA28 crew became aware that a third PA34 was in their vicinity, which they could not see ahead but had heard on the RT. They saw it eventually whilst executing their go-around, as it overhauled them from their 8 o'clock position. This prompted them to level off 400 ft below the PA34 until it had passed. Since the PA28 pilot was then always in a position to avoid the conflicting ac, PA34 (A), the Board concluded this had removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

PA34 (B) did not integrate safely into the cct.

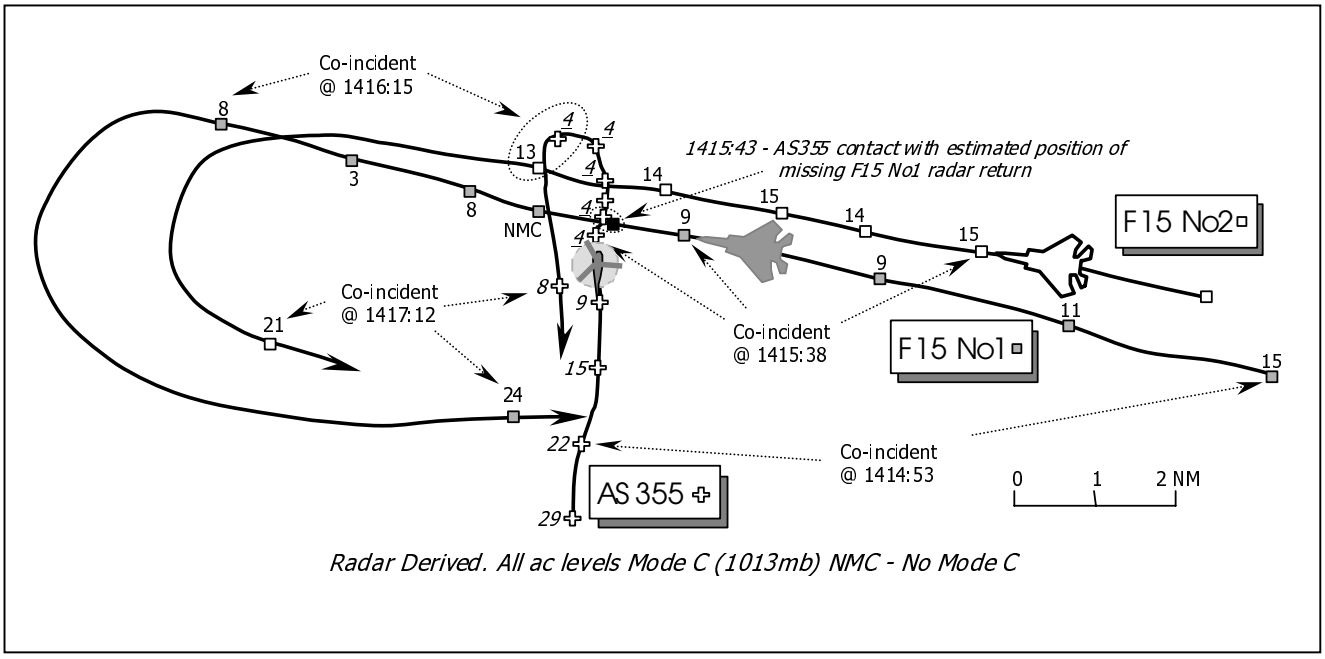
The Oxford ADC did not exercise positive control.

Lack of appropriate response by PA34 (A) and PA34 (B) pilots.

PA34 (A) did not follow the stipulated local go-around procedure.

Degree of Risk: C

AIRPROX REPORT No 11/01



Radar Derived. All ac levels Mode C (1013mb) NMC - No Mode C

Date/Time:	30 Jan 1416	
Position:	5232 N 0138 E (15 NM SE of Norwich)	
Airspace:	London FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	AS355	F15
Operator:	Civ Comm	Foreign Mil
Alt/FL:	↓ 500 ft (SAS 1013 mb)	↓ 500 ft (agl)
Weather Visibility:	VMC CLOC 6-8 km	VMC Not reported

Reported Separation Nil H, 2-300 ft V

Recorded Separation:

AS355 v F15 No1: not recorded.
AS355 v F15 No2: 0·3 NM H, 900 ft V.

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE AS355 TWIN SQUIRREL HELICOPTER PILOT, the PF, reports that his crew consisted of a co-pilot and flight test engineer. They were conducting a test flight to assess the handling qualities of the Twin Squirrel helicopter with a large survey camera slung underneath the fuselage. The helicopter's colour scheme is high-conspicuity black & silver with a white stripe; anti-collision beacons, navlights and HISLs were on and he was receiving a FIS from Norwich APPROACH, squawking A7000 with Mode C.

About 5 NM SW of Great Yarmouth, heading N at 140 kt at 3000 ft SAS (1013 mb) he dived to achieve Vne (never exceed speed). As they bottomed out at 500 ft, Norwich APPROACH alerted him to the presence of other traffic. One of two F15 jets passed from R – L "virtually directly overhead" his helicopter by about 2-300 ft. The jet was seen too late to take avoiding action for which there was no time, but he assessed the risk to be low. The test was abandoned when the jets were spotted.

He added that the workload was high for both himself and the PNF as the manoeuvre required very accurate flying and close attention to the ac instruments, whilst the PNF was noting and giving control displacement readings to the test engineer in the rear cabin. He admitted their lookout had been degraded, during the dive, but he did not believe the other pilot could have seen his helicopter; it was inconceivable that the F15 pilot would have flown so close if he had.

He added that the F15s reappeared 5 min later circling the helicopter.

THE F15E PILOT reports he was flying the No1 F15 leading a flight of 2 F15E ac conducting realistic surface attack training with simulated precision air to ground munitions to a bridge on the outskirts of Reedham SE of Norwich; his No2 was 4 NM in trail. Both ac are dark grey, HISLs are not fitted and they were squawking 3/A 7000 with Mode C. On their first pass at 450 Kt they were over the bridge at 1416 [UKAB Note (1): the time of the Airprox]; the run-in was at 1000 ft agl on a heading of 270° (M), with a descent to 500 ft agl within 2 NM of the target. On completion of the first pass, they made a L turn onto 090° climbing to 1600 ft agl to set up for a second practice delivery on the bridge. No other ac was seen on the first pass. He added that crew workload was high during the training sortie.

UKAB Note (2): The second pass over the target was at 1422, 6 min after the Airprox reported by the AS355 pilot. The F15 flight followed the same profile but on this occasion the No2 detected a helicopter, the AS355, 6 NM ahead at 2000 ft. The No1 acquired radar contact with the helicopter and flew over the target, followed by a climbing left-hand turn egress off-target as before. The No2 was in visual contact with the helicopter and told the No1 not to climb, who arrested his climb at 1600 ft agl, before descending back down to 1000 ft agl. The No2 then reported the traffic was "no factor", 1000 ft above them.

THE NORWICH APPROACH CONTROLLER (APR), situated at Coltishall, reports that he was providing a FIS to the AS355 helicopter crew, which was operating about 18 NM SE of Norwich. During a scan of his display he noted two fast-moving west bound contacts 4 NM in trail, E of the helicopter, but close to it and on a collision course. Traffic information was passed to the crew of the AS355, who advised that they had spotted the first ac passing close to them. He advised that the second jet was 3 NM in trail and the helicopter crew reported visual contact, both jets circled the helicopter before departing to the E. At 1423, the two contacts were noted returning again, so the helicopter crew was advised and they reported visual contact.

ATSI reports that the AS355 crew was in receipt of a FIS from Norwich APPROACH. In accordance with MATS Part 1, controllers, when providing a FIS will, subject to workload, provide pilots with information concerning collision hazards when self evident information from any source indicates that a risk of collision may exist.

The 2 F15s, who were not receiving an ATS from Norwich APPROACH, were seen on radar and traffic information was passed to the AS355 crew. This was at around the same time as they reported one F15 passing overhead and that an Airprox would be filed. The Norwich controller continued to provide a comprehensive FIS, passing further

traffic information when the pair of F15s returned.

UKAB Note (3): The LATCC Cromer radar recording shows the AS355 northbound, descending through 2200 ft Mode C (1013 mb) at 1414:53, as the flight of two F15 ac were conducting their first practice attack westbound. At 1415:38, F15 No1 is shown descending through 900 ft Mode C (1013 mb) with the No2 about 3·8 NM in trail, displaced slightly to the North and descending through 1500 ft, as the AS355 levels at 400 ft Mode C (1013 mb). The radar recording does not display the next radar return from F15 No1, (which is shown on the diagram in an estimated position from interpolation of preceding and succeeding returns) nor the Mode C on the next return. Therefore, the CPA between the No1 and the AS355 cannot be accurately measured. Nevertheless, by interpolation F15 No1 was probably at about 8-900 ft and in the order of 4-500 ft above the AS355 when it overflew the helicopter, in descent. F15 No2 passed 1300 ft in descent about 0·3 NM S of and 900 ft above the AS355, which was still flying level at 400 ft as the latter turned about onto S. The F15 flight continued with their practice attack and then turned about eastbound and climbed above 2000 ft (1013mb) as they flew off-target.

During the second practice attack, when the AS355 was seen by the F15 flight crews, the No1 indicated 1400 ft Mode C as it crossed from R – L 1 NM ahead of and 500 ft below the AS355 at 1422:53. The No2 indicated 1000 ft just before it turned, 900 ft below and 0·5 NM astern of the helicopter, when the latter indicated 1900 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 the appropriate ATC authority.

It was apparent that there had been two events here - the first observed by the AS355 pilot, with the helpful assistance of the Norwich APPROACH controller – the second observed by all crews involved. However, it was the first event that had been reported as an Airprox and although the second event could not be discounted entirely it is the first encounter that has been assessed on risk and cause. Some members wondered if the Twin Squirrel pilot was conducting this test flight under the most appropriate ATS. If a certain amount of 'heads-in' time was needed as the helicopter dived to achieve Vne (155 kt), members thought that a radar service might have provided more warning about other traffic operating in the FIR and might have been more appropriate to the task. However, the BHAB member explained that the pilot had liaised with Norwich ATC prior to the flight and a FIS was all that could be provided in the circumstances. Notwithstanding the FIS, APPROACH had passed traffic information promptly when he spotted the F15s on radar heading towards the helicopter; so in effect he had provided a RIS in all but title. This provided a vital 'heads-up' to the helicopter pilot but the Board concurred with him that this was at a very late stage – too late for positive avoiding action and was thus, effectively, a non-sighting of the No1 F15 jet. It was also apparent from the F15 pilot's account that neither of the fast-jet crews had spotted the AS355 at all on their first run-in to the 'target'. The Board determined, therefore, that this Airprox resulted from a non-sighting by the F15 crews, and effectively a non-sighting by the AS355 crew. It was also clear that the F15s had not circled the helicopter on the second occasion and were merely setting themselves up for a second pass over the 'target'. It was stressed there was never any intention to 'target' the AS355 at all – it just happened to be in the vicinity of their surface 'target'. This led to a wide-ranging discussion about the nature of the F15 crews' sortie and some members queried whether they should also have been communicating with an ATSU in the area. It was suggested that if they had been able to work Coltishall, whose Approach Control Room and facilities are used by Norwich APPROACH, traffic information might have been feasible before the Airprox occurred. However, the HQ 3 AF adviser commented that with only one UHF radio fitted in the F15 (required for intra-formation communication) an ATS from Coltishall was not a pragmatic option in this instance, but could have been useful. Several members thought that practise attacks should not have been conducted in the FIR close to North Denes, which was described by a helicopter pilot member as a very busy area for civil helicopter traffic. Moreover, there

was a strongly held view expressed quite forcibly by some that military jets should not be conducting such practice attacks in the 'Open FIR' at 450 kt. Some members considered that concentration on the tactical training aspects of the sortie to the detriment of the priority tasks of lookout and safe navigation at this speed was neither wise nor appropriate in this area where other airspace users were likely to be encountered legitimately proceeding about their activities at speeds below 250 kt. They contended that such simulated attacks involving high-energy manoeuvres should be confined to notified Danger areas where they can be practised without hindering other aviators proceeding about their business. Having made these assertions, it was pointed out by the chairman that the general exemption from the ANO which allowed military crews to fly in excess of 250 kt below FL 100 was not a subject for debate here. Other members drew attention to the AS355 pilot's task, which had apparently taken precedence over look-out. Nonetheless, all the crews involved in this Airprox were proceeding about their individual tasks quite legitimately and were entitled to be doing so where they were. It was only by coincidence that the F15 crews had overflown the AS355 a second time, at which stage the No2 saw it and reported it to the No1, so that effective avoiding action could be taken. This was an important point; unlike the first pass, second time around the helicopter had been closer to their flight-path and in their forward field of view, making it easier to spot. Some members reasoned that whatever the separation was on the first pass it was no less safe because the F15s had been unsighted on the helicopter. Here it was difficult to determine the exact separation that pertained - it was probably somewhere between 2-300 ft reported by the AS355 pilot and 4-500 ft suggested by the radar recording. There was an operating risk here on both counts when flying in the FIR where 'see and avoid' is the primary means of separation, but if the helicopter had been in the forward field of view of the F15 crew it may indeed have been seen. However, this was all conjecture. Although not clear-cut, a majority view prevailed amongst the members that see and avoid had not worked on this occasion. Therefore, the Board concluded that the safety of the ac involved had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the F15 crews, and effectively a non-sighting by the AS355 crew

Degree of Risk: B.

AIRPROX REPORT No 12/01

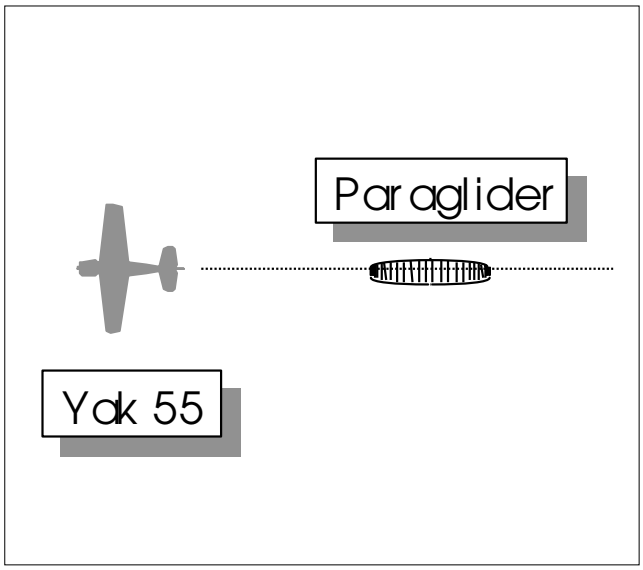
Date/Time: 8 Feb 1145

Position: 5338 N 0231 W (3 NM NW of Bolton)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Paraglider	Yak 55
Operator:	Civ Pte	Civ Pte
Alt/FL:	100 ft (agl)	1000-4000 ft↑↓ (QNH)
Weather Visibility:	VMC CLNC 20 km	VMC CLNC
Reported Separation:	100 ft V	/800 ft V

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PARAGLIDER PILOT reports soaring on the N face of Winter Hill - a hang glider was also in the vicinity. After about 10 minutes a 'Stunt Plane' with what he thought were red crosses on the wings appeared and started performing aerobatics in the area; initially he was enjoying the spectacle but became concerned when it got nearer to them. Whilst considering landing he suffered a major canopy collapse (about 40 % of one side and 20% of the other) which he was able to recover before landing. Whilst doing so a walker called out to him and pointed out the Yak which had made a low pass directly above him and appeared to him to be pulling up between the aerials on top of Winter Hill. It climbed and came round to repeat the manoeuvre in the same airspace. He was concerned that his paraglider might reinflate in any downdraught so he bundled it up and held onto it. He flew again afterwards and found the air thermic but not excessively turbulent; there were no further collapses. He thought the Yak pilot may have been unaware that his wake could have caused the paraglider to crash.

THE YAK 55 PILOT reports practising aerobatics above Winter Hill. He saw the hang glider during his HASELL checks and about 10 minutes into his practice he saw the paraglider 'join in', both gliders traversed up and down the ridge. Both were a long way beneath, and his minimum separation from them was 800 ft. He thought if the large red stars on his ac had been mistaken for crosses, his ac may have been further from the gliders than suggested.

UKAB Note: The incident is not visible on recorded radar, and the Yak 55 has no transponder.

THE BHPA comments that the presence of the adjacent Winter Hill mast (2452 ft) downwind of the soaring para- and hang glider, and the TMA base above at 3500 feet, leave questions about the actual geometry of this incident. The paraglider pilot's question as to whether the YAK pilot knew about the inadvisability of manoeuvring in the vicinity of light weight aircraft is pertinent. A double collapse of the sort described by the paraglider pilot is unlikely in the wind/thermal conditions described without the presence of ac wake or some other unusual factor.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The 2 pilots' views of the incident were so different that without any independent information from recorded radar etc there was no way for the Board to conclude in detail what was the cause of the incident, or to draw any conclusions as to the risk level. It was apparent that the Yak pilot had flown close enough to the paraglider to cause its pilot concern about the risk from wake turbulence, and this was as close as members could get to a cause. However, it was not clear how well founded this concern was. Members were reminded that the Yak 52 is a very large ac for its type and this, along with the point made by its pilot about the non-recognition of the stars on it, suggested that it might not have been quite as close as it looked. The collapse suffered by the paraglider could not be explained conclusively; such events can be caused by inattention or mishandling as much as by external influences.

There were other factors which muddied the waters; it was observed that the lower of the altitudes given by the Yak pilot for his exercise (1000 ft) was below the height of Winter Hill, and the higher (4000 ft) was in the Manchester TMA. There was also a remote possibility that the paraglider seen by the Yak pilot not less than 800 ft below him was not the reporting pilot's. Members regretted that no firm conclusions could be drawn but suggested that the messages to come out of the incident included the need to share airspace safely and considerately with other users, and to be prepared to get out of the way of someone who does not appear to be aware of your presence, as the paraglider pilot sensibly did by landing.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Yak pilot flew close enough to the paraglider to cause its pilot concern about the risk from wake turbulence.

Degree of Risk: D

AIRPROX REPORT No 13/01

Date/Time: 14 Feb 1336

Position: 5047N 0113W (2·5 NM S of Lee-on-Solent)

Airspace: London FIR (*Class:* G)

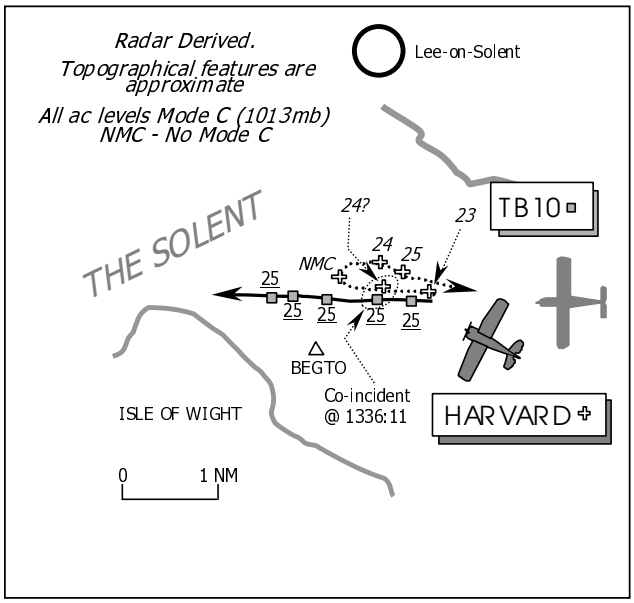
	Reporting Aircraft	*Reported Aircraft*
Type:	TB10	Harvard Mk4
Operator:	Civ Pte	Civ Pte
Alt/FL:	3000 ft (QNH 1033 mb)	↑ 3000 ft (QFE)
Weather Visibility:	VMC CAVOK >10 km	VMC CAVOK >10 km

Reported Separation:

<50 ft V, 2-300 ft H /200 ft V

Recorded Separation:

1-200 ft V, 0·2 NM H @ 1336:11



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TB10 PILOT reports his ac has a white/purple livery with a yellow stripe. Navigation lights, landing lights and tail mounted HISL were all on and he was squawking with Mode C, whilst under a FIS from Solent APPROACH.

He was flying over the Solent inbound to Bournemouth, cruising at 3000 ft QNH (1033 mb). Heading 250° at 110 kt, he thought abeam Cowes, a low wing single engine yellow/black monoplane was seen at about 4 o'clock 2-300 ft away and just below his ac, banking sharply to the R and turning away. He had not spotted it until the last moment as it approached from behind and below so avoiding action was not taken. At the CPA it was less than 50 ft below his ac and 2-300 ft away. He thought that if its pilot had not turned away when he did a mid-air collision would have ensued. Solent APPROACH did not provide any warning of this ac and he reported the Airprox to them on RT.

THE HARVARD MK4 PILOT reports he was conducting an aileron trim check test flight at various speeds between 80 – 140 kt in level flight, whilst working the Fleetlands TOWER/Lee-on-Solent (L-O-S) frequency of 135·7 MHz, in accordance with local procedures. The ac colour scheme is RAF trainer yellow, red anti-collision beacons were on and a squawk of A7000 selected with Mode C.

Whilst flying over the Solent on a north-westerly heading, he spotted another low-wing single engine monoplane, white in colour, about 1 NM away. It was a couple of hundred feet above his ac and behind him at 4 – 5 o'clock. He was flying slowly for a Harvard - about 80 kt IAS, and the other ac would probably have eventually overflown him. This could have presented a potential risk of collision if he had been unaware of it, if Solent APPROACH had not warned its pilot, or, if he had climbed or the other ac had descended. He watched the other ac for a short time and assessed that he had not been seen by its pilot. Even after he rocked the Harvard's wings gently, the other pilot continued on track and gave no indication that he had seen his ac. He flew a level L turn, until the TB10 had crossed behind him. By that stage he was off the TB10's starboard side, so he then turned onto a parallel course and overhauled it slowly, with the intention of noting the registration. However, as he was not prepared to fly close enough to complete this rather fruitless task and with more important work to be done he rolled to starboard, away from him back towards L-O-S.

Subsequently, he discussed the matter with the Airfield Manager at L-O-S, but they mutually concluded that it was of minor consequence and did not justify further follow-up action. He added that in his opinion it did not constitute an Airprox; he kept the other ac in good visual contact throughout and there was no risk of a collision at any time.

ATSI reports that the TB10 pilot was routeing from Shoreham to Bournemouth and contacted Solent APPROACH at 1330. The pilot was instructed to 'standby' as a controller change was taking place. One min later the TB10 pilot called again and was once more instructed to standby, because the controller was engaged in obtaining an airways clearance from LATCC, co-ordinating this ac's departure with Southampton TOWER, together with go-around instructions for another ac carrying out training.

At 1333, the controller passed a CTZ transit clearance to another ac, together with relevant traffic information, and then asked the TB10 pilot to pass his flight details. The pilot reported his position as 3·6 NM NE Ryde abeam Portsmouth and requested a FIS. The controller issued a squawk of A3666 and then dealt with 3 other ac before telephoning Bournemouth ATC to co-ordinate the return of an IFR training flight. One ac was then transferred to Boscombe Down and the IFR training flight transferred to Bournemouth before at 1336, the controller advised the TB10 pilot that he was identified 12 NM S of Southampton. The controller then issued a VFR transit clearance of the SOLENT CTA, whereupon the TB10 pilot reported that he had just experienced an Airprox. It was later established that the other ac involved, the Harvard, had been operating on a Lee-on-Solent frequency.

The Harvard's radar response first appeared on the radar recording at the time the controller was issuing the CTA crossing clearance to the TB10 pilot. The controller had no prior knowledge of the Harvard traffic and so could not have been expected to pass any traffic information in the circumstances.

UKAB Note: This Airprox is not shown clearly from the outset on the LATCC radar recordings. The Harvard, shown squawking A7000 with Mode C, is only displayed by the Pease Pottage radar as it climbs into cover and steadies on a parallel westbound track to the TB10, which itself is shown steady westbound indicating a constant 2500 ft Mode C (1013 mb), equating to about 3100 ft Southampton QNH (1033 mb). The early stages of the encounter as the Harvard reportedly headed NW and then turned L on the TB10's starboard quarter are not shown. The Harvard is first displayed at 1336:01, steady westbound and overhauling the TB10. The CPA is shown at 1336:11, the Harvard appears to ascend to 2400 ft Mode C (1013mb), 100 ft below the TB10 and about 0·2 NM off the latter's starboard beam. However, due to SSR label overlap it is difficult to determine the Harvard's Mode C indication. Thereafter, the Harvard overhauls the TB10, before it breaks away to starboard in a R turn as reported by both pilots.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

A CAT pilot member contended that there were two distinct elements to this occurrence, but the TB10 pilot had reported in essence the second event from when the Harvard drew alongside. Some thought that doing so was the basis of the cause and risk assessment as the Harvard pilot had elected not to file of his own volition, but what had reportedly gone before could not be discounted. The Board noted that the Harvard first appeared on the LATCC Pease Pottage radar recording when the controller was issuing the CTA crossing clearance to the TB10 pilot. Consequently, some pilot members queried if the Harvard could have been displayed on the Southampton radar earlier and, if so, whether the controller could have provided a warning to the reporting TB10 pilot. The Southampton radar picture is not recorded, indeed very few terminal radar equipments are, hence the Board's reliance on area radar recordings from LATCC and SCACC; there was no way of determining if both ac had been displayed for any length of time before the occurrence. The TB10's SSR was displayed at 1336, because at that time the controller had advised the TB10 pilot he was 'identified'. This

was also when the Harvard was first shown on the LATCC recording, overhauling the TB10. It was explained that 'identification' in this context was for the CTA crossing clearance and did not imply that a radar service was being provided unless clearly stated by the controller. This point was sometimes misunderstood by pilots and was worth repeating here. Solent APPROACH was evidently very busy with other higher priority IFR traffic and the Harvard was completely unknown to the controller. If it was displayed and if he had seen it a proximity warning would have been helpful. However, APPROACH was merely providing a FIS whilst issuing the CTA clearance before actual entry of the TB10 into the Class D CTA, wherefore, at the boundary, the nature of the ATS changes significantly. The TB10 pilot had not requested a radar service nor had it been proffered. Hence, the responsibility for lookout in the 'see and avoid' environment of the Class G 'Open FIR' rested firmly with the TB10 pilot under the FIS that pertained. In this respect the TB10 pilot had apparently not seen the Harvard as he reportedly closed on it from astern in the first instance and then passed it as the Harvard moved to the TB10's starboard quarter. Understanding the geometry of the encounter was complicated by the lack of complete radar information, but there was no reason to doubt the Harvards pilot's account of events. Members understood that the TB10 pilot was not able to avoid the Harvard if he had not seen it, and once it had drawn astern was understandably not very easy to detect until it drew up on the starboard beam alongside. Such an event was certainly going to induce an element of surprise when the TB10 pilot suddenly saw it rolling to starboard to return toward L-O-S.

Turning to the Harvard's actions, the Board was unanimous that pilots should not actively chase other ac to identify their registrations from the air, irrespective of the circumstances. AIS (Mil) at LATCC are tasked with this responsibility - civilian and military ac alike. Members agreed with the Harvard pilot that his 'chase' was indeed a rather fruitless task; they cautioned against flying close to other ac to note registrations as it could well have adverse safety consequences. Furthermore, a GA pilot member pointed-out that ac are not to be flown in formation unless the respective pilots have agreed to do so, which was clearly not the case here. Taking all these factors into consideration of the cause, the Board concluded that the Harvard pilot flew sufficiently close to the TB10 to cause concern to its pilot, who had not previously seen the Harvard, when it had been ahead of his ac. The Board was agreed that the assessment of the risk of this encounter should encompass the whole event. The Harvard pilot had seen the TB10 closing from 4-5 o'clock and then manoeuvred to its starboard beam whilst it passed. Unlike the TB10 pilot, the Harvard pilot had the other ac clearly in sight throughout; but had closed to 0·2 NM whilst 200 ft below it, as evinced by the radar recording which was at variance with the CPA reported by both pilots. However, the Harvard pilot was clearly able to turn away earlier if he had chosen to do so. Hence the members agreed unanimously that no risk of a collision had existed during this premeditated manoeuvre.

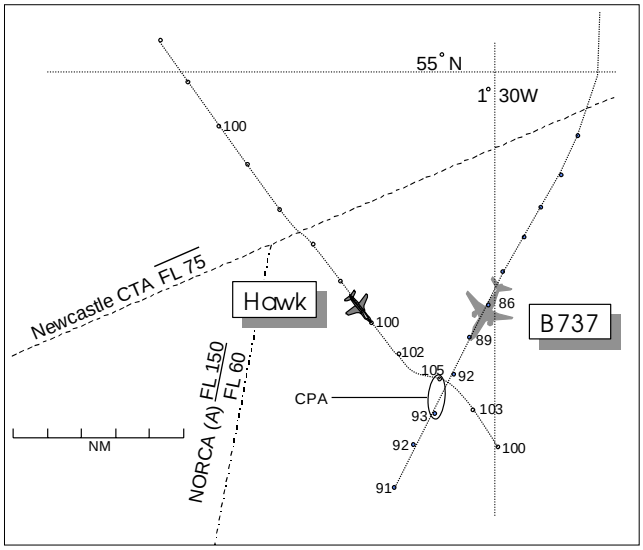
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Harvard pilot flew sufficiently close to cause concern to the TB10 pilot, who had not previously seen the Harvard.

Degree of Risk: C.

AIRPROX REPORT No 14/01

Date/Time:	14 Feb 1208	
Position:	5455 N 0131 W (Gateshead)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	B737-400	Hawk
Operator:	CAT	HQ STC
Alt/FL:	FL 90	FL 100
Weather	VMC CLOC	VMC CAVK
Visibility:	50 km	10 km+
Reported Separation:	700 ft V	
Recorded Separation:	1200 ft, 0·5 NM	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737-400 PILOT reports heading southerly at 250 kt in a climb out of Newcastle, from whom he was receiving a RAS, and had been cleared to climb to FL 170. On passing FL 80 he was warned of traffic at FL 100 in his 2 o'clock. A TCAS TA sounded and at FL 90 ATC requested him to maintain FL 90. He selected 'Alt Hold' on his AFDS but this was ineffective due to the ROC. The TCAS gave him a 'reduce climb' RA and he disconnected the autopilot, followed the RA and stopped climbing at FL 93. The traffic, crossing from right to left was shown as 700 ft above on TCAS. He considered there was a low risk of collision.

THE HAWK PILOT reports heading 130° at 300 kt, level at FL 100, inbound to Teesside and receiving a RIS from Scottish Mil on UHF. He saw a B737 in his 10 o'clock about 4 NM away but Scottish gave him no warnings until it was 1-2 NM away. By this time he had climbed to FL 120 (he thought) and turned left to pass behind and above it. There was no risk of collision.

UKAB Note: LATCC radar recordings show the B737 climbing on a track of 206° and the Hawk converging, steady at FL 100, tracking 142°. When the ac are 2 NM apart the B737 is passing FL 89 and the Hawk starts a climbing left turn to pass about 0·5 NM behind the B737 at FL 105. At that point the B737 has stopped its climb at FL 93.

MIL ATC OPS reports that the Hawk pilot was recovering to Leeming from the N at FL 170 under RIS from the Scottish (Mil) Allocator (ALLOC) on 249·75. As the unit workload was relatively low, ALLOC kept the Hawk under his control and intended to hand the ac directly to Leeming, subsequently changed to Teesside for weather diversion. The Hawk pilot was descended initially to FL 100 to remain above the Newcastle CTA (upper limit FL 75). ALLOC decided it would be prudent to contact Newcastle by landline to pass traffic information (TI) before free calling the ac to Teesside. At 1207:03, ALLOC passed the position of the Hawk to the Newcastle Approach Radar controller (APR) but APR was unable to see it in the Newcastle overhead. ALLOC advised APR that the Hawk *"will pop out south east by 3 miles inbound Teesside, descending FL 80 if you're happy"* to which APR replied *"No, I've got 3745 south east of me climbing flight level one seven zero turning on track GASKO"* (this was misinterpreted by ALLOC as FAMBO, a reporting point to the SE over the North Sea). ALLOC then stated *"Contact, I'll avoid you on that one in the descent"*; APR replied *"Okay, I'm climbing flight level one seven..."* at which point the landline was disconnected. The Hawk pilot reported level FL 100 at 1208:10 and 5 seconds later ALLOC transmitted *"c/s, avoiding action…disregard, there's traffic due east by three miles indicating similar level"*, to which the Hawk pilot immediately replied *"visual"*. A few seconds later, ALLOC contacted APR by landline stating *" ..my Hawk's passing*

behind your ac departing – is visual with him" to which APR replied *"OK, I've got a TCAS on . . . reported anyway"*. ALLOC descended the Hawk to FL 80 and freecalled the ac to Teesside at 1209:00.

The ScATCC recording of the Great Dun Fell Radar (the radar and display system that ALLOC was using) shows the B737 in the Hawk's 10 o'clock at 6·5 NM passing FL 54 and also partially obscured by merging traffic; the B737's radar trail dots do not give a clear indication that the ac is turning. At 1207:28, after the landline conversation had terminated, the Hawk is about 1·5 NM SE of Newcastle descending through FL 110 with one contact 1 NM to the NW and another 1·5 NM to the E. The B737 is exiting the Newcastle Zone between the Hawk's 10 and 11 o'clock at 6 NM and in a tighter right turn; there are 3 further tracks cluttering the picture 5 NM S of the B737, 2 of which are tracking NW towards the Hawk and B737. At 1207:41, the Hawk is 4 NM SE of Newcastle passing FL 106 with the B737 in its 11 o'clock at 4 NM climbing through FL 75; the B737 is badly obscured by one track to the NW at 1 NM and 2 tracks 2 NM to the SSE tracking NW. At 1208:15, the time of ALLOC's attempted avoiding action/TI, the Hawk has levelled at FL 100 with the B737 left of its 12 o'clock at 1 NM climbing through FL 89 tracking 225°.

When the statement *"I'll avoid you on that one in the descent"* (the term 'co-ordination' was never used by either party) was made, ALLOC believed the B737 would route SE towards FAMBO. His response would have been different had he realised that the B737 was actually turning SW into confliction. However, the controller required the pilot's prior agreement before agreeing Tactical Co-ordination under a RIS where his basic responsibility was to provide adequate TI, which he subsequently did, although very late, but the Hawk pilot had already seen the B737. The radar picture in the vicinity of Newcastle at the time was cluttered with squawking and non-squawking ac overlapping to the extent that ALLOC had to reduce his radar picture to a 55 NM, then 45 NM radius to distinguish individual tracks; therefore prudently he could have limited the Hawk pilot's radar service. Whilst the B737's initial turn onto SE was visible to ALLOC, the remainder of the ac's turn to SW was slower and not immediately apparent against the background traffic. This, coupled with a check of the 2 min 'predict vector' facility (which then indicated that the tracks were diverging), appears to have reinforced ALLOC's assessment that the B737 was routeing towards FAMBO, rather than GASKO, as passed by APR.

Under RIS, ALLOC could have freecalled his ac directly to Teesside when above the Newcastle CTA (as Teesside had requested) without passing TI to APR. Extensive regulated/semi-regulated airspace near Newcastle had been introduced specifically to protect inbound/outbound traffic; the B737 was vectored outside of the protection afforded by the CTA and NORCA, airspace which ALLOC had specifically avoided.

ALLOC said that he would avoid, believing incorrectly that the ac tracks would not conflict. Hence no specific controlling input required was from him – he had simply stated a fact, rather than entering into a co-ordination agreement, as none appeared necessary. However, having stated that he would avoid meant APR had every right to assume they had co-ordinated, and to expect ALLOC to keep the Hawk clear of the B737; fortunately, APR noticed that the ac were still in confliction and issued a stop climb instruction to the B737 pilot, who reached FL 93 briefly before descending.

ATSI reports that apparently Scottish Military did not comply with the co-ordination carried out with the Newcastle APR i.e. "I'll avoid you on that one in the descent". The Hawk routed through the Newcastle radar overhead and, therefore, was not continuously displayed on the Newcastle radar. APR reported that on seeing the Hawk's squawk 7 NM SE of the airport, she passed traffic information to the B737 pilot on the Hawk. By this time the latter was in the former's one o'clock position at a range of 2 NM. Subsequently, the B737 was instructed to stop its climb at FL 90, although the ac continued to FL 93 before descending. With hindsight, it would have been prudent if APR had taken appropriate avoiding action as soon as the confliction was realised and used the term "avoiding action". However, action was taken to minimise the risk of the encounter, which was not of the APR's making.

HQ STC comments that there is little to add to the comments provided by Mil ATC Ops. Following a misunderstanding by ALLOC of the B737's routing,

the Hawk captain may have been denied the opportunity to take more timely avoiding action. In the event, he saw the B737 at a range of 4 NM and manoeuvred appropriately to minimise 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.

Although the word 'co-ordination' was not exchanged between ALLOC and APR, members agreed that the latter had every right to assume that co-ordination had been effected; he was not informed that the Hawk pilot was under a RIS. Members observed that since the NORCA was there, it would be useful to vector ac routeing via GASKO inside it. In this case, doing so would have caused the B737 to exit the top of the CTA but it would also have passed well behind the Hawk.

While members agreed that the Allocator's misunderstanding of the B737's routeing was a feature of the incident, the Hawk pilot was operating VFR in Class G airspace. He saw the B737 and avoided it successfully, removing any risk of collision, but not by enough to prevent APR from stopping the B737's climb or enough to avoid a TCAS event in the B737. If the Hawk pilot had seen the B737 at 4 NM he could have done more in this respect. Members were advised that IFS (RAF) was taking action to highlight this problem to military aviators and that this incident would be used to reinforce the message. The Board concluded that following a misunderstanding by Scottish Mil ALLOC, the cause of the Airprox was a confliction of flightpaths which was resolved by the Newcastle APR and the actions of both pilots.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction following a misunderstanding by Scottish Mil ALLOC, resolved by the Newcastle APR and both pilots.

Degree of Risk: C

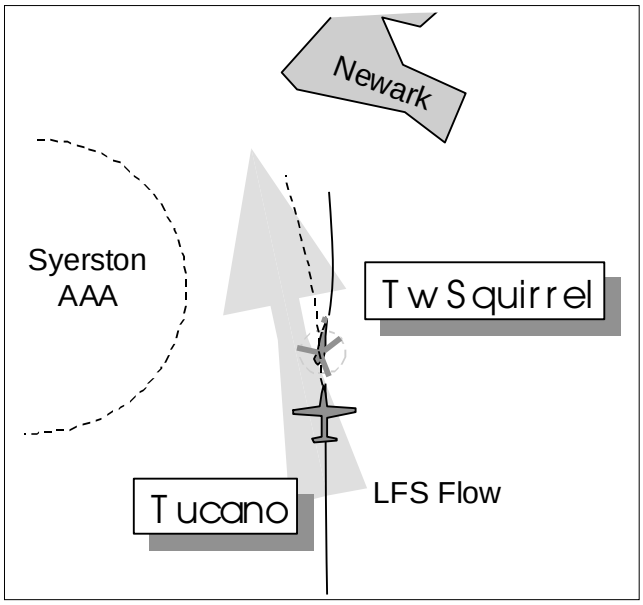
AIRPROX REPORT No 15/01

Date/Time: 14 Feb 1201

Position: 5300 N 0048 W (4 NM ESE of Syerston)

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

	Reporting Aircraft	*Reported Aircraft*
Type:	Twin Squirrel	Tucano
Operator:	Civ Comm	HQ PTC
Alt/FL:	1000 ft (QNH 1035 mb)	1000 ft (RPS)
Weather Visibility:	VMC CLNC 10 NM+	VMC CLNC 10 km+
Reported Separation:	200 m, 10 ft V /1-200 ft V	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TWIN SQUIRREL PILOT reports heading 170°, into sun, at 35 kt on a photographic task requiring accurate tracking and flight with the stbd door open; his workload was high monitoring 4 radios associated with his task and 2 ATC frequencies. He was receiving a FIS from E Midlands and because he was aware that the area was a military transit corridor, was in communication with Syerston, and keeping extra vigilance. He saw the Tucano approaching head-on from 500 m in his 1 o'clock and it passed 10 ft above and 200 m to his starboard; he took no avoiding action as it was already passing. He thought there was a moderate risk of collision, especially if the Tucano pilot had not seen him. With hindsight he thought he could have been on Waddington's frequency although the Tucano was not. His normal ac was being serviced; it has TCAS which would have given ample warning of the Tucano.

THE TUCANO PILOT reports heading 350° at 240 kt; he had called Syerston and started a climb to 1000 ft to transit the Syerston/Newark gap; Syerston knew of no traffic. On levelling he saw the helicopter in his 1 o'clock slightly low. He rocked his wings to indicate his sighting which was late as the helicopter had been masked by his nose in the climb and by the canopy arch. He passed the helicopter by some 1-200 ft V and considered the risk of collision was low. He commented that the helicopter was operating in an area where low flying military ac are required to climb to 1000 ft.

UKAB Note: LATCC radar recordings show the Tucano turning onto N by Belvoir Castle and the ac are then head-on for 90 sec before the Airprox. The Tucano is showing 000 Mode C and the helicopter 300 ft as the ac approach each other but neither Mode C shows at the closest point. Shortly afterwards the Tucano shows 100 ft and the helicopter 200 ft. No lateral separation can be measured from the radar recording.

HQ PTC comments that while Syerston is apparently perceived by pilots to be able to provide an ATS, this is not the case. The RT at Syerston is normally manned by the Duty instructor (DI) from the caravan on the airfield. With no qualified ATC staff, it cannot be more than an A/G Station and is not able to offer even rudimentary ATC advice. Because the RT is not recorded we cannot verify when each ac called Syerston nor what was said to them but neither would have been seen as a threat to the Syerston circuit by the DI of the day; having established this, the DI would have no further interest or responsibility for their movement.

Whilst each ac was prudently going about its lawful occasions, each may have expected a little too much from Syerston Radio. It is as yet unclear how such misconceptions may have arisen; however, we intend to investigate further, and ensure that what is promulgated in both civil and military documents reflects reality.

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.

Members were advised that the helicopter pilot's task demanded flight at 1000 ft rather than lower and that he was aware (being ex-military) of the structure of the Military Low Flying System in the area. It was noted also that the Tucano pilot was required to head N and climb to 1000 ft (LFS regulations) at the position of the incident. Unsurprisingly the requirements on both ac had put them on opposing flightpaths. There was no explanation of why both pilots had called Syerston other than out of courtesy and the helicopter pilot's FIS with E Midlands would have served no apparent purpose to either party. Members agreed that Waddington, a LARS unit, would have been a more appropriate station for the helicopter to have been communicating with; they might well have been able to warn him of the Tucano's approach even if the latter was not receiving an ATS.

In the event this was a situation in which the pilots were required to see and avoid other traffic and the Board concluded that the cause of the Airprox was that neither pilot saw the other ac until it was too late to take avoiding action. The Tucano, dark coloured and climbing against a terrain background and with no angular motion, would not have been easy to see from the helicopter even if the latter's pilot had been free to concentrate exclusively on lookout. Similarly a Twin Squirrel head-on against a sky background would not have stood out clearly

to the Tucano pilot. Both pilots appeared to see the other ac as some angular motion developed on passing each other and all of this exemplified the nature of the task of seeing and avoiding other ac at low level. While it was clear that the ac were not actually going to collide, even in the absence of avoiding actions, the Board concluded that the combination of a close pass and the too-late sightings meant that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Very Late sightings by both pilots.

Degree of Risk: B

AIRPROX REPORT No 16/01

Date/Time: 4 Jan 1706 NIGHT

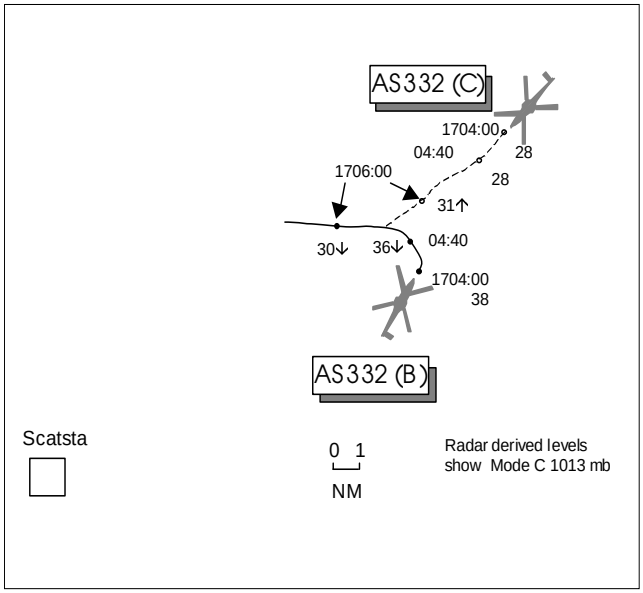
Position: 6036 N 0050 W (17 NM NE Scatsta A/D - elev. 75 ft)

Airspace: FIR (*Class:* G)

Reporter: SCATSTA

	First Aircraft	*Second Aircraft*
Type:	AS332 (B)	AS332 (C)
Operator:	Civ Comm	Civ Comm
Alt/FL:	↓2000 ft (QNH 983 mb)	2000 ft (QNH 983 mb)
Weather Visibility:	IMC KLWD NK	IMC KLWD NK
Reported Separation:	NK	3 NM H

Recorded Separation: 100 ft V 3·3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SCATSTA TOWER/APPROACH CONTROLLER (TWR/APP) reports that he was working two inbound AS332 helicopters (A) and (B), at 2000 ft and 3000 ft respectively, with ETAs of 1704 and 1702. At 1655, both ac were transferred to Scatsta RADAR (APR) for vectoring for surveillance radar approaches (SRAs). At 1703, another inbound AS332 (C) contacted him, having been released from Sumburgh Approach at 2000 ft; the pilot was passed the QNH, provided with a FIS and informed that he was No 2 in traffic behind (B). He contacted the APR and advised him of helicopter (C) at a range of 23 miles at 2000 ft and asked for the position of (B) at 3000 ft; the APR told him to 'keep him coming', which he acknowledged. He questioned the APR as to whether he still had (B) identified on radar but owing to other RT calls, he did not receive a reply; he instructed (C) to slow down, which he did (80 kt). The APR then called and instructed him to climb (C), which he did to 2500 ft, and he passed generic TI '(B), 3 miles away, 3000 ft descending to 2000 ft.' The Sumburgh APR then telephoned asking if they were aware of the situation and was told that (C) was climbing. He then instructed (C) to climb to 3000 ft to report reaching and then requested level confirmation on (B) from the APR; (B) was confirmed level at 2000 ft. The AS332 (C) pilot then reported that he had (B) in sight at a range of

3 miles and was cleared for a 'step descent' on the Scatsta NDB procedure following (B).

UKAB Note (1): The Scatsta METAR at 1650Z shows 16002 6000 SCT006 BKN012 08/07 Q0983 RERA and the 1750Z shows 17013 9999 FEW006 SCT012 07/06 Q0983.

THE AS332 (B) PILOT reports flying IFR inbound to Scatsta at 3000 ft with another company AS332 (A) in close proximity at 2000 ft; he had been informed by ATC that he was running 'neck and neck' with (A) and he decided to slow down to position No 2 in traffic. He was turned by Scatsta APR for identification and then instructed to hold in his present position, approx. 18 miles E of the aerodrome, whilst the APR carried out an SRA on (A). He was also aware that company AS332 (C) was inbound, about 30 miles behind him, at 2000 ft. After (A) had completed its approach, he was turned for reidentification, before commencing his approach, onto a heading and was given descent clearance. However, according to a cross reference to his ADF and GPS, the headings he had been given were incorrect. After discussion with the APR, he was turned again and reidentified; the APR admitted that he had identified the wrong return as the radar was performing poorly in bad weather. At about the same time, he heard on radio box 2, which was selected to TWR frequency, an instruction being passed to AS332 (C) to "*climb to 3000 ft due to traffic"*. As he was being continually vectored to avoid weather and completing his cockpit landing checks, he gave this instruction no further thought; the approach was completed normally.

THE AS332 (C) PILOT reports flying inbound to Scatsta at 2000 ft IMC. At 20 NM he was informed by ATC (TWR/APP) that he was No 3 in traffic, No 2 was at 13 NM. At 16 NM he was instructed to *"climb now to 2500 ft, acknowledge",* which he did at 80 kt, and then was recleared to 3000 ft. Whilst on the instrument approach, he became visual with the preceding helicopter (B) from 8 NM when he was at 2000 ft.

UKAB Note (2): The RT transcript at 1710:50 shows a transmission from AS332 (C) pilot *"c/s, is eleven and a half miles and we have the other traffic in our one o'clock".* The ac is still maintaining 3000 ft and descent to 2000 ft is given at 1713:50.

ATSI reports that because of the delay in notifying this occurrence, no field investigation was carried out, however, the following has been compiled following reference to ATC reports, pilot reports and RT and radar recordings.

At the time of the Airprox, the unit was manned by an aerodrome/approach controller (ADC/APP) and a radar controller (APR). The workload and traffic loading were light and the relevant ATC equipment was all serviceable.

The subject helicopters were both inbound to Scatsta, AS332 (B) at 3000 ft, estimating the 'SS' NDB at 1702, and AS332 (C) at 2000 ft, estimating at 1715. Running with AS332 (B) was a third inbound helicopter, AS332 (A), which was not directly involved in the Airprox but was central to the events that preceded it. This helicopter was at 2000 ft, estimating the 'SS' at 1704.

On receiving the estimates on AS332 (B) and AS332 (A), the APR, who was initially providing the ADC/APP service, decided that the most expeditious course of action would be to open radar and provide both helicopters with an SRA. At that stage, no estimate had been received on AS332 (C). Once in communication with Scatsta, the crews of AS332 (B) and (A) confirmed that they were requesting radar approaches. The crew of AS332 (B), on being advised that they were estimating at a similar time to AS332 (A), which was at the lower altitude and would, therefore, be easier to make number one, volunteered to slow down and this offer was accepted. The second controller took over the combined ADC/APP role, and the original controller opened radar. AS332 (A) was transferred to radar at 1654 and AS332 (B) at 1657.

The radar in use at Scatsta is a short range primary radar and, initially, the APR could not see a radar return which he could associate with AS332 (A). However, a short time later at 1657, he observed a contact which, employing the turn method, he identified as AS332 (A), 14 NM to the NE of Scatsta. At 1658, he also identified AS332 (B), 13 NM to the NE of the airfield, placed it under a limited RAS and instructed it to hold in that position while he conducted the SRA on AS332 (A). The Scatsta MATS Pt. 2 states the following: -

"The Approach Radar Controller's primary duty will be the provision of Surveillance Radar Approaches to Runway 24. In view of the extensive blind spots that are found on the Radar picture, and due to the short ranges displayed, caution must be exercised when offering any type of Radar service, and pilots must be informed that the services will be limited".

In addition, and central to this Airprox, in the Approach Radar Control section, the MATS Pt. 2 also states, under the heading *"Co-ordination prior to an SRA"*: -

"Prior to providing an aircraft with a Surveillance Radar Approach, the Radar Controller will give the Tower Controller full details of the flight, including type, position and level/altitude. All other aircraft receiving a radar service must be handed back to the Tower/Approach Controller and procedural separation must be applied".

The APR did not comply with this requirement despite the ADC/APP asking him to put AS332 (B) back to him, so that it could be given an NDB approach and 'step descent' behind AS332 (A). Apart from helping prevent the type of scenario which preceded this Airprox, the requirement also takes account of the MATS Pt.1 condition (Page 3-17, *"Surveillance Radar Approaches)* which states that, for SRAs terminating at less than 2 NM, as was the case here, *"Transmissions shall not be interrupted for more than 5 seconds from a range of 4 miles until the approach is terminated."*

The SRA for AS332 (A) was uneventful and the flight became visual at about 2.5 NM when it was transferred to the tower. APR then returned his attention to AS332 (B) but had lost radar contact with it. He advised the crew accordingly but, nevertheless, instructed them to descend to 2000 ft and at 1704 assigned them radar heading 270°. This instruction, apart from not following the correct procedure for re-identifying the flight, dispensed with the 1000 ft vertical separation which existed with AS332 (C), which he had been advised by the ADC/APP a short time before approaching 20 NM at 2000 ft.

The ADC/APP had received the estimate on AS332 (C), 25 miles at 1703 and the field at 1715, at 1656. AS332 (C) established communication with ADC/APP, at 1701:40, who cleared it to the 'SS' to expect no delay for a procedural NDB approach. He had anticipated that, by the time AS332 (C) commenced its NDB approach, AS332 (B) would either have landed or been at least 1000 ft below. This expectation would not have been unreasonable if all had gone to plan. The crew of AS332 (C) were advised that they were number three, with number one carrying out an SRA and number two holding at approximately 12 NM at 3000 ft. They were asked to report "approaching two zero miles". At 1703:30, before APR instructed AS332 (B) to descend to 2000 ft, ADC/APP advised him: *"Your next problem is c/s AS332 (C) on frequency approximately twenty two miles at two thousand feet."* APR replied: *"Yes, I've got him....* (one or two unintelligible words)*"*. ADC/APP was monitoring the radar frequency and when he heard APR descending AS332 (B) to 2000 ft, he again reminded his colleague that he had traffic at 2000 ft approaching 20 NM and asked: *"Can you see him, is he identified?"* APR's response was not intelligible. It is reported that APR later explained that he had not been able to see AS332 (C) at that time. He had assumed that it was still outside his radar cover but believed that it would come into cover in sufficient time to enable him to provide 5 NM radar separation from AS332 (B) which he believed, wrongly, was at approximately 13 NM range.

At 1705:00, the pilot of AS332 (C) reported at 20 miles. ADC/APP informed him that radar had advised that he should continue at 2000 ft and again passed TI on AS332 (B): *"…approximately twelve thirteen miles also at two thousand feet descending from three."* The pilot replied: *"That's copied thanks happy with that.";* ADC/APP confirmed that he was providing a FIS. Meanwhile, at 1705:10, the pilot of AS332 (B) advised APR that he was heading 270° and descending through 2650 ft. APR responded: *"... roger target believed to be you about twelve and a half miles east not yet identified."* AS332 (B) was asked to confirm its range and the pilot advised that his GPS was showing 16 miles. APR acknowledged: *"Roger er in that case you're further out than I thought er could er turn left further heading two six zero."* At this point, using intercom, ADC/APP again reminded APR that AS332 (C) was at 20 miles. A largely unintelligible exchange then took place which ended with ADC/APP instructing AS332 (C) to climb to 2500 ft initially and, a few seconds later, to 3000 ft. The crew were advised

that the traffic was AS332 (B), which was further out than radar thought. Sumburgh Radar must have observed the developing conflict on their radar because, at 1705:50, they telephoned the ADC/APP to alert him to the situation. They were advised that Scatsta were aware and already taking action.

At 1706:30, the pilot of AS332 (B) reported level at 2000 ft, heading 260° and showing a range of 14 NM. APR informed him that his radar was affected by 'clutter' and that *"I've lost you again."* He instructed the crew to continue on the heading and establish on the final approach track for Runway 24. By that time, vertical separation had been restored and AS332 (C) was level at 3000 ft and continuing at reduced speed but AS332 (B) had never been provided with any TI. APR continued to have difficulty locating AS332 (B) on radar and, at 1707, the pilot requested a L turn to pick up the final approach track. APR approved this commenting that a lot of weather was showing on the radar and he still did not have radar contact. Eventually, at 1708:00 APR located a radar return believed to be AS332 (B)'s and successfully and correctly re-identified the flight. By vectoring it around the weather returns, he retained the identification of the ac and carried out a successful SRA with the helicopter landing at 1716. In the meantime, at 1710:50, when at range 11 NM, the crew of AS332 (C) had reported visual with AS332 (B) in their one o'clock position. ADC/APP had subsequently 'stepped' the flight down on top of AS332 (B) and it carried out a successful straight-in NDB approach, landing at 1720.

The investigation of this Airprox was hampered by the poor quality of the recording of the Direct Line/Intercom between the Tower and Radar controllers. This was brought to the attention of the SRG Northern Region Engineering Inspector who has received an assurance that this problem has since been rectified.

UKAB Note (3): Analysis of the Sumburgh Radar recording at 1704:40 shows AS332 (B) in a LH turn, 17 NM NE of Scatsta, in descent passing 3600 ft Mode C (2800 ft QNH 983 mb) with AS332 (C) in its 3 o'clock position at a range of 4·1 NM, level at 2800 ft Mode C (2000 ft QNH 983 mb). CPA occurs at 1706:00 as AS332 (B) descends through 3000 ft Mode C (2200 ft QNH 983 mb) on a W track 3·3 NM WSW of AS332 (C) who has commenced a climb passing 3100 ft Mode C (2300 ft QNH 983 mb). Lateral separation remains fairly static for the next 40 seconds until vertical separation is established when AS332 (C) levels at 3800 ft Mode C (3000 ft QNH 983 mb), 1000 ft above AS 332 (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.

Discussion opened on identifying the sequence of events that culminated in the Airprox. The Scatsta APR had correctly taken both helicopters (A) and (B) under his control for radar identification and separation prior to giving (A) an SRA. However, the APR had not handed AS332 (B) back to the ADC/APP to provide procedural separation whilst he concentrated on the SRA traffic. This was contrary to procedures laid down in the Scatsta MATS Pt 2 and that led to the Airprox. The limitations of the primary radar were well known and procedures to overcome these deficiencies were in place. ATCO members wondered if the APR was trying to be helpful in retaining control of (B) whilst 'talking down' (A) but, whatever the reason, it led to him offering a service to (B) that he could not accomplish in the circumstances. The ADC/APP had kept the APR informed of helicopter (C)'s progress and tried to help but there appeared to be a break down in teamwork between the ATCOs. The ADC/APP had been rightly concerned as helicopter (C) approached 20 NM at 2000 ft when the APR descended (B) (who was not identified on radar) to the same height as (C) ahead of it; the APR had erroneously thought that (B) was closer to Scatsta, and consequently further ahead of the approaching (C), when he dispensed with the only known separation that already existed, 1000 ft vertically. Of most concern, the APR by that stage was neither providing radar nor procedural separation between the subject ac. Members believed that it was only the persistence of the ADC/APP to resolve the confliction, that finally prompted the APR to change his separation 'mindset' from radar to procedural, eventually instructing the ADC/APP to climb (C) in stages to 3000 ft. However, this too was actioned when neither (B) nor (C) were identified; (B) was still

descending to 2000 ft and crossing ahead of (C) who was below radar cover at 2000 ft. Both helicopters, (B) and (C), were IMC in cloud at the time and the crew of (C) only saw (B) when at about 11 NM established on final approach (after the incident). Members noted and commended the additional input from the Sumburgh Radar controller who had noticed the situation and had telephoned to alert the Scatsta ATCOs. From all of this members concluded that several factors could be identified as to cause; the APR had not followed unit instructions, had not ensured radar or procedural separation between ac under his control and had not identified them.

As to the risk, the APR had dispensed with vertical separation whilst trying to identify the AS332 (B) who was further from Scatsta than he thought. However, after the crew of (B) queried the range passed by the APR (12·5 NM), it was apparent that both ac were about 4 NM apart while IMC in cloud and not identified. Helicopter (C) had slowed to 80 kt to position behind (B) and was then climbed to 3000 ft to give 1000 ft vertical separation. In this sequence of events it was fortunate that both unidentified ac had not been closer to each other, but this had been a matter of luck rather than any judgement or control being exercised. While the Board could not unanimously agree (some felt that there had been no risk) a majority of the members concluded that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Scatsta APR did not:

Transfer AS332 (B) back to the ADC/APP controller as per unit instructions to provide an Approach procedural service.

Apply radar or procedural separation between AS332(B) and AS332(C),neither of which at that time were identified.

Degree of Risk: B

AIRPROX No 17/01

Date/Time: 16 Feb 1052

Position: 5415 N 0242 W (3 NM SSE of Kendal)

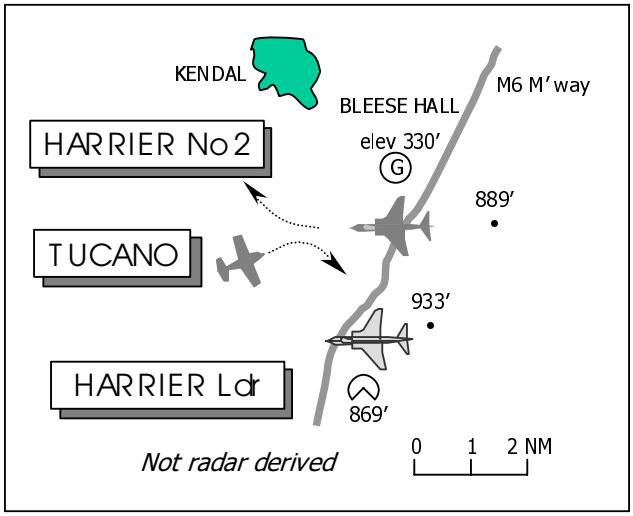
Airspace: LFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tucano	Harrier
Operator:	HQ PTC	HQ STC
Alt/FL:	250 ft (msd)	250 ft (Rad Alt)
Weather Visibility:	VMC CAVOK 50 km	VMC NR 'Good'

Reported Separation:

10-50 m H, 20-50 ft V/500 yd H nil V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUCANO PILOT, a QFI, was occupying the rear seat whilst conducting the low-level section of a final navigation test at 250 ft msd. The ac has a high-conspicuity black colour scheme and high-intensity sidelights were on. Whilst approaching

the M6 motorway at 240 kt, heading 075° (M) about 1 NM S of the glider site at Kendal, a Harrier was seen as it was skylined at 2 o'clock about 1 NM away and both he and the front seat student immediately scanned for the 'inevitable' No 2. The student spotted the conflicting Harrier first, just before he did, about 2-300 m head-on slightly below and to the L of the Tucano and to avoid it initiated a climbing break to the R. He increased the avoidance manoeuvre and pulled 6·5 g as the Harrier passed about 20-50 ft beneath them and 10-50 m to port. He added it was a "very close shave".

UKAB Note (1): Bleese Hall Glider Site Avoidance Area is not applicable during weekdays, as the site is only active weekends and public holidays.

THE HARRIER PILOT reports he was No2 of a pair of camouflage grey Harriers on a low-level sortie in 'battle' formation at 420 kt and HISLs were on. They were heading 270° (T) at 250 ft Rad Alt, about 3 NM S of Kendal, with his leader 2 NM to port, when he spotted the Tucano about 1500 yd ahead of his ac and at the same height; it was also seen simultaneously by his leader. He broke R to avoid the Tucano, whose pilot also broke R and passed about 500 yd to port with no risk of a collision.

UKAB Note (2): This Airprox was not shown on recorded radar.

HQ PTC comments that this Airprox bears uncomfortable echoes of a previous Tucano/Harrier encounter, albeit with less serious results. Approaching on a near-constant bearing and at minimal aspect to each other, this geometry of confliction is the most difficult to detect visually. In addition, sighting of the other, more distant Harrier may well have delayed detection of the greater threat.

UKAB Note (3): An individual driving southbound along the M6 also observed this Airprox and subsequently reported the sighting to the RAF Regional Community Relations Officer. He stated that he saw the Tucano take severe avoiding action against 2 Harriers very close to each other over the M6.

HQ STC comments that there is clearly some considerable disparity in the separation ranges reported by each pilot. Nevertheless, at best, the horizontal separation was unlikely to have been more than 500 yd (nil vertical) which is considerably less than ideal given the excellent weather conditions, and it is therefore surprising that the Harrier pilot did not regard the incident as noteworthy. Fortunately, sufficient time existed for both pilots to take avoiding action but once again, the incident highlights not only the importance of good lookout but also the need for an effective collision warning system (CWS).

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.

The HQ PTC member endorsed the comments by HQ STC regarding the need for a collision warning system to be fitted to military ac, which could, potentially, have forestalled such an occurrence as this where pilots must rely on the principle of 'see and avoid'. The STC member explained that a 'see and avoid' study (DERA - 1997) had shown the statistical probability of a mid-air collision occurring between military fast-jets at low-level was estimated at 1 accident every 2 years. The probability lessens to 1 accident every 6 years if one of the ac involved is civilian and 10 years if both are civilian. The study concluded that the installation and use of a CWS could reduce the chances of a mid-air occurring significantly. Indeed the value of such a system at low-level had been illustrated graphically to members during the Board's consideration of another Airprox (26/01), where TCAS had enabled a helicopter pilot to detect a Harrier formation at low-level. Unfortunately, military pilot members thought that there was little likelihood of a CWS being introduced in the near future across the military fast-jet fleet, which greatly dismayed the Board.

UKAB Note (4): Since 1998 there has been one mid-air collision at low level where both ac were military fast jets, and one where one of the ac was civilian and the other a military fast jet.

It is a commonly held misconception among some civil pilots that positive action is taken to deconflict individual low-level sorties within a Low Flying Area (LFA) from one another – this is generally not the

case. Hence, conflict resolution relies on the principle of 'see and avoid'. Here the Tucano crew spotted the lead Harrier ac at 1 NM and perceptively detected the No2 ahead, but only when it was 2-300 m away. The Harrier pilot reports he saw the Tucano 1500 yd ahead and with a closing speed in the order of 680 kt, only about 6 sec at most was available to react to the sighting and take avoiding action. This led the Board to agree unanimously that this Airprox resulted from a late sighting by both pilots.

Turning to the inherent risk of this encounter, without the benefit of a radar recording it was difficult for the Board to resolve the widely differing perception of the horizontal separation that pertained. Whereas the Tucano QFI believed it to be 10-50 m, the No2 Harrier thought it was 500 yd - a significant disparity. Another observer (the individual who was driving along the M6) when asked was unable to quantify the separation other than "very close". The feeling among the members was that the actual distance probably lay somewhere between the two reports, but nonetheless the differences were surprisingly wide. The HQ STC member thought that it was probably much closer than 500 yd and as the Tucano QFI had pulled 6·5 G to avoid the Harrier, the majority of members supported this view. Nonetheless, both pilots had time to take action to avoid the other. It was fortunate that the ac were slightly off-set as they approached each other, prompting turns in opposite directions; the Harrier pilot breaking to the R and the Tucano pulling up and turning to the R. These actions, coupled with the responsive flying characteristics of a propeller driven ac, where a change of flightpath can be effected quickly, had removed the risk of a collision, but only just in time, which led the Board to conclude that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by both pilots.

Degree of Risk: B.

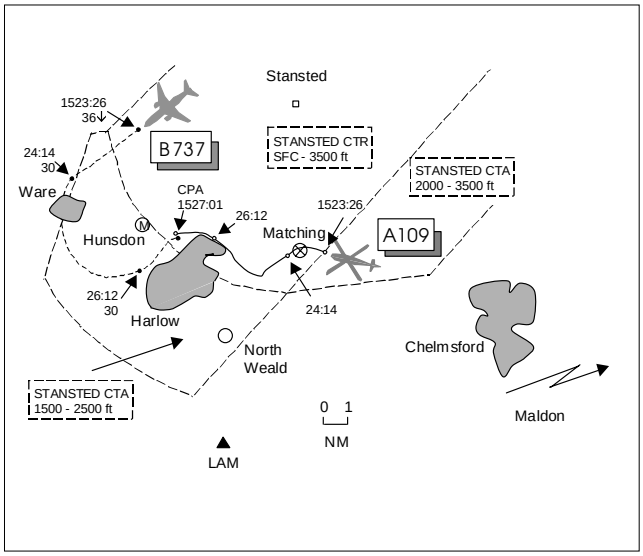
AIRPROX REPORT No 18/01

Date/Time: 16 Feb 1527

Position: 5147 N 0006 E (7 NM SW Stansted A/D - elev. 348 ft)

Airspace: CTR (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-300	A109
Operator:	CAT	Civ Pte
Alt/FL:	2300 ft ↓ (QNH 1034 mb)	600 ft (agl)
Weather	IMC KLWD	VMC HZBC
Visibility:	NK	7 km
Reported Separation:	NK V 0.5 NM H	NK
Recorded Separation:	NK V 0.2 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 050° at 180 kt established on the ILS LLZ at Stansted in the descent to altitude 2000 ft QNH 1034 mb. When

passing 2300 ft, he thought, he received a TCAS TA alert; ATC were concerned as they could not confirm the height of the traffic. He initiated a go-around climbing to 3000 ft whilst ATC issued a R turn onto heading 180°. The conflicting ac passed <0·5 NM clear on TCAS; he did not visually acquire the traffic as he was IMC throughout the encounter. He assessed the risk of collision as medium.

THE A109 PILOT reports flying on a local sortie from North Weald and he was receiving an A/G service from North Weald Radio on 123·52 MHz squawking 7000 with Mode C. The visibility was 7 km, 400 ft below cloud, in VMC and his helicopter was blue with red anti collision strobe lights switched on. He submitted a full and frank report. The helicopter had undergone, in January, an extensive COM/NAV refit which included the installation of 2 Garmin GNS430 units. On this flight he intended to carry out casual testing of both Garmin units with a passenger who was familiar with the equipment. He had flown from his private site at Hunsdon and picked up the passenger at North Weald, with his rotors running, before departing to the E towards Maldon VRP to commence functionality testing. After 10-15 minutes, the visibility grew worse so he elected to cease his testing and return to North Weald. He intended to route direct passing S of Chelmsford since the cloud base, 1000 ft estimated, would preclude safe transition over the town. Unfortunately, his unfamiliarity with the new equipment and the poor visibility combined to confuse him slightly and he believed he tracked to the N, not S, of the town. His error was compounded (ironically) by the improving visibility which encouraged him to make a detour to overhead his private site at Hunsdon to allow his passenger to assess its suitability for his flying operations. This error led him to track into the SE corner of the Stansted CTR and realising that he had entered Class D airspace, he turned onto a S track to exit the Zone and also remain clear of any built up areas. He had at this stage descended to 600 ft agl which was confirmed by the ac's rad alt. He did not realise that he had flown into close proximity to another ac or had passed close enough to cause serious problems for Stansted since his height had only been 600 ft and he estimated 7 miles from the aerodrome. He acknowledged that this had been a stupid error and, in hindsight, he should have contacted Essex Radar to keep them informed. However, the incident only lasted 1-2 minutes and his priority had been to vacate CAS as quickly as possible after noticing his error. He subsequently found out that his transponder had erroneously been set with Mode C switched off.

ATCI LATCC reports that the incident occurred 7 NM SW of Stansted at 1527 UTC. The Stansted FIN DIR described the traffic loading as moderate and all facilities were serviceable.

The B737 established contact with the Stansted FIN DIR at 1520. The pilot was instructed to fly a heading of 240° to position downwind and to descend from 6000 ft to 3000 ft. The A109 entered the CTR in the vicinity of Matching disused aerodrome at 1523 squawking 7000 but with no Mode C. The CTR is notified as Class D airspace requiring ATC clearance before entering but no communication had been established between the A109 pilot and the LATCC TC controller. At 1524:14 the B737 was 8 miles downwind and was instructed to turn L onto heading 180° towards base leg then further L onto 130°. As the B737 commenced the turn and passed over Ware VRP, the A109 had turned onto a SW track and appeared to be exiting the zone. At 1525:20 the B737 pilot was instructed to turn L onto heading 075° to establish on the LLZ and shortly thereafter cleared to descend to 2000 ft; he reported LLZ established at 1526:12 and was cleared for descent on the GP. At this point, the FIN DIR noticed the unknown traffic infringing the Zone in the B737's 12 o'clock at a range of 3·8 NM; the unknown ac had turned onto a NW track to cross the B737's track R to L through the final approach RW 05. The B737 crew were passed TI and then asked if they wished to continue their approach (1526:30); their response was to break off the approach and execute a go-around. The FIN DIR then instructed the B737 crew to turn R immediately, heading 090° (1526:40); further TI was passed (1526:50) by the FIN DIR as the A109 turned W towards the B737 who reported climbing to 3000 ft. The point of minimum lateral separation occurred at 1527:01 when the A109 passed 0·2 NM NW of the B737 which was turning R on the go-around and climbing through 2600 ft. The B737 was repositioned back onto the ILS whilst the A109 routed to a position near Hunsdon then turned onto a S track to North Weald.

UKAB Note: Stansted radar recording replay and RT transcript at about 1526:40 reveals the FIN DIR transmitting, in response to the B737 crew's go-around call, "*B737 c/s, roger it's coming into your twelve o'clock now I suggest a right turn a right turn heading zero niner zero immediately*". The B737 arrested its descent at 2500 ft QNH for about 10 seconds until the climb through 2600 ft is seen at 1526:58.

ATSI endorsed the LATCC ATCI report commenting that the two ac got very close together in plan despite the Stansted FIN DIR becoming aware of the unknown traffic in CAS when they were about 3·5 NM apart. With hindsight, it may have been preferable to have promptly adopted the guidance given in MATS Pt 1 (page 1-51, para 14 Unknown Aircraft): -

"Give avoiding action if 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."

Nevertheless, the B737 crew were kept updated on the unknown traffic and, as is now known, there was probably never less than 1000 ft separation between the subject 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.

The ATSI adviser reiterated the statement from his report that if the FIN DIR had promptly adopted the MATS guidance of passing avoiding action to the B737 crew, the subject ac would not have come into such proximity. ATCO members surmised that there may have been some reluctance to break off the B737 as a busy instrument approach sequence had been established, the confliction was seen late on radar and the TI that was passed may have allowed the crew to see the traffic visually and continue its approach. For whatever reason, the FIN DIR only noticed the conflicting flight paths after the A109 had been flying in the Stansted CTR for over 2·5 minutes although, initially, it looked as if the helicopter would just cross the SE corner, but it then turned NW and into confliction. Also noted was the lack of STCA alert on the display which was in accordance with system parameters as the A109 was not squawking Mode C; the B737 only received a TCAS TA for the same reasons. Pilot members expressed concern over the airmanship shown by the A109 pilot. By his own admission, his unfamiliarity with his new equipment and the poor visibility led him to become unsure of his track, in relation to Chelmsford, and then his position. There was a learning point for all pilots here. Although this had been an equipment test flight, possible over-reliance on new equipment, whilst flying a high performance ac, could easily and rapidly impair navigation. His primary function should have been to fly and navigate normally to ensure that his ac remained outside CAS and to then cross check this with reference to the 'new NAV kit'. The situation was probably also exacerbated by the 1000 ft cloudbase and the need for the A109's pilot to avoid overflight of built up areas whilst cruising at 600 ft; in skirting around the outskirts of Harlow it may have delayed his early exit of CAS to the S. However, members felt that the pilot, having found that he had infringed CAS or even perhaps earlier, when he had become unsure of his position, should have immediately contacted Essex Radar to inform them of the situation; this would have allowed the controller to identify the ac and subsequently assist the pilot. Ultimately, the subsequent verification of squawk and display of Mode C would almost certainly have avoided the need to break off the IFR inbound traffic. At the end of the day, the Board were in no doubt that in entering CAS without clearance the A109 pilot had caused the incident.

In looking at the risk element, members noted that the A109 had been flying below 1000 ft VFR without the Mode C selected on his transponder. This rendered the STCA useless but the FIN DIR saw the A109 on a conflicting flight path, albeit late, and passed the B737 crew TI. The crew had also received a TCAS TA and elected to carry out a missed approach as the weather was IMC. The

climbing R turn to 3000 ft took the B737 vertically away from the A109 and clear of the helicopter's track, although only by a small distance. These elements combined led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The A109 pilot entered the Stansted CTR without clearance, while uncertain of his position.

Degree of Risk: C

AIRPROX REPORT No 19/01

Date/Time: 17 Feb 1231 (Saturday)

Position: 5140 N 0032 E (15 NM E of LAMBOURNE VOR)

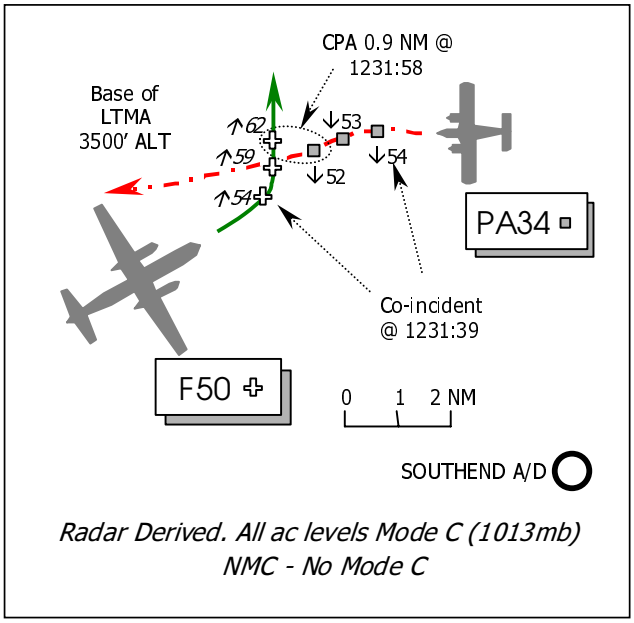
Airspace: London TMA (*Class:* A)

Reporter: ***LATCC TC NE SC***

	First Aircraft	*Second Aircraft*
Type:	F50	PA34 Seneca II
Operator:	CAT	Civ Pte
Alt/FL:	↑ FL110	3000 ft (QNH)
Weather	VMC NR	VMC
Visibility:	>10 km	Not reported

Reported Separation: 3-500 ft V, 1 NM H Not seen

Recorded Separation: 1000 ft V @ 0·9 NM H



Radar Derived. All ac levels Mode C (1013mb)
NMC - No Mode C

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

LATCC reports with RT transcript that the F50 departed London City outbound for Amsterdam, on a CLN 5 N SID. Traffic loading was reported as light when the crew established contact with the LATCC Terminal Control NE Sector Controller (TC NE SC) at 1226 and was cleared to climb to an altitude of 4000 ft London QNH (1042mb), underneath a Stansted departure. A short while later the flight was placed on a heading of 065° and cleared to 5000 ft QNH. At 1230:20, the F50 was about 10 NM E of the LAM VOR and was cleared to climb to 6000 ft QNH. At this point, unbeknown to the TC NE SC, the PA34 was in the F50's 12 o'clock - 10 NM squawking A7000, indicating an altitude of 6100 ft. The SC was not aware of this traffic because the conspicuity code of A7000 was filtered out in accordance with standard TC practice. However, this ac had penetrated the London TMA without clearance, where Class A CAS extends from a base of 3500 ft altitude.

Short Term Conflict Alert (STCA) activated between the F50 and the A7000 squawk at 1230:56. This alerted the SC to the situation when the two ac were about 7 NM apart, as the F50 climbed through 5400 ft QNH. The SC realised this was a genuine confliction and instructed the F50 crew to turn L on to 360°, and passed traffic information on the unknown ac. The F50 crew reported contact with

the other ac on TCAS and shortly after were instructed to expedite their climb up to FL 110, and turn further L on to 350° for avoiding action. Further traffic information was issued and the F50 crew gained visual contact, confirming the other ac was at about 'six zero' and was a low wing monoplane. The F50 subsequently passed clear of the unknown ac and the SC advised the F50 crew that ATC would be filing an Airprox.

UKAB Note (1): The radar display used by TC NE SC, as related in the foregoing, displayed Mode C indications as altitudes, on the applicable London QNH of 1042 mb, for ac below the transition altitude of 6000 ft.

THE FOKKER F50 PILOT reports that the First Officer was the PF, whilst outbound from London City flying on a radar vector of, he thought 070°, at 160 kt. During the climb from 5000 ft London QNH (1042 mb) to their cleared level of FL 100, London CONTROL issued an avoiding action L turn onto a heading of 360°, coupled with a request to expedite the climb to FL 110, before a further avoiding action turn onto 350° was given. A low-wing monoplane, he thought single-engined, with a grey and blue livery was spotted late, at 3 o'clock low, and passed about 1·5 NM away some 3-500 ft below his ac. TCAS enunciated a TA alone which was useful, but he considered the severity of risk to be *"medium"*.

UKAB Note (2): The initial report of a single-engined monoplane, with an incorrect registration initially delayed confirmation of the identity of the other ac. However, radar tracing action conducted by AIS (Mil), enabled the flight to be followed from departure to arrival and confirmed the reported ac to be a twin-engined PA34.

THE PA34 SENECA II PILOT provided a comprehensive account of the flight and reports that his ac is grey with blue and yellow lines and strobes were on whilst conducting a check test flight after the return of the ac from its annual maintenance. The transponder had also been sent away for repair, but they did not have serviceable equipment to confirm the signal at Elstree. Therefore, after departure from Elstree out to the E and after clearing the Stapleford area he asked Thames RADAR if it was convenient to validate the squawk to confirm it was functioning correctly and verify the Mode C to confirm its accuracy. This proved satisfactory and so he advised Thames that he would reset A7000 with Mode C and switched to his enroute frequency for the remainder of the flight.

He turned onto an appropriate heading towards CLACTON VOR to check the other instruments and trims whilst maintaining a listening watch with either Stapleford or Stansted APPROACH. He was approaching cloud ahead with an estimated base of about 1800 ft and the tops up to about 3000 ft so he decided to climb to remain VMC on top. The cloud cover appeared to be continuous ahead with rising tops, therefore, he carried out some heading changes to check the instruments and control surfaces before turning onto a reciprocal track back towards LAMBOURNE. He flew a route between Stapleford and North Weald, the north end of the lakes (UKAB Note (3): about 6 NM W of Stapleford) then direct to Elstree.

He later added that he had not seen the F50 and could not account for his inadvertent incursion into Class A airspace. Although he had seen other ac he was always in good VMC and was surprised to find he may have caused concern to another operator and for which he offered his sincere apologies.

UKAB Note (4): Analysis of the Thames RADAR RT transcript reveals the PA34 pilot called at 1211. After a delay of about 1½ min he reported at 1212:30, that he was conducting a *"…navigation exercise Elstree - Chelmsford – Elstree just in the overhead of Stapleford at this time 2100 feet on 1043* (the applicable London QNH at the time)*…"* and requested a squawk and Mode C check. Thames RADAR assigned a squawk of A7055 and reiterated the QNH as 1043 mb, which the PA34 pilot acknowledged with an accurate readback at 1212:50. The Thames RADAR controller reported that the PA34 was identified just before it crossed the M25 – SE of Stapleford at 1213:30*"…showing 2100 feet squawk ident".* After Thames reported that the squawk and Mode C check were satisfactory the PA34 selected A7000 and switched enroute at 1214:10. Hence, the PA34 was identified as the reported ac whose Mode C was verified to be accurate, some 18 min before the Airprox.

ATSI reports that the TC NE SC did not see the

A7000 squawk – the PA34 – for the reasons given in the LATCC report. This common practice within TC, helps to reduce clutter on the radar displays. However, STCA did activate between the F50 and the unknown ac, which resulted in the track data block for the A7000 squawk being displayed as if it had not been filtered out. The SC passed appropriate traffic information about the unknown ac, instructed the F50 crew to expedite their climb to FL 110 and gave a turn onto N for avoiding action, which resolved the confliction.

MATS Part 1, Page 1-51, details the relevant responsibilities for controllers providing a radar service when an unknown ac is encountered in Class A Airspace which states that; *"Neither avoiding action nor traffic information will 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".* On this occasion it is considered that the NE SC took appropriate action when his radar display revealed that an unknown ac – the PA34 - had made an unauthorised penetration of the London TMA.

UKAB Note (5): A review of the Heathrow radar recording shows that the Airprox occurred just before 1232, about 15 NM E of LAM. The Mode C reference on the recording available to the UKAB was 1013 mb. Hence, as the London QNH was 1042 mb, 870 ft must be added to Mode C FL indications to achieve an equivalent altitude amsl. The F50 is shown turning L onto N in response to the TC NE SCs instruction at 1231:39, climbing through FL 54 Mode C, as the PA34 is 2·6 NM to the ENE in a gentle descent through the same level on a steady WSW'ly track. The F50 steadies northbound at 1231:51, passing FL 59 as the PA34 passed FL 53, some 600 ft below the former. The CPA of about 0·9 NM is shown two sweeps later at 1231:58, as the F50 climbed through FL 62, 1000 ft above the PA34 indicating FL 52. At this point the PA34 was at an equivalent altitude of about 6070 ft London QNH (1042 mb) and about 2570 ft inside Class A 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, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The Board commended the TC NE SC for his prompt reaction when the STCA warned him of the presence of the PA34 within the TMA. Controllers familiar with TC operations endorsed the requirement to suppress A7000 squawks, especially on a Saturday, when the radar picture might otherwise be extremely difficult to use because of the density of traffic beneath the TMA squawking A7000. It was explained that it was the displayed SSR label that was suppressed, including both the code and the Mode C altitude readout. However, the SC could legitimately ignore the remaining plot extracted radar symbol and he could thereby 'deem' the ac contact to be outside CAS. The SC had relied on STCA and it had worked well in this situation, which was reassuring and enabled the SC to detect the confliction at a range of about 7 NM and issue avoiding action instructions. This Airprox was a good testament to the efficiency of STCA and the importance of pilots selecting Mode C if available, when flying in the vicinity of and especially beneath TMAs. Notwithstanding the pilot's sole responsibility when flying VFR, to navigate clear of CAS this was an intricate piece of airspace where the lower levels vary markedly across the whole TMA and some members thought it all too easy for pilots to stray inadvertently up into CAS. However, IFR CAT had to be afforded protection and some civil controllers enquired if any improved SSR height filter settings could be developed to display ac squawking the A7000 conspicuity squawk, if Mode C showed they strayed above the respective base altitudes of the LTMA. If these squawks could be displayed and thereby 'forced' through the filter it might provide SCs with earlier warning of a potential conflicts rather than relying on the essentially 'short term' and hence close range nature of STCA. Programming such equipment was not easy, but a NATS adviser mentioned that some initial work had been done and it might be possible to modify the STCA used in the LATCC TCR. Whilst some controller members thought the choice of the avoiding action L turn was questionable it was pointed out that further traffic outbound from Stansted might have precluded a R turn to pass to the S of the PA34. The instruction to expedite the climb allowed the F50 crew to fly about 1000 ft clear above the PA34 at the CPA; this probably explained why the TCAS

had not generated an RA and merely a TA.

It was evident from the tracing action conducted by AIS (Mil), coupled with the radar recording and analysis of the Thames RADAR transcript, that the reported ac was a not single-engined ac as thought by the F50's first Officer but was indeed a twin-engined PA34. The Board wondered why its pilot could not account for his incursion into Class A. It was surprising that he had not been aware of this at the time especially as he operated from an aerodrome directly beneath the LTMA and the local geography should have been very familiar. They could only postulate that the extensive cloud cover had somehow caused him to misinterpret his position relative to the various base altitudes of the LTMA. Once inside Class A airspace, without an appropriate clearance, he apparently had not seen the F50. On this basis the Board concluded that the cause of the Airprox was an unauthorised penetration of the LTMA by the PA34 pilot. Turning to risk the STCA operated 'as advertised' and allowed the alert SC to issue prompt avoiding action - which resolved the confliction - and traffic information. This in turn facilitated a visual sighting of the PA34 by the F50 crew. All the appropriate safety nets had worked to prevent the PA34 pilot's error from becoming a more serious accident and had effectively removed any risk off a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of the Class A London TMA by the PA34 pilot.

Degree of Risk: C.

AIRPROX REPORT No 20/01

Date/Time: 18 Feb 1717 (Sunday)

Position: 5119 N 0040 E (3 NM ENE DET VOR)

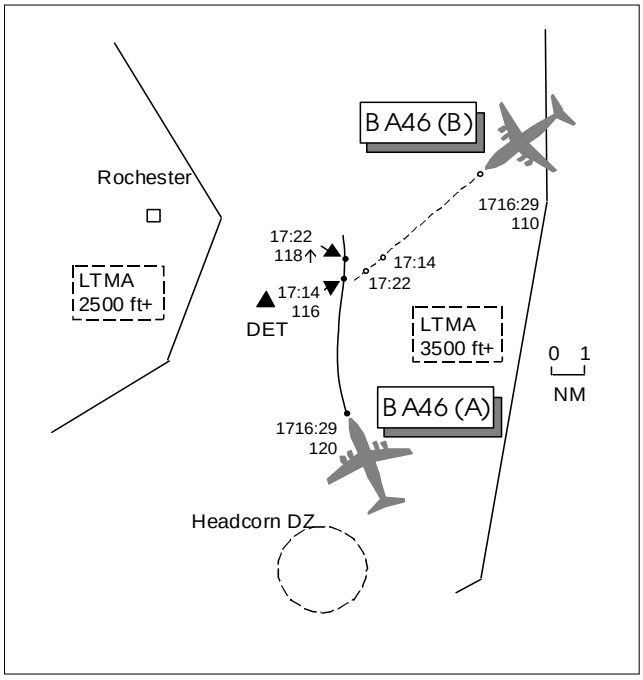
Airspace: TMA (*Class:* A)

Reporter: LATCC TC

	First Aircraft	*Second Aircraft*
Type:	BA46 (A)	BA46 (B)
Operator:	CAT	CAT
Alt/FL:	↓ FL 90	FL 110
Weather Visibility:	VMC CAVOK 50 km	VMC CAVOK 50 km

Reported Separation: 700 ft V 0 H/700 ft V 1 NM H

Recorded Separation: 800 ft V 0.8 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC TC SE (BIGGIN/TIMBA) SC reports that having asked his co-ordinator to obtain a lower level for BA46 (A) inbound to Stansted, to facilitate climb for some Gatwick departures on crossing CLN SIDs, he then descended BA46 (A), without taking into account BA46 (B); BA46 (B) inbound to Gatwick had already descended to a level below BA46 (A). On recognising the confliction, the BIGGIN SC passed avoiding action and TI to BA46 (A) and descent clearance to BA46 (B) whose crew reported having taken TCAS action against BA46 (A) which they had seen throughout the incident.

THE BA46 (A) PILOT reports heading 010° at 290 kt descending from FL 120 to FL 90 inbound to Stansted. When approaching FL 110, he saw an ac on TCAS in his 1 o'clock, about 700 ft below, which he pointed out to his F/O and prepared to disconnect the A/P when the TCAS annuciated '*monitor vertical speed'*. As he arrested the ROD, London ATC gave an avoiding action '*immediate left turn'* and TI; TCAS had worked as intended and had prevented any possibility of collision. The other ac's crew had seen them during the encounter and London ATC's quick reaction had contributed to the safe resolution of the incident. He also believed the risk of collision would have been high if it were not for TCAS.

THE BA46 (B) PILOT reports heading 230° at 250 kt level at FL 110 inbound to Gatwick. When about 25 NM N of MAY, he received a TCAS TA '*traffic'* and saw another BA46 1 NM ahead, crossing L to R, 700 ft above and turning away. TCAS then gave a RA '*descend'* but it was apparent that the other ac was not a threat so he took no action. ATC then apologised and issued descent clearance to FL 100; he assessed the risk of collision as low.

ATSI reports that the SE quadrant of the London TMA (i.e. TC Biggin and TC Timba) was being operated in 'bandboxed' mode. Although the SC assessed the workload and traffic loading to have been "moderate to busy", he did not regard this as a factor which had contributed to the error which led to the Airprox. The relevant ATC equipment was all serviceable and no other factors, which may have adversely affected the SC's performance, were identified during the course of the investigation.

BA46 (A) had been co-ordinated into the sector descending to FL 120, to be level by LYD, en route to DET VOR. BA46 (B) was transferred to the sector under the terms of a Standing Agreement with TC Saber, whereby the flight would cross TANET level at FL 130 en route to DET. The BA46 (A) crew established communication with the sector at 1711:40 and were instructed to leave DET heading 360°. The SC's plan, at that stage, was, in accordance with normal practice, to transfer BA46 (A) to TC North at FL 120 and the flight was initially co-ordinated out of the sector at that level.

The pilot of BA46 (B) established communication at 1714:20 and was instructed to descend to FL 110, routeing direct to MAY VOR. The SC explained that this had been a conscious decision and formed part of his initial plan to get BA46 (B) below BA46 (A). As a precaution, he had "highlighted" BA46 (A) on his radar display to serve as an extra reminder of its presence as it transited the sector.

At 1716:10, the SC instructed BA46 (A) to turn R onto heading 010°; he explained that this was merely a track adjustment to assist TC North by positioning the flight towards ABBOT. At about that time, the SC became aware that there were two Gatwick departures airborne on Clacton SIDs. These would be crossing BA46 (A)'s track and, in order to facilitate the task of climbing them to the Standing Agreement level of FL 130, he elected to descend BA46 (A). TC North agreed to accept BA46 (A) at FL 80 and, at 1716:30, the SC issued initial descent clearance to FL 90. By his own admission, this descent clearance did not take account of BA46 (B), which was approximately 9 NM to the NE, converging at FL 110.

The SC became aware of the developing conflict a short time before the STCA activated, at 1717:12. By that stage, the ac were <3 NM apart with BA46 (A) at FL 116 and BA46 (B) at FL 110. He instructed BA46 (A) to turn L "immediately" heading 330° and passed TI on BA46 (B). The latter was instructed to "expedite" descent to FL 100. The pilot acknowledged the instruction and reported the traffic in sight. In the event, BA46 (B) remained at FL 110 while BA46 (A) levelled at FL 116 prior to climbing back to FL 118; both crews reported receiving TCAS RAs. The SC apologised, admitting an error on his part, and indicated that he would be filing a report on the incident.

Although the SC reacted promptly and issued appropriate instructions, with due urgency, he did not use the words 'avoiding action'. This was queried at the interview and the SC gave assurances that this had been an unintentional oversight in the heat of the moment. In fact, following the incident, he had been convinced that he had employed the appropriate phraseology and was surprised when the subsequent investigation revealed that he had not.

BA46 (A) passed through BA46 (B)'s 12 o'clock position at range of 1.7 NM. Lateral separation had reduced to 0.8 NM as BA46 (A) reached FL

118 but, by that stage, BA46 (B) was passing behind. With the benefit of hindsight, the SC thought that, having resolved the potential conflict between the subject ac, by getting BA46 (B) below BA46 (A), he disregarded BA46 (B) in this context and concentrated on the conflicting profiles of BA46 (A) and the two Gatwick departures. He confirmed that appropriately annotated fps on the subject ac had been present, probably fairly close together, under the DET 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.

It was clear to the Board that the Airprox had been caused by the SC descending BA46 (A) into conflict with BA46 (B) but members wondered what had led him to do so. He had formulated a plan and descended the Gatwick inbound BA46 (B) below the Stansted inbound BA46 (A) who was to leave the sector at FL 120 in accordance with normal practice. Sensibly, he had 'highlighted' (A) on his display as an 'aide memoire' to this plan but then realised that the two Gatwick departures through his Sector that were routeing to CLN would be better accommodated if (A) was at a lower level. This seemed to capture his attention and after successfully co-ordinating a lower level with TC N, it appeared that his mental process locked onto quickly executing (A)'s descent to accomplish this new plan but to the exclusion of (B), whose presence was overlooked. Some members were surprised that BA46 (B)'s crew did not immediately descend to FL 100 when instructed to *"expedite"* during the encounter. But the crew had received a TCAS TA and had seen the other BA46, before receiving an RA 'descend' once the other ac had passed and was seen to be clear. The crew did subsequently descend when the SC issued descent clearance to FL 90 very shortly afterwards.

As to risk, both crews had received TCAS alerts; BA46 (A) crew arrested their descent in response to an RA and (B), on seeing (A), remained level after their TA warning. The SC had acted upon his STCA by passing an avoiding action L turn and TI to BA46 (A) followed by a descent clearance to BA46 (B). All these factors combined led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The LATCC TC SE SC descended BA46 (A) into conflict with BA46 (B).

Degree of Risk: C

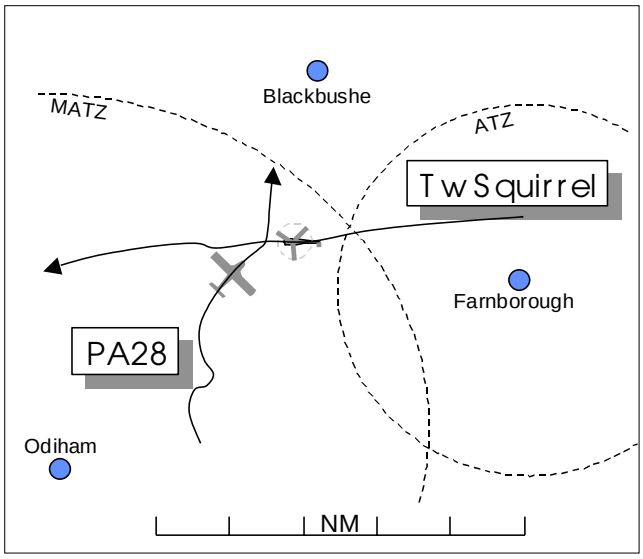
AIRPROX REPORT No 21/01

Date/Time: 16 Feb 1605

Position: 5117 N 0052 W (3.5 NM WNW of Farnborough - elev 237 ft)

Airspace: MATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Twin Squirrel	PA28
Operator:	Civ Comm	Civ Trg
Alt/FL:	2400 ft (QNH 1036 mb)	(QNH)
Weather Visibility:	VMC CLBC 6-8 km	VMC
Reported Separation:	200 m	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TWIN SQUIRREL PILOT reports heading 260° at 115 kt on an air test, cleared to transit the Farnborough/Odiham zones along the railway line at 1000 ft. He was warned by Farnborough ATC of conflicting traffic and assumed he was under a 'radar/MATZ penetration service'; he was then asked to fly at 2400 ft to deconflict from departure traffic. He was conducting autopilot checks when he was told by his engineer passenger that a fixed wing ac had passed close by at the same level, banking right in avoiding action. It was first seen when 2-300 m away at their 9 o'clock. He had not seen it from the RHS and considered the risk of collision had been high. He asked the controller if this traffic was under service; the controller replied that he had just taken over and was not aware that the helicopter was under service until reminded of his squawk. A RIS was then formally applied.

He included a list of contributory factors: His lookout had not disclosed the orange and white ac; he had not checked the ATS being provided by Farnborough and believing he had been under a radar service may have relaxed his lookout; the airtest required some 'heads-in' time; he had assumed ac in the Odiham/Farnborough ATZ/ MATZ would be talking to Farnborough, and the visibility into sun to his left was in fact not as good as to the N where he could see Blackbushe circuit traffic.

THE PA28 PILOT was unavailable until 7 Apr; his memory of events was therefore sketchy. He reports heading N at 110 kt recovering to Blackbushe on an instructor training sortie in his red, white and yellow ac. He could not remember anything about his ATS but said he would have talked to Farnborough to penetrate the zones; Farnborough usually released them to Blackbushe before they cleared the zone. His student remembered they got a late sighting of the helicopter and turned sharply right to avoid it.

UKAB Note: The Pease Pottage ATC radar recording shows the Twin Squirrel squawking 0453, 1700 ft Mode C, on a westerly track with a 0443 NMC squawk closing from its 10:30 on a track skirting the W edge of the Fleet built-up area. The 0443 becomes primary-only when abeam Odiham and the returns pass very close at 1605:15. The primary-only disappears 1·5 NM short of Blackbushe; Farnborough identified the ac from its 0443 squawk. 1700 ft Mode C equates to 2300 ft on the QNH 1035 mb.

ATSI reports that the PA28 established contact with Farnborough at 1556. The pilot stated that he was returning to Blackbushe from the south, at 4000 ft, and requesting a FIS. The Farnborough LARS

controller, who was quite busy at the time, allocated a squawk of 0443 and passed the Farnborough QNH. At 1558, the controller identified the PA28 2 NM south of Lasham and established a FIS which the pilot acknowledged. The pilot was asked if he was maintaining 4000 ft, as there was no Mode C readout.

At 1559 the Twin Squirrel, contacted Farnborough LARS stating that he had departed from Fairoaks and was passing Woking at 1000 ft. The pilot requested to route down the railway line to the west of Basingstoke to carry out an air test. The Twin Squirrel was allocated a squawk of 0453 and, at 1600:30, was identified ½ mile south east of Knaphill and placed under a FIS. At 1601, the Farnborough controller requested that the Twin Squirrel climb to 2400 ft in order to facilitate departing traffic from RW 07 at Farnborough.

At 1604, the PA28 was about 4 NM west of Farnborough, and advised the controller that he was changing frequency to Blackbushe Information. The controller instructed the PA28 to squawk standby and approved the frequency change. The pilot of the PA28 did not report leaving 4000 ft nor was he requested to do so by Farnborough. Under the provisions of a FIS, as stated in MATS Part 1, there is no need for the controller continuously to monitor the flight on radar and traffic information is only passed subject to workload. The responsibility for keeping a good look-out and remaining clear of controlled airspace rests with the pilot. At the time there were some 15 ac on frequency some of which were receiving a Radar Information Service (RIS).

At 1607 the Twin Squirrel called the Farnborough LARS controller (now a different one as a hand-over had taken place) and stated that he was leaving the Odiham MATZ at Basingstoke and requesting a RIS. The controller queried what the Twin Squirrel was squawking and the pilot confirmed it was 0453 as allocated by the previous controller. At 1607:30 the controller advised the Twin Squirrel that he was identified 3 NM N of Odiham and now under a RIS. The pilot then asked whether his flight had been monitored whilst it transited the MATZ as some traffic had come close to him. The Farnborough controller advised that he had just taken over and had not looked at the relevant flight progress strip. It would therefore appear that the hand-over between controllers at Farnborough could have been conducted in a more effective manner enabling the oncoming controller to obtain a more comprehensive understanding of the traffic situation before accepting responsibility for the operational position.

The Farnborough MATS Part 2 requires the Farnborough LARS controller to co-ordinate all traffic entering the Odiham MATZ with the Odiham Radar controller and to obtain a clearance from the Odiham aerodrome controller for all traffic below 2000 ft within 3 NM of Odiham. The last notified level that the PA28 reported to ATC was above the MATZ and so would not have been subject to co-ordination. When the Odiham position, located at Farnborough, is not manned the Farnborough LARS controller co-ordinates direct with the Odiham aerodrome controller in respect of any traffic as specified above.

Given that both ac were in receipt of a FIS and, based on the information passed to ATC by the pilots, there was no obvious confliction between the PA28 and the Twin Squirrel. Under the terms of a FIS there would have been no requirement for traffic information to be passed.

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 appreciated the full and helpful report from the Twin Squirrel pilot. The incident provoked much discussion about Air Traffic Services and pilots' interpretations of them which often, as in this case affected the outcome. The Twin Squirrel pilot had thought he was receiving a radar service which may have affected his lookout. Members discussed what ATS should have prevailed in the Farnborough ATZ/Odiham MATZ.

The AIP (ENR 2·2·4·1 para 2.2) says of a MATZ crossing service: "The service will, whenever possible, be based on radar observations and either a Radar Advisory or Radar Information Service will be given." So, unless advised otherwise, the helicopter pilot might have expected a radar service. The service was not stated when he called

Farnborough, and he was almost immediately given radar information. Half a minute later he was formally identified and told "Flight Information Service" and asked if he would be maintaining 1000 ft. He answered the question but appears not to have absorbed the FIS part of the transmission which he did not read back. The Board agreed that it is essential that pilots understand what ATS applies at all stages of flight and to ask if it is not stated. Since the Board's meeting it has become evident that the above provisions of the AIP ENR are not applied at some MATZs where there is civilian ATC, and the ATS specified in the ENR are consequently under review.

Turning to the PA28 pilot, members noted that he had descended below 4000 ft without telling Farnborough, which he was not oblighed to do. He may have begun his descent after leaving their frequency, but he had descended into the Odiham MATZ without informing anyone. While an unannounced MATZ penetration was not against the law, members considered it poor airmanship. GA members pointed out that Blackbushe pilots must often be invited to change frequency to Blackbushe below 3400 ft QNH, whenever the Odiham controller is satisfied that no conflictions exist within the MATZ; these pilots may tend to assume when invited to call Blackbushe that they are clear of conflictions and clear to penetrate the MATZ, as apparently happened here. It was also noted that Farnborough's frequency was easily the busiest LARS frequency in the country and that it was sometimes simply impossible for controllers to pass all the traffic information they would like to and for pilots always to keep the controller updated with height changes.

In assessing the ATC aspects, the Board took into consideration the 15 ac on frequency. In the circumstances, with the PA28 under a FIS, at 4000 ft as far as the controller was concerned, if indeed its FPS was still displayed, it was perhaps not surprising that the off-going controller did not draw the oncoming controller's attention to it. A controller handover, with 15 ac on frequency, would have tended to concentrate on the ac under RIS, but members agreed that the oncoming controller should have familiarised himself with the FPS for ac crossing the zone. Had he done so, he might have been able to provide a more satisfactory response to the helicopter pilot. Even so, he would still not have passed traffic information on the PA28's return as he would have had no reason to believe it was in the MATZ. Only if the handover had been sufficiently comprehensive to include the PA28's primary-only return as one returning to Blackbushe, might the thought be triggered that it could be descending.

The Board concluded that because the PA28 pilot had descended into the MATZ without telling the controller, or perhaps not being able to, he had a primary responsibility to see other ac and to avoid them especially those converging from his right (Rules of the Air). Therefore the main cause of the Airprox was the PA28 pilot's late sighting of the helicopter. The Board also agreed that while conducting a distracting task such as an airtest, lookout remained a primary responsibility and enough crew members should be carried to enable a satisfactory watch to be kept. The helicopter pilot did not see the PA28 and the crew only saw it as it was passing; this non-sighting of the PA28 was also part of the cause. Members assessed that the late sightings and relatively close passage meant that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the PA28 pilot and a non-sighting by the Twin Squirrel pilot.

Degree of Risk: B

AIRPROX No 22/01

Date/Time: 17 Feb 1129 (Saturday)

Position: 5150 N 0029 W (5 NM WSW of Luton Airport – elev. 526 ft)

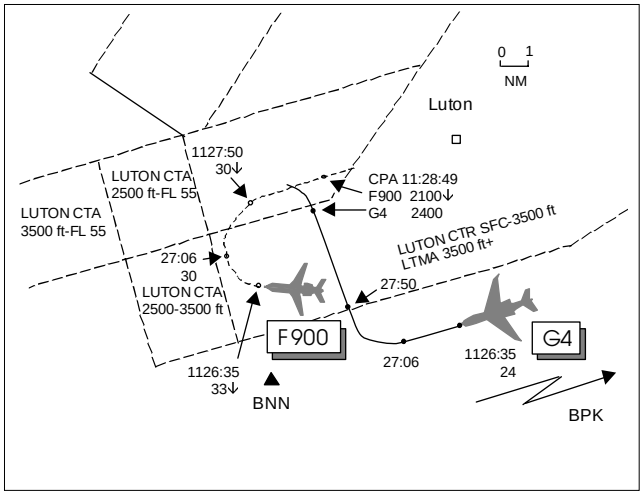
Airspace: CTR (*Class:* D)

Reporter: LONDON FISO

	First Aircraft	*Second Aircraft*
Type:	G4	Falcon900
Operator:	Civ Pte	Civ Pte
Alt/FL:	2400 ft (QNH NK mb)	2000 ft ↓ (QNH 1043 mb)
Weather Visibility:	VMC CBLC 10 NM	VMC CAVOK 8 km

Reported Separation: 1000 ft V 2-3 NM H /NK

Recorded Separation: 300 ft V 1.4 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LONDON FLIGHT INFORMATION SERVICE OFFICER (FISO) reports that the G4 pilot contacted him 10 NM E of BNN VOR at 2400 ft and requested to fly direct to Farnborough, his destination. He advised the G4 pilot that the direct route would take him over Heathrow and would not be possible; the pilot then requested a suitable routeing. The FISO allocated a squawk 0031 (FIR lost) and telephoned TC for assistance; the TC controller advised him to turn the G4 L immediately as it was "head on" to Luton inbound traffic. He informed the G4 crew who reported visual with the Luton traffic and he then transferred the G4 to Luton approach for an en route service.

THE G4 PILOT reports flying IFR from Cambridge to Farnborough at 2400 ft and 220 kt. He had booked out with Cambridge TOWER on the RT and had requested an IFR flight plan to Farnborough; the ADC had confirmed that this was possible and he was issued with a heading, altitude and IFF code prior to departure. He initially proceeded to BKY then onto BPK, whilst awaiting climb clearance from 2400 ft which he had requested on two occasions and had been advised that co-ordination was in progress. As he approached BPK, the controller advised that he would be unable to continue on his track as it would take him into the London control area and he should turn towards BNN. Subsequently, nearing BNN, he was advised that he could no longer proceed in that direction so he initiated a R turn to reverse his course. The controller then advised that he had turned towards Luton airspace and he was instructed to contact Luton approach who gave him a L turn and subsequent vectoring towards Farnborough. He saw a low wing ac, either a Citation or Falcon, at range 3 NM which crossed L to R 2–3 NM ahead and 1000 ft below descending. He had been flying VFR at all times and had been looking out for other traffic visually as well as on TCAS. In the vicinity of BPK he had seen another ac but both had turned R in avoidance manoeuvres and passed at least 2 miles apart.

During a subsequent telephone conversation with Cambridge to establish the reason why he had not been allowed to climb into CAS, the Captain was informed that London had been completely saturated and unable to accept his flight. He apologised for any unnecessary concern he had caused and stated that he would in future ensure that he had a complete 'expected ATC routeing to destination' before departure.

THE F900 PILOT reports flying inbound to Luton established on the ILS RW 08 descending through

2000 ft. He was passed traffic information (TI) from Luton Approach on converging traffic which he did not see, either visually or on TCAS; no alerts were received.

ATSI reports the G4 had filed an IFR flight plan at Cambridge to route Cambridge - BKY - Farnborough at 2400 ft. Having departed from Cambridge, ATC arranged for Essex Radar to provide a limited Radar Information Service. At 1116:40 the G4 established contact with Essex Radar stating that it was levelling at 2400 ft en-route to BKY. A squawk was allocated and at 1118:20 the G4 crew were advised that they were under a limited RIS; the controller did not give the pilot his position, as required in MATS Part 1 page 1-47. The pilot then queried his routeing after BKY and it was suggested that he route BPK and then a R turn towards BNN.

Essex Radar was working another ac routeing towards BKY for Cambridge, also at 2400 ft. TI was passed to both ac but the Essex Radar Controller incorrectly stated that the G4 was operating under VFR. The Essex Radar Controller suggested that the G4 could turn direct to BPK which would assist to resolve the confliction; the G4 crew followed this advice.

At 1123:00, the Essex Radar Controller advised the G4 crew that they were clear of CAS, to squawk standby and continue on their en route frequency. The pilot queried the next frequency and Essex Radar suggested London Information on 124·6 MHz.

At 1124:50 the G4 pilot contacted London Information, whom he called 'En Route Control', and was told to standby. At 1125:30 the G4's flight details were taken by the London FISO and the crew gave their position as *"10 miles east of BNN".* The FISO asked the G4 crew for their proposed routeing after BNN and, on receiving the pilot's reply, then advised them that a track of BNN direct to Farnborough would take the ac overhead Heathrow. When the pilot asked for a route the FISO instructed the G4 crew to remain outside CAS.

At 1127:00 the pilot stated that he was turning R and analysis of the radar recording indicates that a turn was made from a track of 255° onto 350°. The FISO requested the pilot to squawk 0031, the 'aircraft lost' code. The pilot did this and asked to what height he could climb and remain outside CAS. The FISO, having co-ordinated with TC, relayed an instruction for the G4 to turn L immediately as it was within Luton's Control Zone and in conflict with a Luton inbound.

The pilot of the G4 reported the other traffic, a F900, in sight and turned L; the G4 was then transferred to the Luton Director's frequency. At the same time, TI was passed to the F900 and, subsequently, the G4 was vectored away and on track to Farnborough. Minimum separation (CPA) was 300 ft and 1.4 NM.

In the G4 pilot's report after the Airprox, he stated that he had asked for further climb on a couple of occasions and that, approaching BPK, the controller advised that he would be unable to continue heading in this direction because of the London Control Area. Analysis of the RT tape does not support either of these claims.

There were no apparent ATC causal factors found.

UKAB Note: Replay of the Heathrow radar at 1126:35 shows the G4 7 NM E of BNN squawking 7000 maintaining altitude 2400 Mode C tracking 255° with the F900 3·5 NM N of BNN in a R turn onto a base leg for RW 08 at Luton descending through 3300 ft. At 1127:06, the G4 is seen to commence a R turn with the F900 established on R base at 3000 ft 7·2 NM to the NW. 44 seconds later, the G4 is seen to enter the Luton CTR tracking 350° and its squawk changes to 0031 with the F900 in its 11 o'clock 5·2 NM commencing descent on the ILS RW 08 from 3000 ft. Both ac continue on steady tracks; the F900 crosses 1·7 NM ahead of the G4 at 2200 ft until CPA occurs at 1128:49 with the F900 in the G4s 1 o'clock. 4 seconds later, the G4 is seen to commence a L turn away.

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 from the appropriate ATC authorities.

The Board were bemused by the G4 crew's flight planning and subsequent expectations from ATC. The G4 pilot's statement that he would in future

ensure that he had a complete 'expected ATC routeing to destination' prior to departure led members to believe that perhaps the crew were unfamiliar with UK flight planning requirements, ATC services and procedures. It was noted that the G4 pilot had filed an IFR plan at 2400 ft through Cambridge ATC before departure but was then apparently unaware of his routeing once airborne and had made inappropriate requests en route (climb above 2400 ft into CAS and direct routeing to Farnborough). Pilot members had experienced similar procedures when flying abroad whereby ac can depart aerodromes and then follow ATC routeing to a destination but they agreed that within UK airspace this was not acceptable practice. This Airprox had been caused by the G4 entering the Luton CTR without clearance and flying into proximity with the F900. However, it was unclear why the G4, in seeking to reverse its course to return to Cambridge, only turned through 90° and then flew into the CTR. The Board commended the subsequent actions of the FISO, who instructed the G4 crew to select 0031 (FIR lost) squawk and then co-ordinated with TC for assistance.

Looking at the risk element of the incident, members took note of several points. The FISO had alerted TC and Luton APR with the 0031 code that the ac needed assistance. Meanwhile, the G4 had been flying VFR although he had filed an IFR plan and had received a TCAS TA warning which alerted him to the F900's presence and which he saw visually. These factors combined led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised entry of the Luton CTR by the G4 pilot, who flew into conflict with the F900.

Degree of Risk: C

AIRPROX REPORT No 23/01

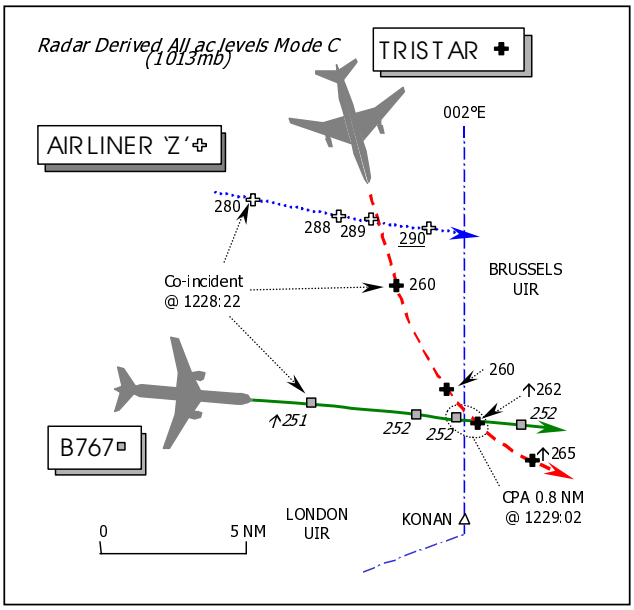
Date/Time: 17 Feb 1228 (Saturday)

Position: 5111 N 0200 E (3·5 NM N of KONAN)

Airspace: UAR – UG1 (*Class:* B)

	Reporting Aircraft	*Reported Aircraft*
Type:	B767	L1011
Operator:	CAT	Foreign Mil
Alt/FL:	FL 252 ↑	↑ FL 280
Weather	VMC CAVOK	Not reported
Visibility:	>50 km	Not reported
Reported Separation:		
	<50 m H, 800 ft V	Not reported

Recorded Separation: 0·8 NM H, 1000 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B767 PILOT reports he had departed London Heathrow for Munich, eastbound on UG1 under the control of LATCC at 330 kt, level at FL 250 and

approaching a position about 5 NM N of KONAN on the UIR boundary. ATC issued a climb clearance to FL 270 and a slow climb was initiated. Heading 095°, passing FL 252 in the climb, the TCAS enunciated a TA. An L1011 Tristar was sighted crossing his track from L – R, 800 ft above his ac and climbing slowly. He reduced his B767's ROC to 100 ft/min to avoid the other ac and the vertical separation remained constant at 800 ft for about 1 min, as the Tristar overflew less than 50 m ahead of his ac. He opined that ATC "was under the impression" that the Tristar was well clear above his ac, but he believed that the L1011 was climbing at about 100 ft/min. The risk was assessed as *"High"* and he reported the Airprox to LATCC.

THE LOCKHEED L1011 TRISTAR was flying under contract to the USAF. Despite repeated requests through the good offices of HQ 3AF, no report has been forthcoming from the pilot. The company merely commented that they "can find no record of such an occurrence involving our ac. In such cases…TCAS will alert the crew (and) when a TCAS warning occurs, a report must be filed with the company. As far as our crew knows, the situation did not occur hence they would not have filed a report".

UKAB Note (1): The UK AIP at ENR 1-1-3-1, stipulates that "…pilots of ac commencing a climb or descent in accordance with an ATC clearance should inform the controller if they *anticipate* that their vertical speed during the level change will be less than 500 ft/min or, ……their vertical speed is in fact less than 500 ft/min".

THE LATCC DOVER/LYDD SECTOR CONTROLLER (DVR/LYD SC) reports that the L1011 Tristar had initially been co-ordinated into the DVR Sector at FL 290 routeing CLN-DVR-KOK. GAT outbound from the LTMA transiting through the Sector, including the B767, had been climbed to procedurally safe levels beneath the Tristar.

Conflicting traffic in the CLACTON (CLN) Sector prevented CLN from achieving this initial co-ordination and so the Tristar was co-ordinated to enter the DVR Sector at the lower level of FL 260. Subsequently, the B767, which had been cleared to climb to FL 270 on a radar heading of 095° against other traffic, was instructed to stop climb at FL 250, beneath the Tristar's assigned level.

When the Tristar crew called on the DVR Sector frequency about 10 NM N of DVR, they were instructed to turn L direct KOK and cleared to climb to FL 280. Over this period there were several revisions to the planned co-ordination; the B767's level was changed to FL 280 from FL 290 and then again to FL 270; the Tristar was changed to FL 250 from FL 290 and a third ac – Airliner 'Z' - to the N of the B767 and on a parallel heading, was assigned FL 290.

After the B767 was issued clearance to climb from FL 250 to FL 270, the crew reported they had traffic on TCAS at FL 260 and were aborting their climb. At this point the labels of the B767 and Tristar were garbling to the E of KONAN. The B767 pilot then reported his intention to file an Airprox.

ATSI reports that the DVR and LYD Sectors were bandboxed together at the time of this Airprox. Initially, the SC reported that the workload had not been high but in the 15 min period leading up to the Airprox, he considered that the traffic situation on the combined sectors was very busy. A request for the sector to be split had been made shortly before the occurrence, but had still not taken place.

The B767 crew contacted the DVR/LYD SC at 1222, maintaining FL 170 on a heading of 100°. The flight was placed on a radar heading of 095°, to parallel another slower Airliner - 'Z' and about 1 min later the B767 crew was instructed to climb to FL 270. The SC confirmed that he was aware of the Tristar's flight details and that it had been co-ordinated into the sector, routeing CLN - KONAN, at FL 290. However because of problems being experienced getting the Tristar to its co-ordinated level of FL 290, the CLN Sector requested if the flight could be accepted into the DVR/LYD sector *climbing* to FL 290 instead of it being transferred *level*. The CSC who had answered the call asked the SC if that was acceptable, but as the workload had now increased significantly he refused, saying that he would prefer the CSC to co-ordinate an actual level. The Tristar was thus co-ordinated into the sector at FL 260 and the SC confirmed that he was made aware of this new level. The SC commented that the Tristar was not a problem to the traffic situation on his sector at FL 290 as it had been co-ordinated out of the sector at that same level. However, the Tristar was now at FL 260 and his already busy workload was increased

because he had to concentrate his attention on the developing scenario with the B767 and the other slower Airliner 'Z'.

His first reaction was to instruct the B767 to stop its climb at FL 250 to ensure vertical separation from the Tristar, whose crew made their initial call on the DVR/LYD Sector at 1227, heading 160° at FL 260. The Tristar crew were instructed to continue on the heading initially, followed shortly afterwards when it was clear of Airliner 'Z' with an instruction to route direct KOKSI. At 1228:12, the SC cleared the Tristar to climb to FL 280, its revised exit level out of the sector. Immediately afterwards, the B767 crew was instructed to climb to FL 270, its level for transfer to Maastricht UACC. The radar recording at 1228:22, shows the subject ac on converging tracks, 5·3 NM apart, the Tristar maintaining FL 260 to the NE of the B767, which is at FL 251. The much slower Airliner 'Z', is eastbound about 6 NM behind the Tristar, passing FL 281. The SC could offer no explanation as to why he had instructed both ac to climb on potentially conflicting tracks, without ensuring that vertical separation would be maintained. He certainly did not realise that the instructions issued at the time had placed the B767 and Tristar in conflict, but added that he must have thought that the Tristar was maintaining FL 280, for some inexplicable reason.

The SC was first aware of the deteriorating situation when the B767 crew reported an ac crossing overhead at FL 260. The SC's immediate reaction was that the ac was at FL 280 and he conveyed this impression to the pilot by transmitting that it should be well above, but added that the respective SSR labels of the two ac were overlapping garbled. When the B767's pilot reiterated that the ac was at FL 260 the SC realised the situation from his radar display and asked if he wished to file an Airprox report. The pilot reported that the ac had passed directly overhead, 800 ft above and was now 1600 ft above, clearing away to the S. The B767 pilot later reported receiving a TCAS TA alert on passing FL 252 and he had reduced his ROC for 1 min as the ac passed overhead. At 1228:50, the radar recording shows the B767 at FL 252, with the Tristar at FL 260, on a conflicting track, 1·6 NM to the NE. By the time the Tristar crossed at the CPA 0·8 NM ahead of the B767, 12 sec later at 1229:02,the two ac were separated by 1000 ft.

Analysis of the RT recording revealed that the RT loading increased rapidly in the period leading up to the Airprox. It was noticeable that a number of minor transmission errors were made in this period, indicating a high workload. With hindsight, it would have been prudent to split the two sectors earlier, especially as the traffic loading was divided equally between DVR and LYD. However, no Overload Report was filed for the period.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the B767 pilot, transcripts of the relevant RT frequencies, radar recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The Board was dismayed at the negative response from the L1011 Tristar pilot's company despite encouragement from HQ 3AF to provide a comprehensive report. This left several questions unanswered, which members thought was a very unsatisfactory situation. Such an inadequate response was not in accord with the spirit of open reporting and left the Board with no other option but to formulate a view on cause and risk without any information from the Tristar pilot.

From the B767 pilot's comprehensive report he clearly believed that the Tristar was climbing slowly – he suggested at 100 ft/min. However, the radar recording suggested that rather than climbing slowly, the Tristar crew had been slow to initiate the climb. The SC had instructed the Tristar crew to commence the climb at 1228:12, yet at 1228:50 it was still at FL 260; subsequently it passed FL 262 at 1229:02 then FL 265 at 1229:21 climbing at about 1000 ft/min apparently normally. Given the performance of the B767 some pilot members thought it hardly surprising that it would out-climb the Tristar, but they noted that the B767 pilot had started a 'slow' ascent. Assisted soon after by the TCAS TA he then spotted the confliction and took prompt, effective action to maintain safe separation. It was not known if the Tristar pilot had received a similar TA or whether he had seen the B767. However, neither pilot should have been placed in this situation and both could reasonably have expected that ATC would ensure that standard

separation was maintained between the subject ac.

Looking at the ATC situation at the time of the incident the bandboxed DVR/LYD sector had been very busy and members were disappointed to see that yet again bandboxed sectors had been a factor in raising, perhaps unnecessarily, the SC's workload. A controller member explained that it was usually a joint decision between the SC and the CSC to split combined sectors and in this case the decision had certainly been taken shortly before the Airprox occurred, but apparently the other controller had not yet arrived at the Suite to enable this to be accomplished. Some thought that the sector should have been spilt earlier, but this was easy to say with hindsight. Another (controller) member thought the SC was far too busy to decide when to split the Sector. The SC had been coping with the multiple changes of co-ordination forcing him continually to revise his plan for climbing the subject ac to their sector exit levels and the increased RT loading was indicative of the high workload just before the Airprox occurred. It was suggested therefore that the CSC had been in a better position to judge the situation, but with all the changes of co-ordination that took place it was probable that the CSC would also have been too busy by then. The learning point to highlight was that a decision to split had to be taken early and that delay can often lead quickly to a non-recoverable situation. This is what happened in this incident where, additionally, high workload for both was considered to be a contributory factor. The close proximity of the slower airliner 'Z' and overlapping SSR labels, coupled with all the changes of plan that took place in a short time – a very significant factor – added unwelcome pressure in a deteriorating situation that culminated in the SC making the fundamental error of clearing both the B767 and Tristar crews to climb in short succession. A civil controller member said he understood the SC's plight and why he had thought the Tristar was at FL 280 (and not climbing from FL 260), however the FPSs should have shown him the true situation. In the event the SC had, whilst very busy, instructed both the Tristar and the B767 crews to climb on conflicting tracks, without ensuring that separation would be maintained.

The Board agreed therefore, that the Airprox was caused by the DVR/LYD SC, who climbed the B767 into conflict with the L1011 Tristar. Fortunately the B767 pilot had been alerted to the impending conflict by TCAS and his prompt reaction and wise decision to reduce the ROC whilst monitoring the Tristar visually, prevented the situation from becoming more serious. This ensured that standard vertical separation was only eroded by 200 ft at worst for a short period and with this in mind the Board agreed unanimously that the B767 pilot had effectively removed any risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The DVR/LYD SC climbed the B767 into conflict with the L1011 Tristar.

Degree of Risk: C.

Contributory Factors Bandboxed sectors not split early enough – high SC workload.

AIRPROX REPORT No 25/01

Date/Time: 22 Feb 0722

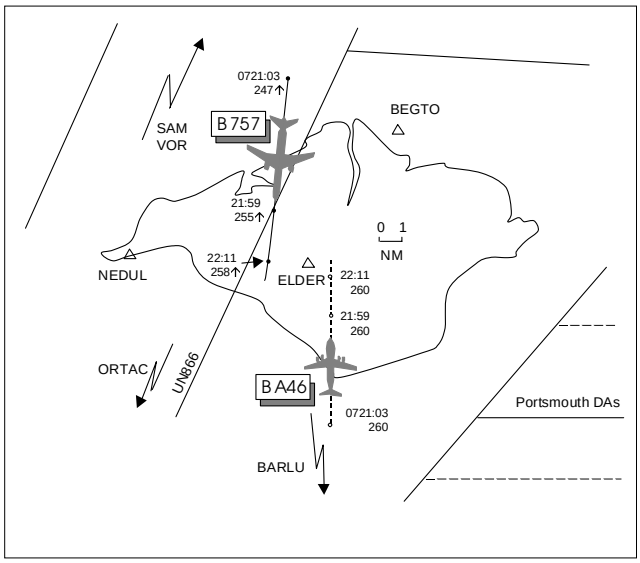
Position: 5040 N 0120 W (18 NM S of SAM VOR)

Airspace: UIR (*Class:* B)

Reporter: LATCC AC

	First Aircraft	*Second Aircraft*
Type:	B757-200	BA46
Operator:	CAT	CAT
Alt/FL:	↑ FL 260	FL 260
Weather	VMC	VMC
Visibility:	>30 km	NK
Reported Separation:	NK	NK

Recorded Separation: 200 ft V 3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LATCC AC HURN SC reports that he was operating as an OJTI to a trainee when the RT and traffic loading increased to a point where the trainee was falling behind the situation. He took over control with the trainee remaining in front of the display and continuing to mark the fpss. The RT was busy with a broad mix of inbounds, outbounds and overflights through the area. He had not positively recognised that the trainee had climbed the S bound B757 to FL 260 which was in direct conflict with the N bound BA46 cruising at the same level; the B757 had been obscured by another climbing ac on a similar track. The activation of STCA brought the error to his notice; he turned the B757 R onto heading 230° and climbed it to FL 290. The B757 pilot acknowledged the clearance and informed the SC that he had the other ac, the BA46, in sight.

The SC felt that he missed the confliction because he remained seated in an offset position whilst the trainee continued marking the fpss. Also, he had allowed the trainee to continue controlling beyond his capabilities and then he had to 'catch-up' with the situation.

THE B757 PILOT reports flying en route to the Canary Islands working LATCC when he received a TCAS TA *"traffic"*, which he saw visually but it was too far away to recognise, followed by an ATC instruction to turn R. He assessed the risk of collision as low.

THE BA46 PILOT was informed after landing that his ac had been involved in an Airprox in the vicinity of SAM. The TCAS equipment on board the ac had been u/s and he had not seen any conflicting ac or been informed of the incident by ATC. He was unable to contribute any information on the incident.

ATSI reports that the Hurn Sector was operating in bandboxed configuration (HURN W, E and LOW) at the time of the incident and was staffed by a mentor and a trainee SC. The latter was an experienced controller, working previously at an Aerodrome/Approach Radar Control Unit. He had completed about 75 hours training at LATCC but, because of other training commitments, less than half had been on the Worthing Suite (Seaford/Hurn Sectors). The mentor described the workload as moderate, whereas the trainee considered the sector to be very busy, especially taking into account his stage of training. With hindsight, the mentor considered that it may have been prudent if the sector had been split so as to accommodate his trainee's lack of practical experience at the

position. The Chief SC position was also staffed by a mentor and trainee however, this was not considered to be a contributory factor to the incident, especially as the trainee CSC was retraining on the sector, having previously held a CSC Certificate of Competence for that position.

Whilst not remembering the exact timing, at some time prior to the incident, the SC mentor said that he had been distracted for a short while by a discussion with a colleague about future rostering. He could not state categorically whether or not this distraction was a contributory factor to the incident but it may have resulted in an increased workload, albeit for a short time.

The BA46 crew established communication with the Hurn Sector at 0712, maintaining FL 260 en route to BARLU. The ac's flight plan route was UB11 to Southampton (SAM), then UR37 to EXMOR, followed by UR14 to destination. This routeing was described by both controllers interviewed as unusual and used only by one particular airline to avoid anticipated ATC delays. The trainee confirmed that he was aware of the ac's route although his mentor did have to prompt him to ensure the correct routeing was passed to the pilot. The trainee then dealt with a number of calls, including those associated with ac inbound to Gatwick on UR8. About five minutes after it had made its initial call, the BA46 was instructed to continue on its present heading of 355°. The trainee stated that the heading instruction was issued to the BA46 in respect of the B757, which was not yet on frequency but had been accepted into the sector at FL 210, routeing southbound on UR41 and UN866, via SAM and ORTAC.

The B757 pilot made his initial call to the Hurn Sector at 0719, reporting level at FL 210, just by SAM; the ac had been co-ordinated out of the sector at FL 290. The trainee said that there had been another southbound ac in its vicinity, which he could see from his radar display had passed FL 260. Consequently his plan was to clear the B757 to climb initially to FL 260. He realised that this was the level occupied by the BA46 but estimated that the two ac would pass each other by, at least, the requisite 5 NM horizontal separation. Accordingly, he started to transmit the climb instruction to the B757 but, as he did so, his mentor prompted him to instruct the flight to turn L slightly. For this reason he instructed the B757 to turn L heading 200° and climb to FL 260, to expedite through FL 240. The heading change and expeditious climb was to ensure separation from an ac eastbound on UR8, which was then given descent to FL 180. The trainee commented that, although the B757 was turning L towards the track of the BA46, he still estimated that horizontal separation would be maintained. However, he did not take into account the prevailing strong NW wind, which he recollected was about 65-70 kt. This resulted in the B757 tracking further E than he anticipated and, thereby, into potential confliction with the BA46. The mentor said that he was aware that his trainee had instructed the B757 to climb underneath other traffic to the same level as the BA46 but he also anticipated that higher levels would soon become available, enabling his trainee to issue further climb and, therefore, to provide the requisite vertical separation.

Once the instruction to descend to FL 180 had been passed to the UR8 traffic, the mentor decided to take over the RT as he felt that his trainee, who was showing increasing signs of hesitation when transmitting, was not keeping up with the traffic situation. Rather than remove the trainee from his position directly in front of the radar/fps display, the mentor remained seated in an offset position, transmitting on the RT by means of a training box with the trainee annotating the fpss. The mentor explained that he allowed the trainee to mark the fps as he thought it would be useful for training purposes. He added that he was very busy in the period after he took over from his trainee, catching up on necessary calls and this is borne out by the RT recording. His workload was also increased because of delays into the London TMA caused by congestion. He explained that he had overlooked the potential confliction between the subject ac even though he had realised that his trainee had instructed the B757 to climb to the same level as the BA46. He surmised that this had occurred because of a number of factors i.e. allowing his trainee to continue working beyond his capability for his stage of training; sitting in an offset position and not marking the fpss personally. He admitted that, for these latter reasons, he was not scanning the fps display to check for conflictions but was reliant solely on his radar display. The trainee commented that, as soon as he was relieved from operating the RT, he did not continue to monitor

the traffic on the radar display or check for conflictions using the fpss but concentrated his attention on annotating the fpss. Consequently, he was not aware of the developing situation.

The mentor only became aware of the problem when the STCA activated. He instructed the B757 to turn R heading 230°. Once this transmission had been read back, he also instructed the flight to "expedite the turn"; the pilot reported sighting the other traffic. The term 'avoiding action' was not used, nor was TI passed to either ac, mainly because the mentor realised there was no risk of collision and the ac were some miles apart. The radar recording at 0721:59, when the turn was given to B757, shows the subject ac on reciprocal tracks 4·4 NM apart, the B757 is 500 ft below the BA46. However, the B757 did not commence its R turn until after it had passed the BA46. The minimum separation, as the ac passed abeam each other, was recorded as 3 NM horizontally with the B757 200 ft vertically below the BA46.

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 commended the LATCC HURN SC for his honest report on the incident and agreed with his hindsight view that it would have been better to have split the Sector prior to the trainee commencing work to accommodate the trainee's lack of experience at the position. ATCO members were all too aware of the OJTI's role in the 'live' training environment; there was always a fine balance to be struck in allowing the trainee to continue 'in control' (to learn from a developing situation) without allowing events to progress beyond his or her capabilities. Perhaps the situation here had progressed to a point where the mentor, in having decided to 'take control', had underestimated the amount of work needed by him to catch up with the situation. Also, because of the ergonomics of the Sector, remaining in the offset position meant the least amount of upheaval to both ATCOs during the 'catching-up' process. However, in doing so, he denied himself the opportunity to sit in front of the radar and fps displays and therefore the ability to 'double check' for conflictions using both. Nevertheless, it was clear that the HURN SC had allowed the B757 to climb to the level occupied by the BA46. Some members wondered whether the CSC should have been aware that the situation was becoming busy and split the Sector. However, ATCOs familiar with AC operations, felt that ultimately the onus would have been on the SC to make the request and pointed out that he had thought the traffic loading, at the time, was only moderate.

A further aspect touched on was whether or not the mentor's distracting conversation on future rostering had compounded the situation. Members believed that OJTIs should concentrate on the training task to hand, to the exclusion of other non-related matters. There was no way of knowing what influence, if any, this particular distraction had on the eventual outcome. The learning point was that distractions were unwelcome and should not be encouraged – however brief. An ATCO member, familiar with the Worthing Suite, also concurred with the SC's view that the BA46's routeing was not just unusual but, more importantly, it also could make the Sector more difficult to manage than normal. This was owing to the requested cruise level and track, which crossed inbound and outbound ac from the LTMA and then turned W to join UR37 at SAM. ATCO members agreed that this was a topic for further discussion, outside the UKAB forum, and it should be raised through NATS channels.

Turning to risk, STCA had alerted the SC to the confliction which he felt would be resolved by instructing the B757 to turn R realising that the subject ac were some distance apart but with less than the prescribed separation. For their part, the B757 crew had received a TCAS TA and had seen the conflicting ac which was too far away to recognise; these events had been followed by the ATC avoiding turn. All of this led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The LATCC HURN SC allowed the B757 to climb to the level occupied by the BA46.

Degree of Risk: C

AIRPROX REPORT No 26/01

Date/Time: 26 Feb 1123

Position: 5204 N 0200 W (2·5 NM SW of Evesham – elev 160 ft)

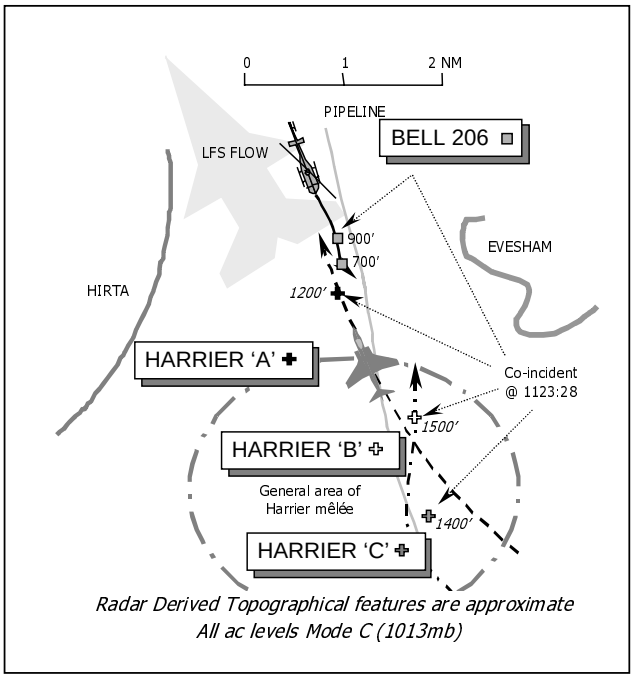
Airspace: London FIR/LFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Bell 206	Harrier
Operator:	Civ Comm	HQ STC
Alt/FL:	400 ft (agl)	2-250 ft (Rad Alt)
Weather Visibility:	VMC CLOC 8 km	VMC CLBC >10 km

Reported Separation:

150 ft V, 200 m H Not seen

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BELL 206 JETRANGER HELICOPTER PILOT reports he was conducting a notified pipeline inspection at 90 kt TAS (giving a 70 kt GS) and flying at about 400 ft agl, some 800 ft below cloud with an in-flight visibility of 8 km. The helicopter livery is black and silver, both HISLs were on and a squawk of A0036 was selected with Mode C. He had been trying to contact Brize RADAR but was too low to establish communication.

Whilst heading 170°, about 2·5 NM WSW of Evesham TCAS enunciated "Traffic Traffic Traffic" and 3 ac were shown at 12 o'clock about 3 NM away. Three jets were then acquired visually and he decided to switch on both of the helicopter's landing lamps to enhance conspicuity. One of the jets was tracking toward his ac but he assessed it would pass clear down the starboard side, until at a range of 0·25 NM, its pilot turned directly toward his helicopter. He initiated a maximum rate descent and the jet passed 2-300 m ahead from L – R about 150 ft above his helicopter.

UKAB Note (1): The B206 pilot subsequently made contact with Brize RADAR and reported the Airprox on RT. At 1136:10, the pilot reported to Brize that he *"…was low-level and they* (3 Harriers) *were doing a tactical manoeuvre around one spot and one of the ac came within 150 feet of me".* He added that he had "*…TCAS fitted to this ac which was of great assistance and gave me plenty of warning and I saw them flying towards me and then one turned directly at me and that's when I had to make the avoiding action".*

THE HARRIER PILOT reports he was leading a pair of grey Harriers that were to be 'Bounced' by a third Harrier. HISLs were on and a squawk of 7001 was selected with Mode C. At 1122:50, the pair were heading W at about 52° 01' N 001° 54' W (about 5 NM SE of the Airprox position), in a 1·5 NM battle formation. The leader saw the bounce ac to the NW and called the pair to turn onto 320° (T). The Bounce passed above the Harrier leader and commenced a hard R turn to engage the pair. At 1123:15, at 52° 03' N 001° 58' W (about 2 NM SE of the Airprox position), the pilots of the Harrier pair were focusing their lookout to the rear. The No 2 called for a R break as the Bounce pilot called a simulated missile launch. At 1123:45 the pilot of the Bounce ac disengaged to the NW, whilst the leader called for a run out on a heading of 150° (T). The crew's lookout was primarily concerned with this event and no other ac was seen by either of the three Harrier pilots.

UKAB Note (2): The Airprox occurred close to the northern boundary of PINS area J4, within which the bounce took place. This area was not notified active for the B206's flight in the PINS NOTAM - UKLB 3043, transmitted at 251935Z FEB the day before the Airprox, whereas the areas immediately to the N [F3/4] were. The B206 pilot reports that he notified the appropriate PINS Areas to be surveyed on this flight by FAX to the Low Flying Booking Cell (LFBC) on Friday 23 Feb for the flight on Monday 26 Feb and provided a copy of the company form submitted. The LFBC archived data does not contain the B206 pilot's notification fax, which was not received by LFBC and hence not included on the compilation sheet of that days warnings. (UKLB 3043 was superseded by UKLB 3051, transmitted at 261008Z FEB, which included other notifications from the same company). The B206 pilot's notification included timings along certain legs of the pipeline route, which would have suggested that the helicopter would not have been in Area J4 after 1100. However, as the UKLB warnings are promulgated with validity up until midday (local), if it had been included it would still have provided a general warning of the helicopter to the Harrier pilots.

HQ STC comments that the nature of the Harriers' exercise was such that the lead pilot and his No 2 would have been essentially 'heads out' in order to acquire the bounce ac. To that end, a 360° lookout scan would have been required to the inevitable, and unfortunate, detriment of the sector directly ahead. Nevertheless, it is of some considerable concern that 3 Harrier pilots failed to see a helicopter fitted with 2 functioning strobes. On reflection, the area in which the formation had elected to operate was probably not the most appropriate given the sortie profile, the flight planning warnings, and the generally constricted airspace.

UKAB Note (3): It is not possible to correlate the reported geometry of this Airprox with the Clee Hill radar recording, as it occurred at the base of radar cover and is not illustrated clearly. The rapid turns and close quarters manoeuvres flown by the Harriers prevent them from being tracked continuously, and does not permit the identity of the individual jets to be maintained with any degree of certainty.

The B206, identified from its A0036 squawk, is shown following the promulgated track of the pipeline maintaining a generally consistent 900 ft, unverified Mode C (1013 mb). Contacts believed to be the Harrier Ldr and No 2 are shown squawking 7001 and 7000 (indicated on the diagram as Harrier A & B respectively) heading NW'ly as reported, but the Bounce ac's track history is not shown clearly at this point. At 1123:28, the B206 is shown at 900 ft unverified Mode C; simultaneously, Harrier A indicates 1200 ft Mode C after climbing from 900 ft on the previous return and Harrier B indicates 1500 ft, both unverified Mode C. A single contact, which may or may not be the No 3 Bounce ac, is shown as Harrier C at 1400 ft, unverified Mode C. Vertical separation at this point, between the B206 and Harrier A, was in the order of 300 ft, unverified Mode C. Radar contact on Harrier A & B is then lost and cannot be re-established until after the Airprox, in the general area of the Harrier mêlée to the S. In all probability the Airprox occurred with Harrier A. Neither the B206 nor Harrier A are shown on the next sweep of the radar 8 sec later at 1123:36, which is probably when the Airprox occurred. Immediately thereafter the B206 pilot's avoiding action descent is then shown when the helicopter's unverified Mode C indicates a 200 ft descent, down to 700 ft (1013 mb) at 1123:45. Consequently, neither the B206 nor the Harriers' levels can be determined with certainty when they are at their closest point of approach.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Bell 206 pilot and Harrier Leader, radar video recordings, and a report from the appropriate operating authority.

It was emphasised to the members that the Airprox occurred just inside PINS area J4, which had not been notified active in the UK L series NOTAMs. It was evident that the pilot had completed his notification pro-forma because he had supplied a copy to the Board but, for whatever reason, the faxed version did not arrive at LFBC. The helicopter pilot was adamant that the fax had been transmitted, but members were surprised that the fax had not been received and the STC Low-Flying

advisor mentioned that it was extremely unusual for such messages, which number in the order of 2,800 a year, to go astray. Members recognised the importance of transmission receipts in such circumstances and clearly the pilot was responsible for ensuring notification under the scheme, but members queried if it was possible to have PINS notifications acknowledged. The Board was advised that manpower limitations at LFBC precluded this additional task, for what after all could be accomplished electronically. The outcome was that the pilots of the Harrier formation were unaware of this specific pipeline inspection flight, but many members were not convinced that PINS would have altered events anyway and were sceptical of its efficacy. The shear area of the country that had been notified under PINS, even with the exception of Area J4, extended across the whole breadth of England and Wales. However, it was recognised that the system could only provide a very general warning and whilst less than ideal it was the best compromise that could be achieved, and agreed and refined over a number of years. PINS was not a method of separation - just notification - an important point. Nevertheless, many members considered that it was a poor system with little realistic benefit or potential to inform military pilots operating in the low-flying system about the location of PINS helicopters. They contended that as the helicopter was unlikely to stray very far from the pipeline itself it would be preferable to notify by specific pipeline which are marked on military low-flying charts, but even so under the current system the NOTAM would still only indicate that this pipeline would be inspected am or pm, with no more accurate timing. A military helicopter pilot member also pointed out that if a military pilot had been engaged in flying a similar profile, there was no system open to him for notifying such flight to other users of the LFS.

The HQ STC member stressed that all three Harriers were part of the same formation and although they would have held a joint briefing before the sortie, only the Bounce pilot would have known where he intended to effect each 'Bounce' on the pair. Members agreed with the STC comment that the choice of location for this bounce was not ideal, and the board was assured the Bounce pilot would not have selected an area close to a pipeline if PINS had been pending in the area. As it was the chosen area was one of the few in the region which was not subject to NOTAM activation. The Board highlighted the importance of TCAS in this Airprox, which enabled the helicopter pilot to detect the three Harriers at a relatively early stage. Moreover, some thought it was fortuitous that the B206 pilot had been flying against the general unidirectional flow specified in this location between the two low-flying restrictions for military pilots; members wondered if the helicopter pilot was cognisant of the military low-flying flow structure, details of which are promulgated in the UK AIP (currently at ENR 6-5-2-1). The combination of TCAS and heading allowed the helicopter pilot to acquire the Harriers visually at a range of 3 NM, which would not necessarily have been the case if he had been flying along the pipeline in the opposite direction. It was apparent that the Harrier pilots' attention had been completely captured by the Bounce, to the detriment of all-round lookout as none had seen the B206 at all. This worried members who agreed that the non-sighting had caused this Airprox. Fortunately the B206 had spotted the nearest Harrier when its pilot had unknowingly turned toward him and robust avoiding action had been taken. The only available assessment of the separation that pertained was from the B206 pilot and it was impossible from the radar recording to reconstruct individual ac tracks with any certainty, apart from that of the B206, but it would appear that the B206 pilot's avoiding action descent quickly increased the vertical separation. This effectively removed any risk of collision, but it must have been a difficult and unnerving situation during which, the Board concluded, the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non sighting by the Harrier formation.

Degree of Risk: B.

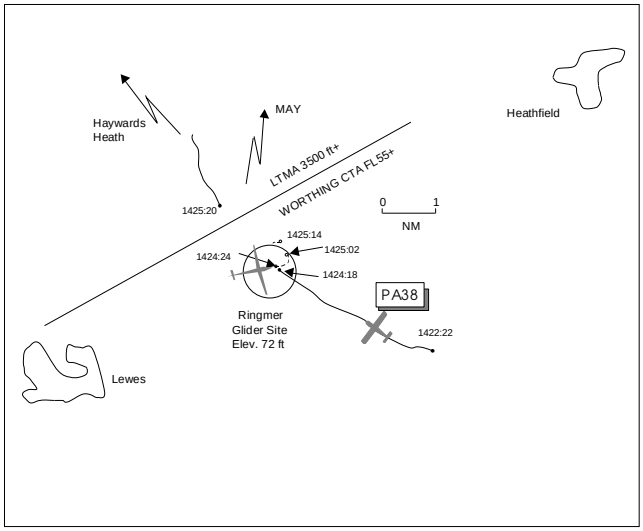
AIRPROX REPORT No 27/01

Date/Time: 24 Feb 1424 (Saturday)

Position: 5054 N 0006 E (O/H Ringmer Glider Site – elev. 72 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	SZD Junior Glider	PA38
Operator:	Civ Club	Civ Pte
Alt/FL:	↑1550 ft (QFE 1010 mb)	1500 ft (QNH 1014 mb)
Weather Visibility:	VMC CLOC >15 km	VMC CLOC 20 km
Reported Separation:	0 ft V 200-300 ft H/NK	
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SZD JUNIOR GLIDER PILOT reports flying solo heading 060° at 70 kt carrying out a winch launch at Ringmer Glider Site. The visibility was >15 km, 600 ft below cloud, in VMC with snow showers in the vicinity. The glider was coloured white overall with an all red nose; no radio or lights were carried. At approx. 1200 ft QFE (1010 mb), as the angle of climb started to reduce, he noticed a PA38 appear over the lower edge of the cockpit, 500 m away, tracking W and crossing at 90° to his track. He continued to monitor the converging PA38 to check that it wasn't going to turn towards him and he prepared to abandon the launch. At 1400 ft in the climb, the PA38 passed directly ahead of him by 200-300 ft at the same level. Although he felt that this was a close encounter, he considered the PA38 would clear his flight path and the winch cable, which he released at 1550 ft QFE. The PA38 continued on a W track without deviation in course or speed. The duty instructor traced the PA38, through Shoreham ATC, which was on a cross country flight from Goodwood.

He was concerned that the ac had transited over the active glider site, which is marked on 1:500 000 Aeronautical Charts as RINGMER with cables up to 2500 ft. The conflicting ac was well below the safety margin for the launch heights being achieved on the day and could have easily contacted the cables.

THE PA38 PILOT reports heading 070° at 87 kt on a local cross country flight from Goodwood at 1500 ft QNH (1014 mb). The visibility was 20 km in VMC and he was receiving a FIS from Shoreham Approach on 123·15 MHz. The ac was coloured navy blue and grey and the anti collision light was on; no transponder was fitted. He believed that it was during the flight leg between Lewes and Heathfield that he had been involved in the incident but he had not seen any glider traffic in the Ringmer area. About halfway between the two towns, he could see patchy light coloured cloud, which appeared to touch the ground, but which he could see around. As he flew closer, the weather was seen to be some snow showers so he quickly turned around to avoid. He manoeuvred around the shower clouds and set course for Haywards Heath and then on to Billingshurst. He believed that in concentrating on these shower clouds and avoiding them, he may have come close to another ac/glider but both he and his passenger had not seen any conflicting traffic in the area.

UKAB Note (1): Met Office archive data for the Shoreham METARs at 1350 & 1420Z shows QNH 1014 mb.

UKAB Note (2): Analysis of the Pease Pottage radar at 1418:50, shows a primary only return pass O/H Ringmer Glider Site tracking NE, which is believed to be the PA38 on track between Lewes and Heathfield. This is when the PA 38 pilot believed he may have been involved in the Airprox. However, this first transit O/H Ringmer occurs over 5 minutes before the reported Airprox. The PA38 is seen to turn R 2 minutes later and proceed on a SE track 2 NM ENE of Ringmer for over 2 minutes before again turning R to steady on a track of 300° at 1422:22. The PA38 fades from radar overhead Ringmer at 1424:18 and, 6 seconds later, another primary only return appears O/H Ringmer, believed to be the SZD Glider, tracking 080°. The glider continues on this track for about 0·25 NM before commencing a L turn to the NW. This contact fades at 1424:02 and reappears 0·5 NM N of Ringmer and is seen to commence manoeuvring. The PA38 reappears on radar at 1425:20 1·5 NM NW of Ringmer tracking 340° towards Haywards Heath.

UKAB Note (3): The UK AIP at ENR 5-5-1-4, promulgates Ringmer (Kitsons Field) as a Glider Launching Site centred 505423N 0000618E for winch and aerotow launches where cables and tug ac maybe encountered to 2500 ft agl, during daylight hours.

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 wondered why the PA38 pilot had planned to fly a cross country route between two towns (Lewes and Heathfield), on a track that passed overhead (O/H) a notified glider site. A significant learning point for all aviators emerges from this incident. The flight safety hazards that are provoked by flying O/H glider sites is well documented but the need to educate new pilots on these matters as well as reminding seasoned flyers cannot be overemphasised. As was seen in this case, the PA38 flew O/H the site, NE bound towards Heathfield, nearly 6 minutes before the Airprox occurred without incident. However, after encountering snow showers and manoeuvring clear of them whilst setting course to Haywards Heath, he passed O/H the site again NW bound and into conflict with a winch launched glider that he didn't see. There was concern whether the pilot had intended to overfly the glider site intentionally on his planned track and on his weather diversion or overlooked its presence in toto. Whatever, the site is marked on topographical charts showing cables up to 2500 ft as a warning to all airspace users.

Discussion then turned to the glider piloting aspects of the incident. The pilot described in detail the launch situation and the way he monitored the PA38's flight path. Because he was not aware of the PA38 pilot's intentions and it appeared that its pilot may not have seen the glider (and cable), some members wondered if perhaps he should have abandoned the launch whilst below the conflicting ac. It was felt that the winch ground crew also had responsibilities to ensure that prior to the launch commencing, the airspace above and behind should have been visually checked as being clear of conflicting traffic. Nevertheless, the glider pilot had elected to continue and had judged that the PA38 would pass clear of his flight path and the cable. This led the Board to conclude that the safety of his ac had not been compromised and any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA38 pilot flew through a notified winch launch glider site and into conflict with the SZD Glider, which he did not see.

Degree of Risk: C

AIRPROX REPORT No 29/01

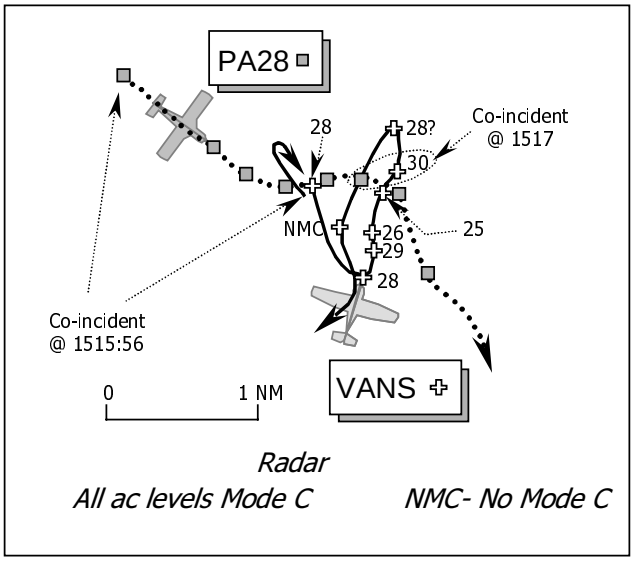
Date/Time: 24 Feb 1517 (Saturday)

Position: 5322 N 0058 W (6·75 NM NE of GAMSTON VOR)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PIPER PA28	VANS RV4
Operator:	Civ Pte	Civ Pte
Alt/FL:	3300 ft (RPS 1010 mb)	4000ft↓↑ (Gamston QNH)
Weather Visibility:	VMC CLBC >10 km	VMC No Cloud >10 km
Reported Separation:	100 m H, nil V	100 m+

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PIPER PA28 CHEROKEE PILOT provided a frank and comprehensive report stating he was returning to Cranwell aerodrome from Leeds Bradford Airport. They were flying at 3300 ft on the Barnsley QNH (1010 mb) and in receipt of a FIS from Waddington ZONE squawking the assigned code; Mode C is not fitted. His "co-pilot" was handling the ac at the time and was practising tracking the GAMSTON VOR. As a matter of courtesy he informed the controller that they would be flying "erratic" headings although he was only receiving a FIS.

As they closed toward the VOR at 100 kt, he told his "co-pilot" to head straight for Cranwell. This was to avoid flying directly overhead the beacon, and that they would then pick up an outbound radial once further away from it. Shortly afterwards, he thought about 3-4 NM E of GAMSTON whilst heading 150°(T), he spotted a small ac at 1 o'clock about 2 – 3 NM away and about 500 ft below them. As this ac was passing R to L, he judged that it would pass clear ahead and would present no threat, but although the ac soon passed through his 12 o'clock he continued to observe it.

When the other ac was on the port beam it pulled up into a fairly tight loop, consequently he began to turn to the R away from it. Upon reaching an inverted attitude, the other ac rolled out of the loop on a heading directly towards his ac. He immediately increased his rate of turn to increase the separation and just before he lost sight of the other ac he noted that it had entered a steep descending turn to the R and would probably pass astern. The risk of collision was very high and at the closest point they were no more than about 100 m apart. After the incident he tried to reacquire the other ac but was unable to do so and asked ZONE if they were aware that there was an ac performing aerobatics in the area. ZONE advised him that they were not in RT contact with its pilot but did have the other ac on radar and had earlier passed traffic information about it. Neither he nor his "co-pilot" had heard this call, but in any case he felt that the warning would not have allowed them to spot the other ac significantly earlier. Moreover, as the ac was not considered a threat when first seen he felt it unlikely that his actions would have differed. He did not think that the other pilot saw his ac until he had finished his roll off the top of the loop and was pointing toward them. At no point did he see him carry out any clearing turns and thought he had commenced his loop when effectively alongside.

The other ac was a low wing monoplane predominantly white in colour with what may have been a blue coloured logo down the side.

THE VANS RV4 PILOT reports his ac is white with blue lettering and the two HISLs were on whilst he was conducting aerobatics to the N of Retford/ Gamston aerodrome at about 4000 ft Gamston QNH and in communication with Gamston RADIO A/G station. There was no cloud in the vicinity and the visibility was over 10 km, but he was flying into the sun. A squawk of A7004 was selected with Mode C.

Whilst practising a half loop, followed by a half roll off the top, he spotted the PA28 as it crossed from R – L and yawed L, then R, to pass behind it on a westerly heading. It was difficult to estimate the minimum horizontal separation, which he thought was no less than 100 m, when the other ac passed slightly above his.

He added that he *"always"* maintains a good lookout and had just suspended his aerobatics to let another ac pass through, as both pilots' saw and avoided each other he believed there was no risk of a collision. However, he was curious to know why Waddington had not warned the other pilot of his 7004 squawk, especially as he had been manoeuvring in the area for about 20 min before the occurrence.

UKAB Note (1): The UK AIP at ENR 1-6-2-5, specifies that A7004 is an unvalidated and unverified conspicuity code for use during aerobatics and display.

MIL ATC OPS reports with RT transcript that the PA28 pilot was in receipt of a FIS from Waddington ZONE and had initially reported flying at 3300 ft BARNSLEY RPS (1010 mb). At 1514:17, the PA28 pilot advised that he would be manoeuvring 'erratically' whilst attempting to fly radials from the GAM VOR, to which ZONE responded *"… roger, that's no problem, there is an aerobatic aircraft indicating to the south east, range of five miles indicating three thousand".* ZONE then continued with transmissions to other ac until 1517:51, when the PA28 pilot transmitted *"...er, you might like to be aware that there's an aeroplane doing aerobatics very close to us, are you aware of him?"* ZONE replied *"Affirmative, when you said you were flying erratic headings, I did call it in to you."* The PA28 pilot replied *"Oh my apologies, we didn't catch that at all"* whereupon ZONE added *"...he's not actually on my frequency, just showing up as an aeros squawk."* The PA28 pilot left the frequency without comment at 1524:26, but 3 days later telephoned Waddington ATC and reported the Airprox. When asked why it had taken 3 days to file a report, the pilot responded that he hadn't known what to do.

UKAB Note (2): Analysis revealed that the RT transcript appeared to be about 2 min behind UTC, hence the above timings have been corrected to UTC.

UKAB Note (3): A review of the LATCC Claxby radar recording reveals that this Airprox occurred just after 1517, but the track and level of the VANS is very difficult to determine with certainty due to label clutter and the nature of the manoeuvres executed which resulted in intermittent contact. The PA28 is shown tracking SE, 6 NM NE of GAM at 1515:56, without Mode C; a reported altitude of 3300 ft Barnsley RPS (1010 mb) would equate to about 3390 ft (1013 mb). The VANS is shown tracking NW on a reciprocal track before turning very tight about onto SE at 2800 ft Mode C (1013 mb), possibly from a loop. At 1516:28, the VANS turns NE in the PA28's 12 o'clock - 1·25 NM, which itself then turns L easterly. The VANS climbs to 2900 ft on the next sweep before descending to 2500 ft. At 1517, the VANS is shown at a maximum of 3000 ft, as it crossed ahead of the PA28 from R – L at a range of 0·25 NM and about 390 ft below the PA28's reported altitude. Contact on the VANS then becomes intermittent - a momentary indication of 2800 ft is shown, which is probably just before the Airprox occurred. Thereafter, the position of the VANS is not readily apparent as it passes astern of the PA28 until it is shown again at 1517:26, without Mode C about 0·6 NM astern of the PA28, which meanwhile had turned SSE'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, and reports from the appropriate ATC authorities.

The Mil ATC Ops report revealed that ZONE had

indeed transmitted traffic information on the Vans at a range of 5 NM, which, for whatever reason, the PA28 pilot had not heard. Although there was no compunction on ZONE to provide this traffic information under the requested FIS, the controller had evidently realised the potential for a conflict between the PA28 and the Vans whilst the latter was conducting his aerobatics. This astute action by the Waddington controller, whilst very helpful, was however to no avail. Nevertheless, the PA28 pilot did manage to spot the Vans, at a range of 2 – 3 NM. One pilot member wondered if the PA28 pilot should have given the Vans a wider berth. As he had not heard the important element of the traffic information which indicated that the Vans was conducting aerobatics it was unsurprising that the PA28 pilot did not realise what the Vans pilot's intentions were when it crossed his path ahead. Clearly the PA28 pilot was wise to keep the Vans in sight, considering each other's responsibilities under the 'Rules of the Air' as the Vans crossed from R – L. However, members recognised that there was little that he could do once the VANS commenced his aerobatic manoeuvre other than watch it closely to try and predict its flight path and then try to maximise the separation until it passed out of sight astern.

Turning to the Vans, members noted its pilot had sensibly set the aerobatics and display conspicuity code of A7004 during this flight - importantly also with Mode C. Controller members emphasised this can prove of great benefit to radar equipped ATSUs and the Board endorsed its use whenever appropriate. However, it was disappointing that this had not proved its worth in this instance, and members wondered if the Vans pilot might have endeavoured to supplement his look-out with some other form of ATS rather than merely listening out on an A/G frequency. The assertion that he *"always"* maintains a good lookout was noted and that this did not appear to be the case here. He had not sighted the PA28 before starting his aerobatics although the PA28 should have been plainly visible. Many members thought he should have spent more time clearing the airspace in which he intended to fly and emphasised the importance of pre-aerobatics checks which included a very thorough lookout scan during clearing turns. The Board agreed that this was the crux of the issue and that the Airprox was caused when the Vans pilot flew into conflict with the PA28, which he had not seen until a very late stage. The PA28 pilot on the other hand had watched the Vans carefully and had endeavoured to increase the separation. Both pilots were in agreement on the minimum separation of 100 m in the end, which was not a very comfortable margin at all. That said, despite the very late sighting, the Vans pilot did manage to fly clear behind the PA28. Therefore, although there had not been an actual risk of collision, the Board concluded that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Whilst carrying out aerobatics the Vans pilot flew into conflict with the PA28, which he saw very late.

Degree of Risk: B.

AIRPROX REPORT No 30/01

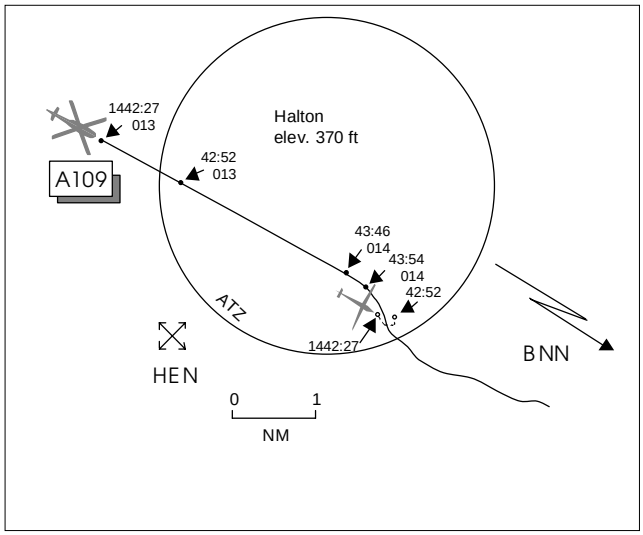
Date/Time: 25 Feb 1444 (Sunday)

Position: 5046 N 0043 W (1·5 NM SSE Halton A/D – elev. 370 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	ASK6CR Glider	A109
Operator:	Civ Club	Civ Pte
Alt/FL:	1200 ft ↑ (QFE 1002 mb)	2000-2500 ft (QNH NK mb)
Weather Visibility:	VMC CBLC >30 km	VMC CAVOK NK
Reported Separation:	0 V 100 m H	200 ft V 100 m H

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ASK6CR GLIDER PILOT reports flying solo from Halton and listening out with Halton Radio on 130·42 MHz. The glider was white with red wing tips and rudder and the visibility was 30 km, 3000 ft below cloud, in VMC. Whilst thermalling at 40 kt 1 NM SSE of the airfield in a climbing L turn at 1200 ft Halton QFE (1002 mb he thought) he heard a helicopter rotor noise which increased in intensity rapidly. He scanned around and saw a dark blue/white helicopter, with a Fenestron tail rotor, approx. 100 m away converging towards his turning circle. He reversed his turn into a 45° R bank turn and then resighted the helicopter which passed 100 m away at the same level. He assessed the risk of collision as substantial.

UKAB Note (1): Met Office archive data for Luton METARs at 1420 & 1450 Z shows the QNH as 1013 mb.

THE A109 PILOT reports flying solo from a private site near Kidderminster to Elstree heading 120° at 140 kt at 2000-2500 ft Elstree QNH, he thought. The weather was CAVOK and he was squawking 7000 with Mode C; he was not communicating with any ATC unit at the time of the incident but had been listening out on the Luton Approach frequency. The helicopter was dark green/white and his red anti collision beacon was switched on. He first saw a glider in his 11 o'clock about 2 NM away, in a LH turn about 200-300 ft above; it was then seen to reverse its turn and maintain its level. He kept the glider in sight and executed a gentle R turn to ensure that he maintained visual contact as the glider's turn reversal had placed it into confliction. The glider passed >100 yd clear on his LHS and he believed there had been no risk of collision.

UKAB Note (2): The A109 helicopter has a conventional tail rotor design.

UKAB Note (3): Analysis of the Heathrow radar recording at 1442:27 shows a 7000 squawk, the A109, at 1300 ft Mode C (1300 ft Luton QNH 1013 mb) 2·75 NM WNW of Halton tracking 120° as a primary only return, believed to be the ASK6CR glider, appears 1·5 NM SSE of Halton tracking 130°. 25 seconds later, the A109 has entered the Halton ATZ steady on track 120° as the ASK glider fades from radar passing a N heading having entered a L turn. At 1443:46 the A109 is seen to climb to 1400 ft Mode C and 8 seconds later commences a R turn onto a track of 160° for a short time before turning L again to resume its original course. This is believed to be the R turn, as described by the reported pilot, to pass clear of the glider however, the incident is not seen on radar.

UKAB Note (4): The UK AIP at ENR 2-2-3-3, promulgates the Halton ATZ, active 07 – 1900 or SS (1 hr earlier in Summer), as a circle radius 2 NM centred on 514734N 0004416W, from surface to 2000 ft above the aerodrome elevation of 370 ft.

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

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 addressed the situation where the A109 pilot had flown through the Halton ATZ without RT contact and into proximity with the glider. Halton is shown on topographical charts with an ATZ and 'intense gliding' with cables, therefore the helicopter pilot should have been aware of its presence and made suitable arrangements; his intended track to Elstree would almost certainly have been through the overhead at Halton if he intended to fly direct. The onus was on the A109 pilot to comply with Rule 39 of the ANO i.e. to contact the AG radio operator, prior to entry into the ATZ, to obtain information to enable the flight to be conducted safely. Also, when within the ATZ, to maintain a listening watch on the appropriate frequency and transmit his position and height on entering and immediately prior to leaving it. None of this had happened. Moreover, it was felt that the A109 pilot, having seen the glider at 2 NM, should perhaps have turned earlier to avoid it by a wider margin but in not doing so, had flown into close proximity when it reversed its turn.

Turning to an assessment on risk, the glider pilot, who was listening out on the Halton frequency, was alerted to the helicopter's presence by the approaching rotor noise and, after seeing the A109, had reversed his turn to avoid it. The A109 pilot had seen the glider at about 2 miles, had continued on track whilst maintaining visual contact throughout and was always in a position to manoeuvre clear. These factors led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The A109 pilot entered the Halton ATZ without obtaining appropriate information to ensure safe transit and flew close enough to cause concern to the ASK 6CR pilot.

Degree of Risk: C

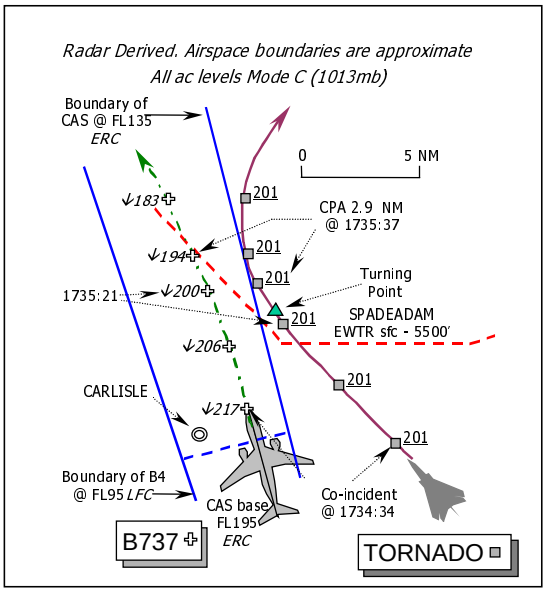
AIRPROX REPORT No 31/01

Date/Time: 7 Mar 1735

Position: 5503N 0248 W (5 NM N of Carlisle)

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

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-300	Tornado GR4
Operator:	CAT	HQ STC
Alt/FL:	FL 205↓	FL 200
Weather Visibility:	VMC NR 10 km	VMC NR 30 NM
Reported Separation:	About 2 NM H	3 NM H, 400 ft V
Recorded Separation:	2·9 NM H, 700 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports descending inbound to Edinburgh under a RCS from ScACC. Heading 330° about 10 NM SE of ESKDO, he thought, at 280 kt whilst descending through FL 205 for their cleared level of FL 140, ATC reported traffic at their level about 2 NM astern and to starboard, closing on the same track. The controller requested they increase their ROD (to avoid it) which they did though no TCAS *"warning"* or RA was received. The First Officer then spotted a Tornado in a hard R turn behind them taking *"energetic collision avoidance"*.

THE TORNADO GR4 PILOT reports conducting a simulated air-surface self-designated trial attack over Spadeadam Electronic Warfare Training Range (EWTR) to a target position 55° 02·402" N 002° 37·997" W. The ac is camouflage grey/green and HISLs were on. This trial sortie involved a simulated weapon release short of the target and flight to a defined point in space at simulated weapon impact – 55° 01·610" N 002° 42·720" W – UKAB Note (1): marked as 'Turning Point' on the diagram. The simulated attack was flown level at FL 200 in VMC and whilst in receipt of a RIS from Scottish MILITARY. Autopilot was engaged for the attack heading 320° at 520 kt and fixed throughout using a GPS with an Estimated Positional Error (EPE) of 32 ft. At 1734:40, Scottish MILITARY reported an ac L of the nose descending through FL 210. He had been visual with the other ac – the B737 - for some time and advised the controller so. After they had overflown the simulated impact point, the autopilot initiated the planned R turn off-target and coincidentally, at 1735:24, Scottish MILITARY advised that they were approaching CAS and instructed them to turn R. He maintained visual contact with the airliner throughout the turn. Concerned about the accuracy of the navigational equipment, they immediately obtained another GPS fix, which confirmed that the ac was within feet of their planned track and some 2 NM clear of the airway. As this was a trials sortie, the attack was video taped, he estimated at the closest point the minimum separation was 3 NM and 400ft. He added that the pilot workload at the time was low and assessed there was no risk of a collision whatsoever.

THE ScACC TALLA SECTOR CONTROLLER, operating the combined PLANNER and EXECUTIVE positions, reports with RT transcript that the B737 was heading 340° flying radar vectors inbound to Edinburgh and descending to the assigned level of FL 140. About 5 NM N of Carlisle an ac under the control of Scottish MILITARY was observed entering Class A CAS at high speed. At 1735:20, to establish separation against the indicated level of the other ac, he instructed the B737 crew to *"…expedite descent FL 190 there's traffic behind you in your 5 o'clock at 2 miles same direction indicating FL 200"*. He updated the traffic information – *"...4 o'clock at 2 miles indicating FL 200"*, whereupon the crew reported they had the other ac in sight. When asked if they wished to file an Airprox, the crew responded *" we didn't actually see him till after he passed so…I suppose I really ought to"*. He estimated the Tornado turned away when the horizontal separation was about 3 NM and the vertical separation 400 ft.

MIL ATC OPS reports that the Tornado crew was in receipt of a RIS from Scottish MILITARY Controller 1 (CON1), tracking about 300° overhead Spadeadam EWTR at FL 200; following a very recent hand-over from London MILITARY. At 1734:35, CON1 reported to the Tornado crew for the first time *"…traffic north west 8 miles, northbound, descending through FL 215",* which referred to the B737. The Tornado pilot immediately responded *"…visual",* whereupon CON1 enquired *"Roger, will you be turning right again shortly, remaining clear of controlled airspace?"* The Tornado pilot responded *"turning right in about 3 miles."* At 1735:15, when it became evident that the Tornado was not turning to avoid CAS, CON1 transmitted *"… avoiding action, turn right now, you're approaching controlled airspace"* and the pilot reported that he was in a R turn. Shortly afterwards, at 1735:41, the Tornado pilot exclaimed *"...we were showing about four miles from the airway then. Does that check with you?"* CON1 responded *"You're actually on the edge of controlled airspace at the moment"* to which the Tornado pilot responded *"... apologies then."* A few minutes later, CON1 advised the Tornado crew that an Airprox had been filed, to which the crew responded that they had been *"...visual with him throughout."*

Recordings of the Great Dun Fell (GDF) radar from both LATCC and ScACC were used during this analysis. Although the LATCC recording shows the incident slightly more clearly there appears to be a slight discrepancy between the alignments of the CAS boundary concerned. The video-map boundary on the ScACC recording appears to be about 0·5 NM further E than that shown on the LATCC recording. However, the relative geometry between the ac is the same. The B737 is shown squawking 3/A 7455, tracking about 345° within CAS but between 1 - 1·5 NM from the edge, with a descent rate of about 300 ft per radar sweep, about 2250 ft/min. The Tornado can be seen squawking 3/A 4612, to the ESE of the B737, tracking NW'ly and level at FL 201 Mode C; its groundspeed is about 1·5 times that of the B737. At 1734:34, the time of CON1's traffic information, the Tornado is tracking 315°, having just turned about 15° L, with the B737 in the Tornado crew's L 11 o'clock - 5·5 NM, passing FL 217 in descent. At 1735:21, as CON1 passed the avoiding action instruction, the Tornado is at FL 200 0·5 NM E of the CAS boundary on the ScACC recording (1 NM LATCC GDF) with about 1 NM on its present track to run before it enters; at this point, the B737 is about 4 NM ahead and 10°L of the Tornado and passing FL 200 (i.e. same level). STCA starts to activate on the ScACC recording at this point. The Tornado's R turn can then be seen gradually to take effect, with the CPA occurring at 1735:37. On the LATCC recording, the LH edge of the Tornado's radar contact just touches the CAS boundary but does not cross; on the ScACC recording, the RH edge of the Tornado's contact touches the CAS boundary. Thereafter separation increases.

UKAB Note (2): At 1735:37, horizontal separation was 2·9 NM [LATCC GDF], when the B737 indicated FL 194, 700 ft below the Tornado which maintained a consistent FL 201 Mode C throughout.

Analysis of the radar recording shows that CON1 over-estimated the horizontal separation of the two ac by about 2·5 NM in his initial traffic information call. Although the B737 was close to the edge of CAS, under the extant RIS CON1 was not required to effect separation between the ac until the Tornado penetrated CAS. At the time the proximity of CAS was being discussed between the crew and the controller, the Tornado had just over 4 NM to run before entry, the intent of the crew being to turn R away from CAS in *"..about three miles".* Therefore, having been assured by the Tornado crew, who were in Class G airspace that they would be turning R before the boundary of CAS, CON1 was left with a difficult decision – whether or when to instruct the Tornado crew to turn to avoid CAS.

The position given by the Tornado pilot as the point at which the ac commenced its R turn, coincides almost exactly with the point at which the Tornado is seen to commence the same turn on the radar recording. This would, therefore, eliminate any possibility of an error in the ac's navigational equipment. The lateral boundary of CAS where the base level is FL 195 is shown to be about 2 NM W of this position on RAF FLIP En-route Charts, although shortly after the incident, the Tornado crew estimated that they were about 4 NM from the CAS boundary. On the military Low Flying Chart which only shows CAS with a base level below 10,000 ft, this same turning point is shown as being about 6 NM E of the boundary of Airway BRAVO 4 where the base level is FL 95. Given the Tornado crew's conviction that they remained *"..some 2 NM clear of the Airway",* it is possible that the flight might have been conducted with reference to a chart that was inappropriate for the level being flown.

UKAB Note (3): The diagram shows the boundaries of the relevant CAS as correctly depicted on the RAF FLIP En-Route Chart UK (L) 2 *(ERC)* and the appropriate Low-Flying Chart LFC UK Sheet 3 *(LFC)*.

HQ STC comments that the Tornado pilot gives every impression that he was well aware of the boundary of CAS and his proximity to it. In accordance with the instruction from Scottish MILITARY, he commenced a R turn and maintained visual contact with the B737. Nonetheless, though the risk of collision had been removed, it is understandable that the B737 crew and perhaps even the civilian controller, were concerned about the proximity of the Tornado and the intentions of its captain.

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.

Although the B737's First Officer thought the Tornado crew was taking *"energetic collision avoidance"*, it was apparent that this was a planned manoeuvre and it was the Tornado's autopilot that turned the ac away from CAS, whilst its crew had kept the B737 in sight for some time. The members noted from the radar recording that both ac passed 2·9 NM apart, when the B737 was already 700 ft below the Tornado. Nevertheless, this was a substantial erosion of separation. Fortunately the TALLA SC had spotted the problem, forewarned the B737 crew and had promptly expedited their descent through the Tornado's level, thereby enabling standard separation to be restored as soon as possible. Similarly, the ScATCC (Mil) controller had instructed the Tornado crew to turn R away from CAS. Civil controller members noted that this Airprox was an interesting example of what can happen when GAT operated close to the boundary of an airway. Although ac operating in CAS are deemed to be separated from unknown ac operating in adjoining uncontrolled airspace, it is recommended (MATS Pt 1-50) that GAT is kept at least 2 NM within the boundary of CAS – more than the 1- 1·5 NM which existed here – to forestall problems.

The HQ STC member reported that he had been unable to clarify which chart had been used by the Tornado pilot, who had recently been working outside the UK. When the Tornado navigator was contacted he thought they had probably used the ERC for sortie planning, though he could not be certain. This surprised some members as the crew's RT comment to ScATCC (Mil) that *"...we were showing about four miles from the airway"* seemed to support the contention by Mil ATC Ops that they might have used the LFC, which did not delineate the CAS at their operating level of FL 200. Notwithstanding the accuracy of GPS, evidently the Tornado had flown onto the boundary of CAS, regardless of which of the ACC's radar video maps were considered. It was academic whether or not the whole of the Tornado's radar contact had crossed the video-map line – more important questions were raised in terms of planning and airmanship. If the crew had used an ERC it called into question some aspects of the sortie planning. If the crew had intentionally picked a point to fly to that was very close to CAS, some members thought this would reveal scant regard for other airspace users. On the other hand, if they had used the LFC, a version of which is installed in the ac's moving map, this might have misled the Tornado crew into thinking they were further away from the airway than they actually were (the CAS in question is not depicted). Whatever the reason, planning to fly that close to CAS was not wise and perhaps the crew should have explained their intentions to the controller more thoroughly. A civil controller opined that a very good working relationship existed between Spadeadam Range, ScATCC (Mil) and ScACC controllers who all get involved in this common airspace. It was a good example of 'sharespace' working for all and special requirements could usually be accommodated with a little prior warning. It was unfortunate that in this instance the Tornado had made a 'glancing blow' off CAS during the simulated attack without notice. Some military pilot members thought that target fixation might have affected the Tornados crew's judgement as they had apparently planned to fly close to, but not into, CAS. Nonetheless, members thought that the ScATCC (Mil) controller acted correctly, based on the information that he had, and exercised sound judgement when he instructed the crew to turn away from CAS. Unfortunately it was not early enough to prevent the erosion of separation, which was the important issue. This was not a case of an unauthorised penetration of CAS, rather the Tornado crew gave the ScATCC (Mil) controller the mistaken impression that they would not get as close to CAS as they did. It was pointed out, however, that under the ATS from ScATCC (Mil), the Tornado could have penetrated CAS if that had been required, provided standard separation was maintained against GAT. What transpired in the end was an erosion of standard separation, which the controller was unable to prevent. Having weighed all these matters for relevance, the Board concluded that this Airprox resulted from a conflict at the boundary of CAS. However, the various safety nets had worked - both controllers had taken action to restore separation and the B737 crew was alerted. The Tornado autopilot was always going to turn the ac at 'the turning point' and the pilot had kept the B737 in sight for some time. The Board agreed, therefore, that no risk of a collision had existed.

Post-meeting UKAB Note (4): The slight variation between the ScACC and LATCC recorded radar videomaps highlighted in the Mil ATC Ops report probably resulted from the use of dissimilar

geographic references. It has been determined that the ScACC LOCUS 16 display system video-map is derived from OSGB 36 co-ordinates, whereas the LATCC PRDS video-map is derived from WGS 84 co-ordinates, as promulgated within the UK AIP - the notifying document for the purposes of the Air Navigation Order. The Board is advised that the variation across the UK U/FIRs would be predominantly E-W, usually measured in tens of metres, but up to a maximum of about 200 m and in practical terms for ATC purposes generally insignificant. The accuracy of the LATCC radar video maps co-ordinates (with the exception of depicted airspace which has a curved boundary that cannot be depicted with the same degree of accuracy) is generally taken to be about 0·125 - 0·250 NM across the whole of the displayed U/FIRs. As GPS also uses WGS84 co-ordinates this should present little difficulty. Future development of 'Skyline' video-maps should see ScACC operating with WGS 84 based video-maps in due course.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict at the boundary of Class A CAS.

Degree of Risk: C.

AIRPROX BOARD No 32/01

Date/Time: 12 Feb 1645

Position: 5109 N 0145 W (Boscombe Down - elev 407 ft)

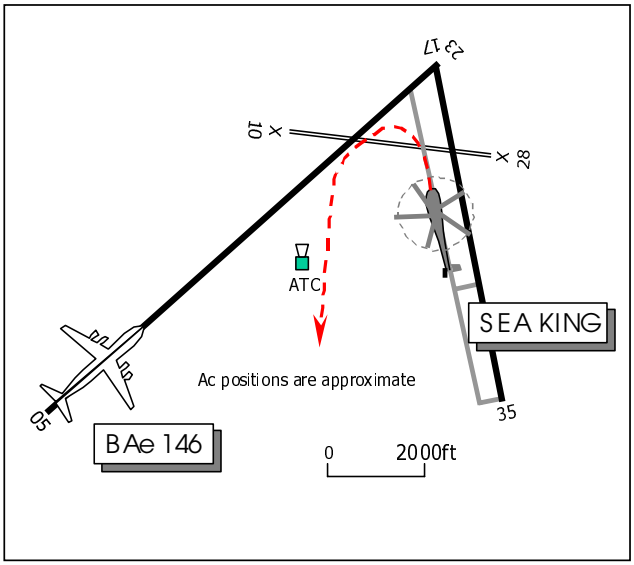
Airspace: MATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	BAe146 CC Mk2	Sea King Mk 2
Operator:	HQ STC	DPA
Alt/FL:	Take-off run	↑500 ft (QFE)
Weather Visibility:	VMC NR >10 km	VMC NR "Excellent"

Reported Separation:

30 ft V, 4000 ft H NR

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BAe146 CC MK2 PILOT reports that TOWER (TWR) had just cleared him for take-off from RW 05 at Boscombe Down for return to base at Northolt. He was accelerating for the take-off run (TORA - 10,538 ft) when he spotted a Sea King helicopter just airborne from the RW 35 parallel taxiway, which then turned onto a reciprocal conflicting heading to his ac at a height of about 30 ft. He immediately aborted the take-off to avoid what he believed had been a possible risk of a collision. The minimum separation he assessed was 30 ft vertically and 4000 ft horizontally. He added that HISLs were on throughout, but they were downsun with a visibility of >10 km.

THE SEA KING MK2 PILOT reports his ac was camouflage grey with an orange nose, tail and sponsons, but HISLs are not fitted. He was executing a rolling take-off from the RW 35 taxiway into a WILTON departure turning L from 350° - 210°. This commonly used procedure entails take-

off along the RW 35 taxiway whilst accelerating to safe single engine speed of 50 kt, followed by a L turn outbound to Wilton [to the S] climbing to 500 ft QFE without impinging on RW 05/23. During the manoeuvre, he heard the BAe146 pilot report over RT that his take-off had been aborted due to helicopter impingement over the runway. He reported to TWR that this had not been the case.

MIL ATC OPS reports that the BAe146 was lined up on the threshold of RW 05 at Boscombe Down. The crew were in communication with TWR on 386·7MHz, but had earlier been advised by GROUND that there would be a *"..slight delay"* as ac were also being recovered to RW 35 and a Tornado was in the final stages of landing. The Sea King pilot, who was based at Boscombe Down, was established on the parallel taxiway to RW 35 and checked in with TWR on the same frequency at 1653:20 advising that he was ready for a 'low level WILTON departure'; a release for this had previously been obtained and passed to the Sea King pilot by GROUND. TWR then transmitted to the Sea King pilot *"...cleared take off, three five taxiway, surface wind zero two zero, twenty"* which was acknowledged. The Tornado vacated RW 35 at 1653:40, and after lowering and checking the position of the Barrier, TWR transmitted *"(BAe146 C/S) cleared take off runway zero five, surface wind three six zero, twenty, runway wet barrier down."* The controller observed the BAe146 accelerate normally, and then decelerate rapidly, which was followed in turn by its pilot transmitting *"(BAe146 C/S) we're aborting take off, there's a helicopter just on the runway."* The controller immediately looked to his right and saw the Sea King in a L turn, passing to the SE of the Control Tower at about 150 ft agl, the position that he would have expected on the intended WILTON departure profile. At 1656, the BAe146 pilot transmitted *"What happened?"* to which TWR replied *"The Sea King was told to depart runway three five taxiway and to depart to the south east and he encroached onto the runway."* Whereupon, the Sea King pilot immediately retorted *"…I was south of the main runway."* (nb: TWR did not witness an encroachment of RW 05 - his transmission 'implicating' the Sea King in a runway infringement was a reaction, based on the BAe146 pilot's transmission as the take off run was aborted). About 20 min later the BAe146 completed an uneventful departure, but it was not until 2 days later that ATC was advised that the BAe146 pilot had raised an incident signal relating to the matter. The incident was filed as an Airprox on 7 Mar 01, some 24 days later.

The 'WILTON departure' profile is a take off into wind, followed by a L turn before and clear of, RW 05/23, with a transit to the S and E of the Control Tower before departing to the SW and crossing the approach to RW 05 when cleared to do so by ATC. As a common method of departure, flown by a station based pilot, TWR had no reason to doubt that the Sea King pilot would not follow the profile and, accordingly, saw no reason to delay the BAe146's departure. It was felt that there would be little gained from informing the BAe146 crew that there was a helicopter departing, as the take-off clearances to both ac had been made on the same frequency. With hindsight however, an additional call from TWR, informing the BAe146 pilot that the Sea King would be turning before and clear of RW 05, may have reduced the 'surprise factor'. The Sea King's exact position at the time the BAe146 pilot aborted his take-off run was not seen and hence an 'independent' view of its proximity to RW 05 cannot be given. That said, the controller's confirmation that the helicopter was in a position commensurate with a standard Wilton departure when he looked, would suggest that there had been no abnormalities in its outbound track.

A large number of differing ac types, both fixed and rotary wing, operate from Boscombe Down; dual runway operations, accompanied by helicopter activity to the S of the main RW 05/23 in an area termed the 'Southside' are routine and the local operating procedures promulgated in the Flying Order Book (FOB). Conversely, information to non-Station based aircrew regarding 'Southside' operations was very limited. Following this Airprox the 'Southside' area within the Boscombe Down FOB has been redefined to provide a buffer between it and ac on RW 05/23. The new area, which is S of a line drawn through the ATC Tower parallel to RW 05/23, is now also indicated in a revised aerodrome chart within the UK Mil AIP and TAP Charts.

HQ STC comments that both captains have presented their individual perceptions of this event with conviction and, in the absence of any further impartial evidence, the precise geometry of this encounter cannot be resolved beyond all

reasonable doubt. However, regardless of whether the helicopter actually infringed the runway or not, the BAe146 pilot perceived that the helicopter's flightpath compromised the safety of his ac and therefore aborted the take-off.

Boscombe Down has acted swiftly to review the relevant procedural aspects of this incident. However, visiting ac captains cannot be expected to be fully conversant with the complexity of the Boscombe Down circuit and associated procedures. Consequently, there may well also be a need for ATC to embellish appropriately, seemingly routine RT.

BOSCOMBE DOWN comments that in this Airprox the separation of the 2 ac was assured by a procedure requiring the Sea King to remain to the S of RW 05/23; the operation of helicopters S of the runway at up to 500 ft QFE is reflected in a note in the En Route Supplement (ERS). However, it is clear that the Sea King captain flew injudiciously close to the runway given that the BAe146 had been cleared for take-off and has been debriefed accordingly. The FOB has been amended to ensure that a buffer is maintained between traffic on RW 05/23 and rotary wing ac on the 'Southside'. Given the complexity of the airfield environment at Boscombe Down provision of a mandatory ATC face-to face briefing for all visitors is being considered.

DPA comments that it would appear the visiting BAe146 captain was unaware that the procedures at Boscombe Down would, normally, allow the safe departure of a fixed wing ac from RW 05 whilst, at the same time, permit a rotary wing departure from RW 35. These procedures have worked entirely safely for many years. The amendment to the FLIPs will ensure that visitors are aware of these specific departure arrangements. It is implicit, however, that the pilot of any helicopter using these procedures, monitors the traffic situation on the main runway and applies the appropriate 'buffer'. This 'buffer' should take due regard of all of the circumstances which pertain at the time, thus allowing significant flexibility for all concerned whilst, at the same time, being entirely safe. In this Airprox the Sea King pilot, whilst following the FOB in principle, appears to have flown far closer than necessary. Under the circumstances it might have been more prudent to allow the BAe146 to have departed first – if indeed the intention was to come as close to the runway as he subsequently did.

The FOB has now been amended to define what is considered to be 'Southside'. This has to take in to account all flying activities and as a consequence is very much more restrictive than the previous arrangements. This Directorate is content that all necessary actions to reduce the potential for a recurrence have been taken.

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 Mil ATC Ops advisor emphasised to the members that there had been no theoretical requirement for TWR to tell the BAe146 pilot about the Sea King helicopter or vice versa. Both were operating on the same frequency and should have been listening out for transmissions from the TWR and each other when the BAe146 and the helicopter had been permitted to take-off more or less at the same time, but from different locations on the aerodrome. Members understood that by the strict interpretation of Military ATC regulations this might be the case. However, if TWR had painted a fuller picture of what was going on and explained to the visiting BAe146 pilot that the Sea king pilot would be turning short of RW05 when following the Standard WILTON departure it could have promoted an entirely different outcome. Recognising, however, that TWR was simply following the long-established WILTON procedure, civil controller members questioned if it guaranteed separation from simultaneous operations on RW 05. Provided nothing went wrong the two flight paths should not cross, but if the helicopter had an emergency the procedure did not seem 'fail safe'. Their feeling was it would have been better to delay one of the take-offs a little. Revisions to the information on 'Southside' departures in FLIPS were noted and these would help visiting pilots but the Board did not agree that these changes were enough to make the procedure entirely safe and went on to express their wider misgivings.

The Sea King captain may well have flown injudiciously close to RW 05, but neither pilot had done anything contrary either to procedures in force at the time, or to ATC instructions. Despite this, sufficient concern had been raised in the mind of the BAe146 pilot, albeit a visitor, to abandon his take-off. Members noted from the revised WILTON procedure that the "buffer" for RW05 had been increased for 'Southside' rotary-wing operations, but this still did not cater for the 'emergency after take-off' situation. An engine failure below single engine safety speed would have prompted the helicopter pilot to stop any turn, raise the nose and flare off excess airspeed, while aiming to touchdown below maximum run-on speed, straight ahead. The rollout could encompass significant distance, depending on AUW and wind conditions. If the engine failed above single engine safety speed, again the pilot would want to roll off any bank and fly straight ahead to achieve minimum power speed before starting a slow climb out at low speed on a steady heading with little ability to manoeuvre. In either situation it seemed most likely that the helicopter's flight path could cross RW 05. Other ac system failures could impose similar restrictions on the helicopter's ability to comply with the departure procedure, with the same undesirable results.

After critical debate the Board concluded that the Boscombe Down WILTON departure procedure allowed the Sea King pilot to fly close enough to RW05 to cause concern to the departing BAe146 pilot and this was the cause of the incident. However, by aborting his take-off, the BAe146 had effectively removed any risk of a collision. The potential for mishap exposed by this Airprox centred on the 'simultaneous' aspect of operations. It convinced members that conducting risk analysis assessments at other Government Aerodromes, where fixed and rotary wing operations are conducted simultaneously from different parts of the manoeuvring area, would be a worthwhile safety exercise.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Boscombe Down WILTON departure procedure allowed the Sea King pilot to fly close enough to RW05 to cause concern to the departing BAe146 pilot.

Degree of Risk: C.

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

AIRPROX REPORT No 33/01

Date/Time: 2 Mar 1058

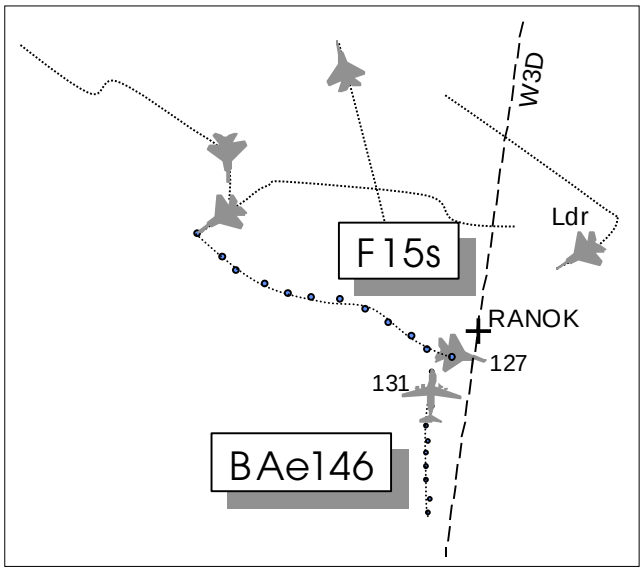
Position: 5640 N 0417 W (2 NM SW of RANOK)

Airspace: ADR W3D (*Class:* F)

	Reporting Aircraft	*Reported Aircraft*
Type:	BAe146	F15 x 6
Operator:	CAT	Foreign Mil
Alt/FL:	FL 140-110↓	Various (SPS 1013 mb)
Weather Visibility:	VMC CLOC 10 km	VMC CLOC NK

Reported Separation: NK /4000 ft V

Recorded Separation: 1 NM, 400 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BAe 146 PILOT reports heading 015° at 260 kt on ADR W3D in a descent towards Inverness. He was receiving a RAS (he thought) from ScACC who had advised him of about 5 military jets operating ahead of him at FLs 250 and 50. He saw them ahead at various levels and received a TCAS TA followed by an RA (Monitor VS). The TCAS then gave confusing RAs: Descend Descend, Clear of Conflict, Climb Crossing Climb and then "went berserk" giving 'Climb Climb', 'Descend Descend', and 'Climb' again before finally giving 'Clear of Conflict'. His responses to these took him no more than 300 ft from his cleared level. His diagram showed ac crossing ahead from both left and right in descents and turning in behind his ac.

THE F15 WING reports that the flight was operating under FIS from Scottish Mil on a 2 v 4 air combat training (ACT) sortie. The 2-ship was holding approximately 70 NM N of the 4-ship and the engagement began with the 4-ship pushing to the NW while the 2-ship tracked SE towards them. During the engagement, Scottish called out several ac including the ac in question. 10 minutes into the flight, the lead of the 4-ship was heading NW with his wingman in tactical formation on the right side. At this point the pair was proceeding south-west, closing from 15 NM. Scottish called out the traffic again, but the transmission was stepped on. The No 2 of the pair, heading SE, radar locked the airliner at a distance of approximately 8 NM. The 4-ship leader visually sighted the ac at their left 10 o'clock with 4000-5000 ft vertical separation, and terminated the engagement to ensure all players would pass well clear of the airliner. The engagement was terminated, but no other avoiding action was necessary.

MIL ATC OPS reports that the formation of 4 F15s was receiving a FIS from Controller 4 (CON 4), Scottish Mil, on 268.925 whilst carrying out ACT between RANOK and Skye from FL 50-240. A second formation of 2 F15s was also manoeuvring in the vicinity, acting as opponents to the first formation, also between FL 50-240 under a FIS from CON 4. Scottish military and civilian controllers are located within the same Operations Room and have access to the same code/callsign converted information.

At 1054:20, CON 4 received a landline call from the Tay Sector Controller (TAY) in which the latter identified a BAe146 under his control to the N of FOYLE *"...descending into Inverness coming down to flight level one one zero, Radar Information"*. CON 4 replied *"Roger, all the* (C/Ss of both formations) *are only with me on a FIS. I will try and get them to manoeuvre west of the advisory route"*. TAY then queried the levels of both of the F15 formations, to which CON 4 replied *"Flight level five zero to flight level two four zero, but I will ask them to manoeuvre west if I can"*. At 1054:45, CON4 transmitted to the 4-ship leader *"Commercial traffic is south of you, northbound, thirty miles south of you, descending passing flight level two zero zero on a five four zero three squawk"*. After the transmission had been repeated, the leader of the formation replied that he had turned north. At 1057:40, after a series of internal transmissions between both formations, CON 4 updated the TI to the 4 F15s stating *"..traffic south of RANOK by five miles northbound, commercial, descending passing flight level one four zero"*. The formation leader replied *"(4 a/c C/S) is turning again to the west"*; CON 4 replied *"Roger, (C/S 12), south-east of you by four miles"*. At 1058:10, CON 4 called TAY and stated *"I have called them continually, I'm afraid that's the best I can do"* to which TAY replied *"Yeah, OK, the (BAe146 C/S) has got the one that's gone through his twelve o'clock in sight anyway"*. At 1058:45, the leader of the 4 a/c formation (11) ordered all elements of both formations to terminate their manoeuvres, which was acknowledged by each crew in turn. Shortly afterwards, at 1058:55, the lead crew transmitted *"(4 a/c C/S), we have commercial traffic just passed through.. south to north…guess about ten thousand"*.

The recording of the Aberdeen radar shows that the position of the BAe146 as called by CON 4 in his first TI at 1054:45 was reasonably accurate. At 1055:20, the BAe146 is seen about 17·5 NM to the SSW of RANOK tracking 020° on ADR W3D descending through FL 203. At the same time, the leader of the 4 ac formation is manoeuvring 3 NM N of RANOK indicating FL 160 with the other elements of the formation to the NW of his position indicating between FL 142-183. The BAe146 continues on its track along W3D over the next 2 minutes, whilst the formations continue their ACT to the NW of RANOK mainly between FL 130-FL 215. At 1057:40, the time of CON 4's second TI transmission, the BAe146 is 6 NM SSW of RANOK

maintaining track whilst descending through FL 145; the nearest element of the 4-ship (No 2) is between the BAe146 pilot's 10 and 11 o'clock position at 7 NM tracking 110° indicating FL 130 and descending. Both ac maintain their profiles for the next 20 seconds whilst closing towards RANOK. At 1058 the No 2 of the 4-ship crosses the BAe146's 12 o'clock at 1 NM whilst descending through FL 127 whilst the BAe146 maintains track descending through FL 132 (the closest pass during the encounter). The remaining elements of the 4-ship and pair are manoeuvring between 5-15 NM NW of RANOK with the exception of the leader who is 5 NM NE of RANOK, south-east bound in a right turn towards RANOK. As the BAe146 and the No 2 F15 begin to diverge, the formation leader is 2·5 NM NE of RANOK maintaining FL 146 having steadied on a south-westerly track, whilst the BAe146 is 1 NM SW of RANOK tracking NE descending through FL 130. Both the formation leader and the BAe146 continue their profiles until their returns merge 1 NM NW of RANOK (F15 2000 ft above) at 1058:45, the time the formation leader terminates the ACT. As the ac diverge, another F15, (the second of the pair), passes 1·5-2 NM behind the BAe146 on a south-easterly track although its Mode C is not being displayed. As the BAe146 clears to the N of RANOK, maintaining track 1 NM E of W3D and passing through FL 113, it is overflown by the No 3 on a south-easterly track indicating well above at FL 185. Both formations then re-group in the vicinity of RANOK, well behind the BAe146 as it continues N towards Inverness.

CON 4's application of FIS was commensurate with current regulations and accepted practices. Whilst he was not under any obligation to do so, he passed accurate TI to the formation leader throughout the encounter, and updated information regarding the BAe146's progress to individual elements of the formation where necessary. Given that the formations were conducting ACT in unregulated Class F/G airspace, it would have been inappropriate for CON 4 to have tried to impose either a control instruction or co-ordination on the F15s; the formation leader would not have been obliged to accept such a suggestion had it been made.

ScACC reports that due to observed military activity, the previous Tay controller had elected not to provide a RAS to BAe146 and advised accordingly when he issued descent to FL 110 that it would be "radar information below FL 250". The Tay controller who took over the sector was content with this service for the same reason and made no change. He observed traffic on 464x squawks operating in the vicinity of RANOK and ascertained from Scot Mil CON 4 that these were operating under FIS. CON 4 said he would advise the military pilots about the BAe146 and try to get them to operate to the west of ADR W3D. The Tay controller continued to pass traffic info on these tracks to the BAe146 pilot and, although stating that it was not avoiding action, suggested a 30 degree turn to the right might help. Although the pilot then advised that he had the traffic in sight and was advised to continue at his own discretion, the controller continued to pass traffic info. Subsequently the BAe146 pilot reported receiving TCAS RAs, but made no mention of filing an Airprox at the time.

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's discussion centred on whether it was necessary or desirable for the F15s to be conducting this exercise across ADR W3D, or could they have moved further to the W. It was pointed out that the FIR to the NW of the STMA contained other ADRs; members agreed that the fighters were perfectly entitled to operate in the FIR to the W of the Glasgow-Aberdeen Airway (P600), but that due regard should be taken of airliners using the ADRs. Members noted that under a FIS the military controller could not order the F15s to move their operations but at the same time the fighters had elected to take a FIS from Scottish Mil to assist them in avoiding non participating ac, and the Board was advised that if CON 4 had in fact asked the F15s in good time to move west of the ADR (as he told TAY he would do), they would have done so willingly.

However, CON4 passed plenty of warnings to the F15s, collectively and individually, about the approaching airliner and in due course the F15 leader called his formation to 'knock it off'.

Unfortunately, this action occurred after the point of closest approach by the 4-ship No 2 who passed some 400 ft V and less than 1 NM from it. Members agreed that the cause of the Airprox was that the F15 formation and in particular the No 2 F15 passed close enough to the BAe146 on the ADR to cause its pilot concern for the safety of his ac.

Members wondered if the F15 wing adopted the same approach as the RAF commands to ADR traffic, to cross ADRs expeditiously and carefully using a radar service where possible, and not to carry out training activity on them. The F15's exercise required airspace the size of N Scotland and having sensibly elected to use an ATS, it was probable that they were expecting some direction towards avoiding conflicts of this nature. The Chairman undertook to consult DAP to make sure the parties concerned in this type of exercise fully understood what was expected of them.

As to the risk level in the incident, the Board noted that the BAe146 pilot had not filed an Airprox immediately, having been given early information on the F15s and his comments on the RT indicated that despite the overloading of his TCAS, he had the situation reasonably under control. Only one of the F15s in the end came at all close to the airliner and since it was about 1 NM and 400 ft below, the Board concluded that there had not been a risk of the ac actually colliding.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: While manoeuvring through and around ADR W3D, the F15 formation flew close enough to cause concern to the BAe146 pilot on the ADR.

Degree of Risk: C

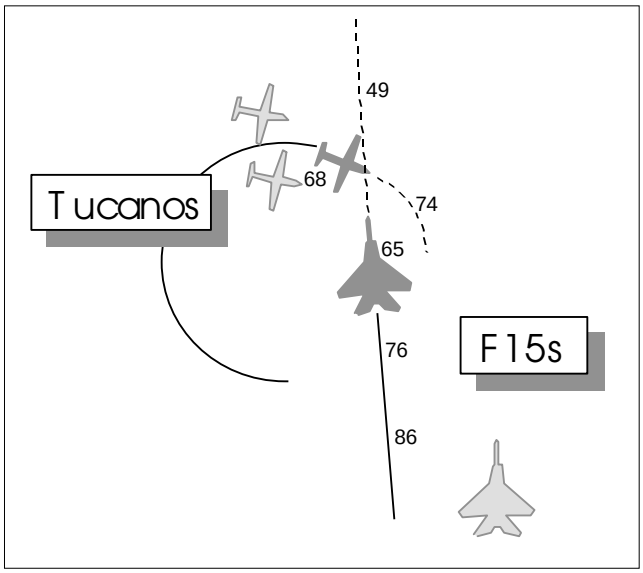
AIRPROX REPORT No 34/01

Date/Time: 8 Mar 1623

Position: 5412 N 0050 W (4 NM NNW of Malton)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tucano	F15
Operator:	HQ PTC	Foreign Mil
Alt/FL:	6000 ft (RPS)	FL 70
Weather Visibility:	VMC CLAC Unltd	VMC
Reported Separation:	300 ft V	2000 ft H, 500 ft V
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUCANO PILOT reports leading a 3-ac formation on a quiet frequency. While rolling out during a formation join, heading 090° at 200 kt, he looked in to check his position on TACAN and he saw an F15 in his peripheral vision, passing 300 ft below on a northerly track. His No 3 called it and at the same time he saw another; it was in his 2 o'clock 1 NM away and below, heading N. While it was not exactly on a collision course, he performed a wing-over to the R to increase separation. He

considered the risk of collision with the first F15 had been high.

THE F15 PILOT reports heading 360° at 400 kt descending to low level under radar service from London Mil and Linton. Traffic was called at 11 NM and 4 NM and the formation established radar and visual contact on a 3-ac formation, watching them as they closed in a slight climb and right turn. They passed about 500 ft above him and he relayed the position to the other F15; there was no danger of collision as they were watching the formation, and since they were manoeuvring he took no action which might have negated their avoidance.

MIL ATC OPS reports that the F15 formation (pair) were receiving a limited RIS from Leeming Zone (Zone) whilst descending to FL 100 prior to entering low level in the vicinity of Pickering. At 1622:59, the formation, which had previously been working with London Radar, were instructed by Zone to set the Barnsley RPS and descend to 4000 ft. Shortly afterwards, at 1623:15, Zone reported "*C/S, traffic right one o'clock, four miles, manoeuvring indicating FL 70",* to which the lead crew responded *"C/S, searching"*. At 1623:36, Zone updated the first TI by stating *"C/S, previously reported traffic twelve o'clock, two miles, manoeuvring indicating FL 65"*. The formation crews reported level at 4000 ft at 1623:51 and were subsequently descended to 2500 ft. The formation crews did not state on RT that they were visual with the conflicting traffic.

Zone's application of RIS was commensurate with current regulations and, whilst there was no requirement to do so, the updated TI appears to have helped the F15 crews to see the Tucanos.

UKAB Note: LATCC radar recordings show the incident as described by the pilots. Just before the leading F15 passes almost directly beneath the Tucanos it shows FL 65 Mode C and the Tucanos show FL 68. On the next clear return after they pass the Mode Cs are 49 and 74 respectively. If the lead F15 maintained a steady ROD it would have been passing FL 58 when closest to the Tucanos which were climbing from FL 68.

HQ PTC comments that of all flying training, formation work is one of the least compatible with an ATS but has the most distractions from good lookout. We would therefore urge those passing through training AIAAs to ensure that they take such a service. The F15s did so and were able to acquire the Tucano formation in good time to avoid them.

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.

While the F15 leader's Mode C was not readable at the closest point, interpolation in time and height indicated that the F15s would have been descending through about FL 58, more than 1000 ft below the Tucanos, as they passed, with no risk of collision. However, the separation may have been somewhat less when the F15 was seen by the Tucano leader just before the cross. Members were well aware of how surprise and the large size of the F15 frequently made it seem closer than it was, and accepted that this was probably the case in this Airprox. There was no reason to believe that the F15s had pulled up in their descent to pass closer to the Tucano than suggested by the radar recording; there would have been no point in doing so. The Board concluded that the cause of the Airprox report was a late sighting of the F15s by the Tucano leader leading to a mistaken impression of a lack of separation.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting of the F15s by the Tucano leader, leading to a mistaken impression of a lack of separation.

Degree of Risk: C

AIRPROX REPORT No 35/01

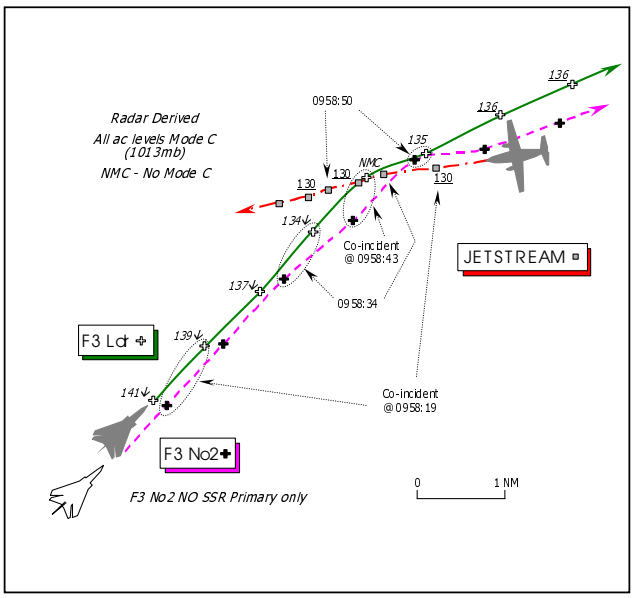
Date/Time: 14 Mar 0958

Position: 5258 N 0024 W (4·25 NM SE of Cranwell)

Airspace: Lincolnshire AIAA (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado F3	Jetstream
Operator:	HQ STC	HQ PTC
Alt/FL:	13000 ft↓ (RPS 1001 mb)	FL 130
Weather Visibility:	VMC CLBC >10 km	VMC CLOC >30 km
Reported Separation:	NR	100 ft V, 50 ft H

Recorded Separation: contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO F3 PILOT reports that he was the leader of a pair of F3s recovering to Coningsby, on completion of a visual air combat manoeuvre (ACM) sortie; the ac colour scheme is camouflage grey, but HISLs were on. After completing the last engagement, the pair rejoined to return to base at 415 kt; they had been steady on a heading of 043°(M) for about 1 min and under a RIS from London MILITARY when the Airprox occurred. About 12 NM SW of Coningsby at 13000 ft Barnsley RPS (1001 mb), a Jetstream was spotted simultaneously by both pilots at very close range to the lead F3 on a reciprocal heading. The leader broke up and to the R to avoid the Jetstream at the same time as his No 2 passed a warning. No traffic information had been received from London MILITARY before they spotted the other ac themselves, neither did they have radar contact on the Jetstream as they had just turned R towards base. He did not quantify the minimum separation but assessed that the risk was *"high"*.

THE JETSTREAM PILOT reports that his ac colour scheme is red and white, anti-collision beacons were on, but HISLs are not fitted. He was conducting an engine air test, with a crew member in the 'jump' seat, flying level at FL 130, clear of cloud with an in-flight visibility of >30 km. He was listening out on 249·875 MHz – the command quiet frequency – but squawking 3/A 2642 with Mode C. About 8 NM S of Cranwell, he thought, heading 270° at 130 kt with the port engine shut-down, he suddenly spotted the underside of a grey F3 at 11 o'clock - 300 m away, heading toward but climbing above his ac. Another F3 was seen further to port and the closest of the two jets passed about 50 ft down the port side and 100 ft above his ac with a *"very high"* risk of a collision. He added that the Airprox occurred when the engine was being feathered and the relevant parameters being recorded - there was no time to take avoiding action.

MIL ATC OPS reports that the Tornado F3 pair was operating between FL 100 and FL 240 to the S of Cranwell, whilst in receipt of a RIS from London MILITARY Console 14 (CON14), manned by a trainee and Mentor operating a discrete frequency of 284·3 MHz. The F3 pair was conducting ACM and had been operating with CON14 since 0938. Shortly after initial contact, CON14 applied a limitation to the radar service being provided due to high traffic density in the vicinity. At about 0954, CON14 took control of a second pair of Tornados, operating under a RIS in the Wash Aerial Tactics Area (ATA) on a different discrete frequency. Whilst the workload was not intense, both frequencies were busy with a steady stream of internal formation RT exchanges; conscious of the need to

keep extraneous RT to a minimum, CON14 selected *'Stop Allocation*' - an indication to the ALLOCATOR that the control team were not prepared to accept further traffic. At 0958:15, the lead F3 crew transmitted *"And London, (Formation C/S) en-route to Coningsby".* However, for the previous 15 sec the other Tornado formation in the Wash ATA had been conducting a range countdown exercise on the other frequency, which involved range calls being made every 3-4 sec. Consequently, the call from the subject F3 leader and another at 0958:24 was not heard by CON14. At 0958:36, the F3 leader again transmitted *"And London (C/S) one and two are complete, thanks very much".* Almost simultaneously with this call, another very short transmission can be heard - *"...watch for the Jetstream",* which it is assumed originated from the crew of F3 No 2. However, this call, requires several replays of the RT recording before its content can be determined clearly and neither the transmission, nor its relevance were realised by CON14. Immediately after the leader's call, CON14 responded *"… roger, squawk seven thousand and freecall Coningsby, good day"* which was acknowledged. Neither trainee nor mentor saw the Jetstream's radar contact at the time. A short period of intra-formation transmissions followed, although they coincide with transmissions from the other formation and are not clear, before the F3s left the frequency. No Airprox was filed on RT.

The LATCC radar recording shows the Jetstream, about 4 NM SE of Cranwell, squawking 3/A 2642 and tracking about 260° at FL 130 Mode C. A total of 5 ac, all squawking - including the Jetstream - are shown within a 2 NM radius circle, the Jetstream being the most southerly ac. The remaining ac are at low altitudes in the vicinity of Cranwell. At 0958:19, the F3 pair is shown about 3 NM SW of the Jetstream after turning NE in a 0·5 NM trail and descending through FL 139 Mode C (1013 mb). Only the F3 lead ac is squawking. At 0958:34, about the time that the No 2 transmits *"...watch for the Jetstream"*, the F3 lead ac and Jetstream are about 0·75 NM apart, with the Jetstream at FL 130 and in the F3 leader's 12 o'clock, some 400 ft below the F3 lead ac at FL 134. The following radar sweep at 0958:43, shows the No 2 F3 passing just S of the Jetstream, whilst the lead F3's radar contact and that of the Jetstream are merged; only the Jetstream's Mode C is shown at FL 130. As the radar contacts separate at 0958:50, the lead F3 is shown to have turned R and climbed to FL 135, before a further climb to FL 136 on successive returns are the pair clear to the E. Meanwhile, the Jetstream had maintained FL 130 throughout.

The confliction is only evident on the radar recording when the displayed range is reduced to 30 NM radius in order to eliminate SSR label overlap. On the larger range scale that CON14 was using – 100 NM radius, which was appropriate to the task - the label clutter from the other low altitude ac in the area obscures the SSR response from the Jetstream. On the London MILITARY MASOR radar displays, the SSR labels cannot be individually rotated to reduce label overlap clutter.

The RIS provided to the F3 pair had been appropriately 'limited', because of the high traffic density in the area. Both trainee and mentor commented that they would have passed traffic information if the confliction been detected.

HQ STC comments that the Tornados were undertaking an Air Defence Operational Conversion Unit exercise in the Lincolnshire AIAA [2500 ft ALT – FL 180]. This operating area is the preferred choice for this particular sortie profile, because of the high fuel usage and complex sortie content. Thus transit times can be minimised and a good radar service can be provided by either RAF Neatishead or London Mil. The incident occurred shortly after the final engagement when the 2 Tornados had just rejoined and, owing to the short transit distance to RAF Coningsby, the cockpit workload in both ac was high as the crews completed post-engagement and recovery checks. Insofar as can be determined from the cockpit recordings, both ac radars were appropriately configured. Moreover, both crews had demonstrated good airmanship and crew co-operation throughout the sortie. Nevertheless, both crews spotted the Jetstream extremely late, without the benefit of AI radar contact, in an operating area where heightened awareness of other traffic is essential. Degraded lookout and the absence of traffic information from LATCC (Mil) combined to generate an alarming incident.

HQ PTC comments that the Jetstream was operating in good VMC with a 3-man crew, but none of them saw the approaching Tornados until very late. It is probable that the cockpit workload at the time - involving engine shut-down and relighting

drills – was a significant contributory factor. Unfortunately, this seems to have coincided with a similar high workload distraction for the Tornado crews involved, with near disastrous consequences. Cranwell based Jetstream and Dominie crews do not normally seek a radar service in the Lincolnshire AIAA when operating in good VMC, because of the resultant considerable distraction from the instructional task. However, it is acknowledged that some sorties involving cockpit drills – principally practice emergency procedures – can result in considerable heads-in-cockpit activity; these procedures inevitably degrade the standard of lookout for significant periods. In future, all 3FTS crews will be required to call for an appropriate radar service prior to engaging in any drills or procedures which may significantly detract from their lookout through such head-in-cockpit activity.

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.

The Mil ATC Ops advisor emphasised to the Board that the RIS provided by CON14 to the Tornado pair was 'limited' due to the prevailing high traffic density in the vicinity of the Tornados' operating area. Some pilot members thought this was a very 'woolly' term and wondered what it was supposed to convey. Here, in essence, the controller could not guarantee to see every confliction on his display and the limitation is to warn the pilot of this condition. Sometimes the crowded display picture can be uncluttered by changing to a different radar source which does not display ac at levels well outside that of the ac under service. Here it would have been desirable to remove the low level traffic from the picture and thus leave the Tornados and any other ac in the same altitude band (the Jetstream) clearly visible. However, in this instance with only a finite choice of radar sources available this was not a feasible option. Another facility on some radar displays allows the SSR data block of individual ac to be rotated to a different position relative to the subject ac. This can permit ac returns to be viewed more clearly and the Mode C level determined more easily when close together. None of the displays used within the Military Operations Room (MASOR) at London Radar has this facility for individual ac; all the SSR data blocks can only be rotated together, sometimes with little benefit. This equipment limitation in the MASOR has long been considered unsatisfactory – indeed IFS (RAF) had made a recommendation on this topic and a response was awaited from HQ STC. As STCA is not available to controllers in the MASOR all these contributory factors prevented CON14 from detecting the presence of the Jetstream at an earlier stage and passing a warning to the Tornado crews. Additionally, the Mil ATC Ops advisor pointed out that instead of squawking 3/A 7000 the Jetstream was correctly transponding on the Lincolnshire AIAA conspicuity squawk. The controller had filtered this code out so it was not displayed. Ironically, if the Jetstream had been transponding 3/A 7000 it might have made it more conspicuous to CON14. Moreover, overlapping RT transmissions from other ac prevented CON14 from detecting that the Tornados were setting themselves up for the recovery back to Coningsby and unaware that the pair was closing in confliction with another ac.

Conversely, the Jetstream captain was apparently content to operate in the AIAA without the benefit of a radar service from London MILITARY. With the additional tasks resulting from the engine air test the Board agreed with Command that this was not wise and thought the revisions to 3FTS SOPs a very sensible and logical step toward improved flight safety. Furthermore, one member questioned whether it was wise to conduct an air test in this busy airspace, but the PTC member explained that there was no alternative. Although the Jetstream crew might have been very busy with the engine shut-down procedure, lookout remained a paramount priority. With three crew-members 'up-front' there was the potential for three pairs of eyes to spot the Tornado pair, but none did until they were but 300 m away as the ac flew toward each other at a combined closing speed of about 545 kt. Some pilot members thought that there was a good airmanship/CRM lesson to be learned here on cockpit priorities. This late spot caught them with one engine shut-down, which denied the Jetstream pilot any chance whatsoever of avoiding the faster jets. Consequently, he could not effect the outcome making this effectively a non-sighting. However, the Tornado leader said he saw the slower Jetstream at about the same time as his No2

shouted a warning. The high workload on the student pilots was reinforced by the STC member but it was clear that this was a late sighting without the benefit of a warning from ATC or AI radar. There was no dissension among members that the late sighting by the Tornado crews and effectively the non-sighting by the Jetstream crew caused this Airprox.

Turning to risk, some members believed that the Tornado pilot's avoiding action removed the risk of a collision, but with barely sufficient time to effect avoiding action safety had been compromised. Whereas other members reasoned that although the Tornado pilot instinctively broke R at the critical moment this probably did little to effect his actual flightpath. Undoubtedly this had been a very close encounter – at high closing speed - and the radar recording showed that the contacts had merged.

A majority view prevailed in agreement with both pilots' assessment that an actual risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the F3 crews and effectively a non-sighting by the Jetstream crew.

Contributory Factors Jetstream crew's decision not to obtain an appropriate radar service in AIAA.

The radar service and equipment limitations at London Radar, which prevented detection by CON14 and denied the Tornado crews traffic information.

Degree of Risk: A.

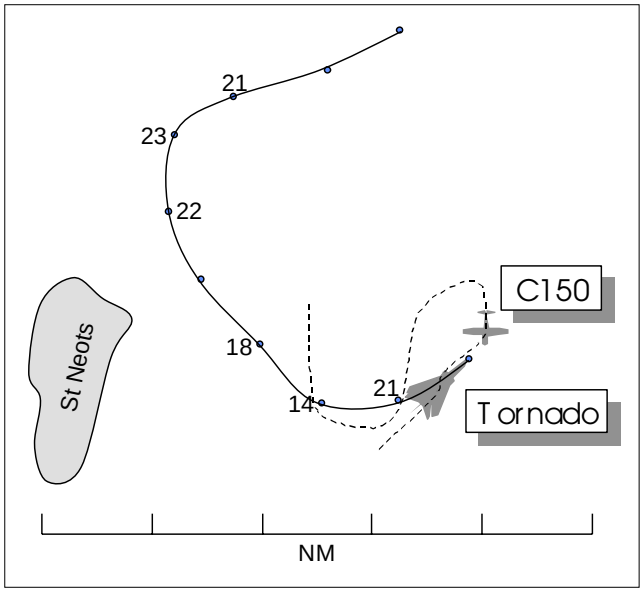
AIRPROX REPORT No 36/01

Date/Time: 15 Mar 1530

Position: 5213 N 0010 W (3 NM E of St Neots)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	Cessna 150
Operator:	HQ STC	Civ Trg
Alt/FL:	2500 ft ↑ (Rad Alt)	2300 ft (QNH)
Weather Visibility:	VMC HZBC 6 km	VMC HZBC 7 km
Reported Separation:	150 ft V, 400 ft H /20-50 ft V	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports heading NE at 416 kt completing a left 180° turn and climbing to 5000 ft. He saw what he thought was a microlight just left of his nose. It was too late to take any avoiding action and the ac passed 400 ft to his left and 150 ft below with a medium risk of collision. He had been unable to detect the other ac against the haze and overcast.

UKAB Note: AIS (Mil) received no responses from the microlight community but saw on a replay of LATCC radars a primary only return which had been manoeuvring for 15 minutes N and E of St Neots and which tracked towards Henlow after the Airprox where it disappeared from the recording.

Eventually a C150 pilot was found who agreed his was the ac involved. The recording showed the Tornado climbing through 2100 ft Mode C as it passes the C150's 7000 NMC return with no discernible horizontal separation.

THE CESSNA 150 PILOT reports heading 180° at 90 kt on an instructional sortie, student handling, when he saw the Tornado about 50 m in front and 20-50 ft above. He instantly grabbed the controls but the Tornado had already passed 20-50 ft directly above. He was then hit by its wake and was rolled 45° before he could recover. He thought the risk of collision had been serious. His ac is not fitted with Mode C. He had been listening out on Henlow Radio frequency, and his CFI advised that there was no suitable LARS in the area.

HQ STC comments that the Tornado crew were in a climbing left-hand turn, having just competed a high workload low level event and their intention was to transit at 5000 ft to their next low level event. At the time of the incident, the ac was under a FIS from RAF Marham, not identified, and the responsibility for collision avoidance categorically remained with the crew. To that end, they clearly did not see the Cessna in sufficient time to take any kind of avoiding action and therefore the pilot's assessment of risk seems somewhat modest. This incident clearly highlights the need for maintaining an effective lookout scan even when a high workload phase is complete and the ac transitions to a seemingly more benign environment.

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 clear to members that the incident occurred because neither pilot saw the other ac in time to take avoiding action. This, and the close pass confirmed on the radar recording, led the Board to conclude that there had been a high risk of collision.

Members noted that both pilots had reported hazy conditions below cloud and discussed whether the visibility was really adequate for the Tornado pilot's task. It appeared to be the sort of 'goldfish bowl' conditions with a poor horizon that may have accounted for the erratic vertical profile in the Tornado's turn as shown on the radar recording. It was pointed out that in a visibility of 6 km it was not always possible to see mainly white ac right at the limit of visibility. Late sightings should be expected and the need to reduce speed for safety should be considered, in order to exercise one's responsibility under VFR to see and avoid other traffic. If this meant that a training or trials task could not be completed, so be it. The Board noted that the camouflaged Tornado, climbing from below the Cessna, would also have been hard to see; this factor laid further responsibility on a fast jet pilot to see and avoid traffic while manoeuvring.

Finally, members could not understand why the C150 pilot had not independently filed an Airprox on this incident and the Chairman agreed to raise this point with the club CFI.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Very late sightings by both pilots.

Degree of Risk: A

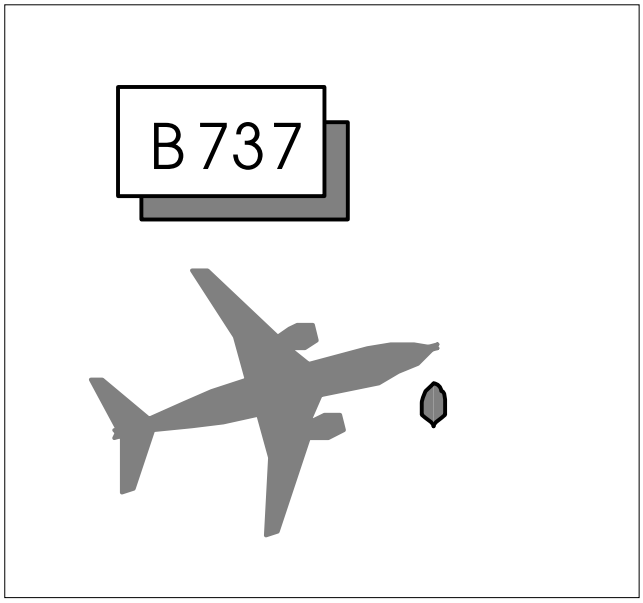
AIRPROX REPORT No 37/01

Date/Time: 5 Mar 1204

Position: 5146 N 0029 E (25 NM W CLN VOR)

Airspace: CTA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-800	Wx Balloon
Operator:	CAT	
Alt/FL:	FL 180↑	
Weather Visibility:	VMC	
Reported Separation:	0 V 10 m H	
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 075° at 290 kt en route to Amsterdam. When about 20 NM W of CLN passing FL 180, ROC 2500 ft/min, an orange (weather) balloon passed down the RHS of the ac level with the cockpit window, about 10 m away, and passed over the RH wing.

AIS MIL reports that tracing action through the Met Office, CAA DAP and Reading University failed to provide any clues as to the origin of the Weather (Wx) Balloon. The Met Office investigation concentrated on radiosonde flight profiles launched on the incident day which showed that the reported balloon could not have been a radiosonde that originated from a UK launch site.

AIS CIV reports that there were no temporary Wx balloon sites promulgated as active on the date of the incident.

UKAB Note: UK AIP ENR 1-1-5-5 details radiosonde balloon ascents, including a description of the balloon and associated equipment with launch site positions and nominal times. The balloon is attached to the radiosonde via a small parachute and 33 m of suspension string. Further discussion with the Met Office highlighted the fact that radiosonde balloons used in the UK are white/ translucent in colour; orange 'pilot' balloons, incorporating a radar reflector, are used occasionally for tracking purposes. Subsequent tracing action for possible 'pilot' balloon launches eliminated UK launch sites; the predominately S to SE lower wind profile changing to W/SW upper winds also eliminated near continent launch sites.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the reporting pilot and radar video recordings.

There was little 'hard information' available to assess this encounter. Pilot members initially discussed the geometry of the incident. It was felt that with the high closing speed involved (290 kt) the balloon would have rapidly passed the B737 and it would have been a very brief sighting in those circumstances. Therefore, from the pilot's description of the encounter of the balloon's relative movement , it may have been further away than was first thought. In trying to identify the balloon's identity, knowing that extensive tracing action had eliminated 'weather' type launches, members wondered whether it may have been an advertising balloon that had broken away and whose automatic deflation device had failed to operate. However, at the end of the day, the balloon remained untraced

and all that could be said was that it and the B737 had come into confliction, much to the surprise of the airliner's pilots. Beyond that there was insufficient information to hand to make any sensible judgement on risk.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict with an untraced balloon in CAS

Degree of Risk: D

AIRPROX REPORT No 38/01

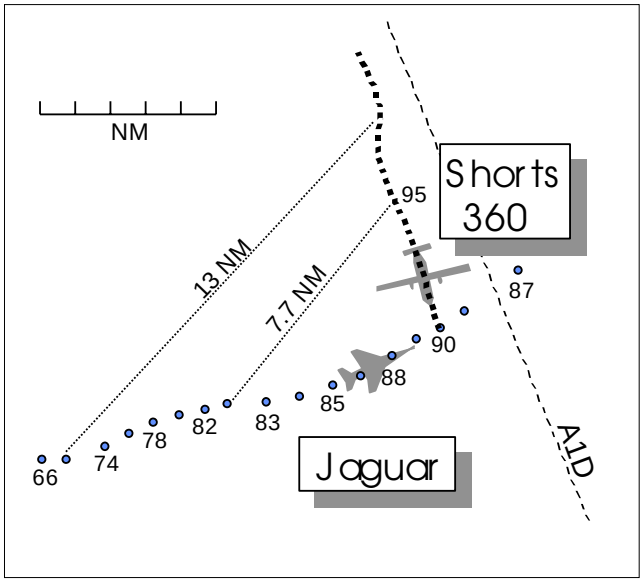
Date/Time: 21 Mar 1739

Position: 5653 N 0518 W (6 NM WNW of Ft William)

Airspace: ADR (*Class:* F)

	Reporting Aircraft	*Reported Aircraft*
Type:	Shorts 360	Jaguar
Operator:	CAT	HQ STC
Alt/FL:	FL 95	8000 ft ↑ (RPS 994 mb)
Weather Visibility:	IMC INCL NK	VMC CLBC 10 km+
Reported Separation:	400 ft V	500 ft

Recorded Separation: 500 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SHORTS 360 PILOT reports heading 140° at 185 kt on ADR A1D and receiving a RAS from ScACC on 127·275. He was passed traffic information (TI) on 2 contacts at 2 o'clock 25 NM away; he was VMC at the time but could not see them. When the next TI call came, he was IMC; the contacts were at 5 NM closing from the right but his TCAS gave no indications at all. The controller then advised that they were very close and TCAS briefly showed a return 500 ft directly beneath, changing to 400 ft with a TA; the traffic then departed to the E. He was under a RAS but was offered no avoiding action; when he asked why, he was told the traffic was so close and fast there would be no advantage in doing so.

THE JAGUAR PILOT reports heading 070° at 450 kt; he was acting as bounce for a pair of Jaguars at low level and was taking separation from them in a climb. Passing 7000 ft he started looking for traffic on A1D and saw a Shorts 360 2 NM in his 12 o'clock travelling SE on the ADR at about FL 90. There was no risk of collision so he continued the climb. Considering the possibility of a TCAS warning he decided to level at about 8500 ft to reduce the chances of producing a nuisance TCAS warning and by the time he had achieved this the separation was increasing. He estimated he was 1500 ft below cloud at the time.

UKAB Note: The Portree RPS at the time was 994 MB; 8500 ft RPS would have equated to FL 90. ScACC radar recordings show the Jaguars earlier at low level and then the No 3 pops up at 1737:30 at FL 66, some 14 NM from the Shorts 360 which is diverging slightly to the W of A1D, steady at FL

95. The Jaguar continues to close on the 360 in a climb. As it passes almost directly beneath the 360 (at 1739:30) it shows FL 96 and the Shorts 360 shows FL 90; presumably the radar processor has transposed the 2 ac readings. The Jaguar then descends to the E towards the rest of its formation.

ATSI reports that the ScACC Tactical and Support Control position was combined with the West Coast and Antrim Sector. At the time of the Airprox the controller was monitoring a trainee, who had relatively little experience, especially on the West Coast Sector. He described his workload level and traffic loading as low. Another controller was available if it had been considered necessary for the sector to be split.

The controller stated that, when he took over the sector, the trainee was already in position. He explained that, in accordance with standard operating procedures, the left-hand console displayed the Tiree Radar, with a radius of about 100 NM centred on the source, to allow control of the West Coast Sector and the Great Dun Fell Radar was selected on the right-hand, with a displayed range of 65-70 NM, to cover the Antrim Sector. He could not recollect exactly where he was sitting, relative to his trainee but confirmed that he had a clear view of both displays. He was aware that the Shorts 360 was on frequency at FL 95, routeing southbound on A1D and was being provided with a RAS. He had no reason to change the type of radar service being provided.

After taking over the combined sector, the controller said that he noticed military traffic manoeuvring 25 NM to the SW of the Shorts 360, well clear of the ADR. He alerted his trainee, who, at his suggestion, passed, at 1735, traffic information to the pilot of the Shorts 360 on two contacts in his two o'clock, at a range of about 25 NM, at FL 105 unverified. The controller added that, shortly afterwards, the squawk of the military ac disappeared from the radar display. Radar recordings of the event confirm the controller's recollection. He noticed it reappear, about one minute later, in potential confliction with the Shorts 360.

Due to the relative inexperience of the trainee, the mentor immediately decided to take over control of the RT. He passed traffic information to the pilot of the Shorts 360, warning him of one or two fast moving ac crossing right to left in his two o'clock, at a range of 3 to 4 miles, at a similar level. The pilot acknowledged the call and when asked if he was visual with the traffic replied "*negative*". The radar photograph of the Tiree Radar, timed at 1738:20, i.e. at the time this traffic information was passed, shows the subject ac on conflicting tracks. The Shorts 360 is shown routeing southbound, just west of the centreline of A1D at FL 95. A 7001 squawk is displayed 8·5 NM to its SW at FL 82. The controller could not explain the discrepancy between the range shown on the radar display and that which he passed to the pilot. He did not think that the 200 NM range, selected on his radar display, impaired his ability to assess small distances because he was used to operating routinely with long ranges set. Traffic information was immediately updated: *"Okay its then it's er very close now three miles indicating FL 83 climbing in your one o'clock.*" The radar at this time shows the ac 6·9 NM apart. Before receiving an acknowledgement, further traffic information was passed: "*……..traffic one o'clock two miles level 85 now er it's unverified*". The pilot replied *"we're looking*". The controller said that as the returns of the ac merged , some garbling of the labels occurred and it appeared that their respective Mode C readouts may have been transposed. Accordingly, when he passed traffic information with the ac in close proximity, he warned the pilot of the Shorts 360 that the traffic was either above or below his ac. The latter reported receiving a TCAS alert showing that the other ac was 500 ft right above him. This was later corrected by the pilot to being 500 ft below. The controller said that he continued to monitor the progress of the military traffic in case it turned back into confliction with the Shorts 360. In the event it continued eastbound away from A1D.

During the course of the incident STCA activated twice. The first time as the 7001 squawk passed FL 81, ceasing as it levelled at FL 83 for three sweeps. It reactivated as the ac started to climb again. Radar photographs show that the returns of the subject ac merge at 1739:20, with the Jaguar passing 500 ft below the Shorts 360.

The MATS Part 1, Pages 1-40/1-41 states, with reference to RAS, that:

> "A Radar Advisory Service (RAS) is an air traffic service in which the controller shall provide advice necessary to maintain prescribed

separation between ac participating in the advisory service, and in which he shall pass to the pilot the bearing, distance and, if known, level of conflicting non-participating traffic, together with advice on action necessary to resolve the confliction. Even though the service is an advisory one, controllers shall pass the 'advice' in the form of instructions".

It also stipulates the following condition:

"Controllers shall pass avoiding action instructions to resolve a confliction with non-participating traffic and, wherever possible, shall seek to achieve separation which is not less than 5 NM or 3000 ft, except when specified otherwise by the Authority. However, it is recognised that in the event of the sudden appearance of unknown traffic, and when unknown ac make unpredictable changes in flight path, it is not always possible to achieve these minima".

The controller said that he did consider issuing the Shorts 360 with avoiding action instructions when he first realised the potential confliction between the ac. However, because of his experience of the unpredictable actions of military fast jet operations and taking into account the low ac performance of the Shorts 360, he decided to rely on the pilot of the latter flight acquiring visual contact with the military ac. He confirmed that he was used to passing avoiding action instructions to ac outside controlled airspace when appropriate. He reasoned that giving the Shorts 360 a left turn would not only have resulted in making it very difficult for the pilot to see the other ac but also it could have prolonged the confliction. He considered that a right turn might have resulted in the ac turning slowly directly towards the conflicting traffic whereas the projected routeing and speed of the military ac would, he estimated, ensure that it passed just ahead of the Shorts 360. In the event, radar photographs indicate that the 7001 squawk did make a slight left turn as it approached the Shorts 360. In view of the relative performance of the ac involved, he assessed that the use of an avoiding action climb to try and achieve vertical separation was not a realistic option. This, he reiterated, was why he opted for a visual sighting. At the time, he believed that the Shorts 360 was flying in VMC, as the pilot had not reported otherwise. The controller commented that he would have expected the pilot to inform him if he was in cloud, especially as he continued to pass the flight traffic information. The impression that the pilot was clear of cloud was reinforced when he replied that he was looking for the traffic. It was only later that he discovered that the Shorts 360 pilot had reported being in cloud at the time of the Airprox and had not seen the military traffic. With hindsight, had he been aware that a visual sighting was not a likely eventuality, he admitted that he would have issued some form of avoiding action.

HQ STC comments that the Jaguar pilot was aware of the likelihood of encountering civilian traffic on the advisory route and paid particular attention to the area of potential conflict as he climbed out from low level. He saw the Shorts 360 in sufficient time to assess that, in his view, there was no risk of collision and took sensible measures, albeit unsuccessful, to avoid triggering a TCAS event onboard the Shorts. This incident highlights the need to maintain a good lookout when operating in or close to ADRs.

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.

Controller members agreed that the only option for effective avoiding action by the ScACC controller would have been to have turned the Shorts 360 hard right as soon as he had evidence that the Jaguar was closing in a climb. It appeared from his somewhat inaccurate range calls that the radar scale selected may have delayed recognition of the problem and members agreed that he had not acted effectively in this incident. The controller's decision making was not helped by the Shorts 360 pilot not telling him he was IMC, but possibly he had been in VMC until the latter stages, and even then the conditions must have been marginal because the Jaguar pilot could still see the Shorts 360 from below it. The Board concluded that the incident was a confliction between ADR and VFR traffic which was resolved by the Jaguar pilot; the latter's sighting having removed any risk of collision.

Members were advised of recent RAF publicity about the need to avoid triggering TCAS events in

airliners where possible; it was clear that the Jaguar pilot was aware of the concept but possibly not of the extent of the avoidance required, and the Chairman undertook to discuss this with IFS (RAF).

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction on ADR A1D resolved by the Jaguar pilot.

Degree of Risk: C

AIRPROX REPORT No 39/01

Date/Time: 19 Mar 1453

Position: 5513N N 0435 W (9 NM SE of TURNBERRY VOR - elev 1637 ft)

Airspace: Scottish FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	SA315B Lama	HAWK
Operator:	Civ Comm	STC
Alt/FL:	200 ft (agl)	↑ 4000 ft (RPS)
Weather Visibility:	CAVOK >10 km	CAVOK >10 km
Reported Separation:	200 yd H/100 ft V	Not seen
Recorded Separation:	Not recorded	

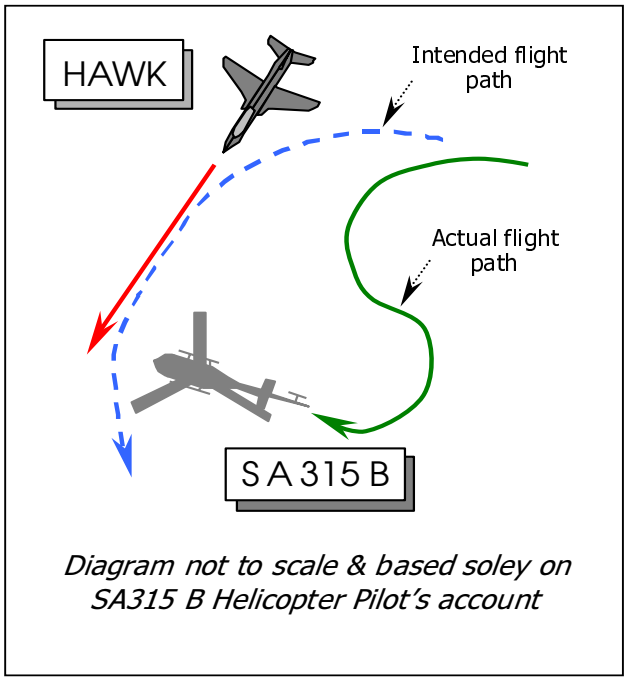


Diagram not to scale & based soley on SA315 B Helicopter Pilot's account

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SA315B LAMA PILOT reports that he was carrying out a forestry under-slung load-lifting (USL) task at 60 kt. His ac has a white livery and HISLs and anti-collision beacons were on. Whilst circuiting L at 200 ft agl to land at a site on a forestry track he was warned by his ground-crew on RT about a fast jet approaching from behind. He immediately descended to tree-top height and turned L to get closer in to the natural slope of the ground, before turning to face NW in a high hover. At this point the fast jet – probably a dark coloured Hawk – was spotted by him about 200 yd away as it crossed his nose, from R – L, about 200 yd ahead of and 100 – 150 ft above his helicopter. The jet was flying down the valley at 2-300 ft agl heading SW and pulled up after about 0·25 NM to clear high ground ahead. He believed that the avoiding action he had taken reduced the risk to *"low"*, but without a call from his alert ground party the risk would have been *"very high"* indeed.

UKAB Note (1): The USL activity conducted by the SA315B pilot had been notified to the Low Flying Booking Cell (LFBC) at LATCC (Mil) under the Civil Aircraft Notification Procedure (CANP). NOTAM, CANP 4361, promulgated a mandatory CANP Avoidance Area (AA) within Low Flying Areas (LFA) 16 and 20T; a 3 NM radius around three co-ordinates and a corridor 3 NM either side of a line connecting the three sites. The AA was promulgated for a seven-day period 19 – 25 Mar inclusive. This Airprox occurred within the promulgated AA on the first day of the CANP - a Monday.

THE HAWK PILOT reports that his ac has a black colour scheme and HISLs were on whilst he was

flying at 420 kt heading 227° (T) inbound to West Freugh on a practice diversion and squawking 3/A 7001 with Mode C. He had been flying between 250 – 4000 ft RPS, into sun, in CAVOK conditions but did not see the helicopter flown by the reporting pilot.

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

UKAB Note (3): Shortly after this occurrence at 1453:08, the Hawk crew free-called W Freugh RADAR declaring a Practice PAN with a simulated bird strike and requesting a low-speed handling check within the visual circuit. At 1453:26, W Freugh advised the Hawk crew to steer 210°(M) (QDM) for W Freugh and report the aerodrome in sight, which they did about one min later. The plotted QDM placed the Hawk along a bearing from W Freugh, which passed through the CANP AA.

HQ STC comments that the Hawk captain was the staff pilot and instructor for a student navigator from the Navigator Training Unit. The planning for this sortie was the student's responsibility, albeit under the supervision of the instructor, and the track as planned should have kept the ac approximately 1 NM outside the CANP avoidance area. Unfortunately, the navigator misplotted the heading on the leg by 10°. The pilot eventually realised the error and initiated a climb-out from low level in order to determine their position but not before the infringement and the Airprox had occurred.

The lessons regarding supervision have been reinforced at the Unit and this is, as always, a graphic illustration of the need to maintain a good lookout, particularly at low level.

UKAB Note (4): This occurrence is also under investigation by the RAF police as a CANP infringement.

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 ATC RT frequencies and reports from the appropriate operating authorities.

It was apparent to the Board that it would have been very difficult if not impossible for the helicopter pilot to have seen the Hawk any earlier than he did as it approached from astern. However, the prompt warning provided to the helicopter pilot by his alert ground crew enabled him to take positive action and members were impressed by the good teamwork and airmanship evident here. A helicopter pilot member observed that when stationary, in a hover close to the tree-tops with no relative crossing motion, the helicopter would not have been at all conspicuous to the Hawk pilot. This probably explained why the Hawk pilot had not seen the Lama at all. HQ STC's comments revealed that the Hawk crew were cognisant of the CANP AA surrounding the Lama helicopter's operating area and had planned their sortie to go around it – but not by much. It was unfortunate therefore that the instructor pilot had not realised the heading error had taken him into the AA. The mistake, introduced by the student navigator clearly contributed to the inadvertent penetration of the AA, but it should have been picked up by his instructor and the Board noted the Command's comments on the supervisory lessons learned at the unit. The members went on to agree unanimously that this Airprox resulted when the Hawk pilot instructor inadvertently penetrated the notified CANP AA and flew into conflict with the SA315B Lama helicopter, which he did not see.

Turning to risk, the ground crew deserved praise for spotting the Hawk when they did, and for warning the pilot in time for him to take effective avoiding action. Without this warning the helicopter pilot would have been very poorly placed, given his under-slung load configuration, and the geometry of the situation as the Hawk approached at a similar height. Even so it had still been a close call at 200 yd/100 ft, and the members concluded that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Hawk pilot instructor inadvertently penetrated the notified CANP AA and flew into conflict with the SA315B Lama helicopter, which he did not see.

Degree of Risk: B.

Contributory Factors Student plotting error.

AIRPROX REPORT No 40/01

Date/Time: 19 Mar 0735

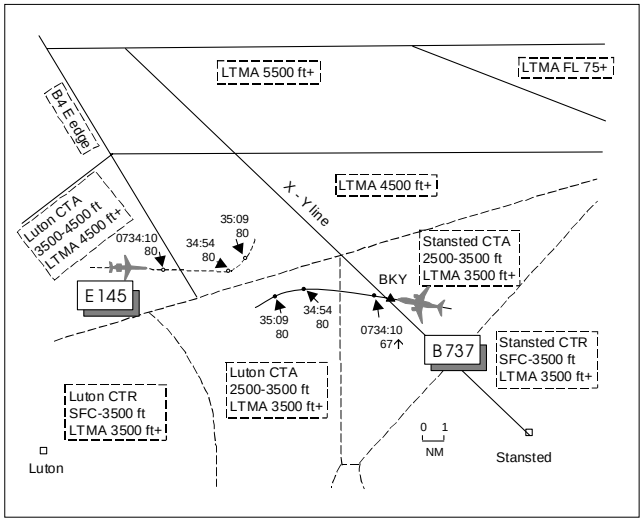
Position: 5201 N 0006 W (6 NM W of BKY VOR)

Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-300	E145
Operator:	CAT	CAT
Alt/F	↑ FL 80	FL 80
Weather Visibility:	VMC CLOC NK	VMC CLOC NK

Reported Separation: 0 V 3.5 NM H/0 V >3 NM H

Recorded Separation: 0 V 2.3NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports flying outbound from Stansted heading 290° at 250 kt cleared by ATC to climb from 5000 ft (QNH 1014) to FL 80. After levelling at FL 80 and changing frequency to 119.77 MHz, he was given an avoiding action L turn owing to conflicting traffic in his 1 o'clock, range 3·5 NM at the same level; a TCAS TA alert was also received. The avoiding action turn was completed smoothly with the AP disconnected, the other ac passing 3·5 NM, he thought, clear on his RHS also in a L turn away. He assessed the risk of collision as medium.

THE E145 PILOT reports heading 090° in the vicinity of BKY at FL 80 inbound to Stansted. LATCC ATC gave an avoiding action L turn onto 360°, twice from two different controllers, owing to a Stansted departure climbing above its cleared level. A TCAS TA was received and the conflicting traffic was seen visually to pass down the RHS of his ac; it was outside the 3 NM range selected on the TCAS equipment. The combination of the controllers' instructions and his actions avoided a near incident and he felt that the safety of his ac had not been compromised.

ATSI reports that the Stansted FIN DIR, who had only been in position for five minutes prior to the incident, described her workload and traffic loading as medium. The Stansted Approach Sector, which is situated in the TC Control Room at LATCC, was adequately staffed, with an Intermediate DIR (callsign Essex Radar) with a trainee and the FIN DIR (callsign Stansted Radar). The latter controller did not consider that the presence of a trainee on the Sector was a contributory factor to the Airprox.

The B737 departed Stansted on a BUZAD SID from RW 05. In accordance with Standard Operating Procedures, as stated in the LATCC-TC MATS Part 2 Page 7-3, all ac on BUZAD SIDs are to be transferred from the Stansted Tower position to the Stansted FIN DIR. Accordingly, the B737 established communication with the Stansted FIN DIR at 0730, reporting passing 2000 ft on a BUZAD 2S SID. The flight was identified and was instructed to maintain the initial SID altitude of 5000 ft because of crossing traffic at 6000 ft.

Once the B737 was clear of the inbound ac, the Stansted FIN DIR instructed the flight to continue on its present heading and to climb to FL 70, the MSL. The pilot replied, reporting his heading initially as 285°, although this was corrected immediately to 290°, but erroneously stating his cleared level as FL 80. The FIN DIR confirmed that she did listen to the pilot's reply and remembered annotating the fps with the reported heading.

However, she said that she was unaware, at the time, that the pilot had read back an incorrect level. She could not readily explain why she had missed this incorrect readback. The RT recording confirms that both levels, as transmitted by the controller and the pilot, were stated clearly and unambiguously. The FIN DIR commented that, on recent operational duties, the MSL, because of lower barometric pressure, had been FL 80. In order to ensure that she issued the correct level she had taken the precaution of writing FL 70 on the B737's fps, as an 'aide memoire'. She theorised that, possibly, she had been used to hearing FL 80 in reply and had not noted the pilot reading back FL 80. Additionally, because the pilot was based at Stansted, he, also, may have been used to receiving a clearance to FL 80.

Having issued what she believed was a safe clearance for the B737 to climb to FL 70, the FIN DIR said that she turned her attention to her inbound sequencing task and did not monitor the ac's rate of climb. Shortly afterwards, whilst still not appreciating that the ac was climbing to FL 80, she transferred the B737 to the NW DEPS frequency, together with a 10° tactical heading change.

The NW DEPS SC, who was expecting the B737 at the MSL, reported that he noticed, prior to the ac contacting his frequency, that it appeared to be climbing unusually quickly and he was suspicious that it intended levelling at FL 70. He realised that, if the ac did not level at FL 70, a potential confliction existed between this flight and the E145, which was inbound to Stansted at FL 80, under the control of Essex Radar. The radar at 0734:10, about the time that the B737 was transferred from the FIN DIR to NW DEPS, shows the subject ac on reciprocal tracks, 10 NM apart. The B737 is passing FL 67 and the E145 is maintaining FL 80; the B737 was climbing in the order of 1800 ft per minute as it approached FL 70. The NW DEPS SC immediately telephoned Stansted Radar to warn them of the developing situation. The telephone line from NW DEPS rings at both the FIN DIR and Essex Radar positions. Normally, a telephone call from NW DEPS is answered by the FIN DIR but on this occasion Essex Radar picked up the call. This was fortuitous, in the circumstances, as not only was the E145 working that position but also the B737 had been transferred from the FIN DIR frequency, prior to contacting the TC Sector. Consequently, Essex Radar was able to give the E145 crew an avoiding action L turn away from the B737, together with TI, straight away.

UKAB Note (1): The Essex Radar ATCO reported that his trainee gave avoiding action instructions to the E145 and he also transmitted, re-iterating the words 'avoiding action', as reported by the E145 crew.

Meanwhile, the B737 crew had made their initial call on the NW DEPS frequency reporting at FL 80. The radar at 0734:56 shows the B737 reaching FL 80, 3·5 NM away from the E145. The NW DEPS SC immediately issued the B737 crew with an avoiding action L turn and passed TI about the conflicting ac. The B737 was also instructed to make an expeditious climb to FL 120. The pilot acknowledged the call and reported sighting the other traffic. CPA occurs at 0735:09 when the radar shows the avoiding action turns having the desired affect with both ac in the turn, passing 2·3 NM apart, at the same level.

The MATS Part 1, Pages E-7/8, states that pilots are required to read back in full messages containing level instructions. Errors in a readback must be corrected by the controller until the pilot gives an accurate readback.

During the course of the investigation, it was apparent that the SID charts for Stansted departures, as published in the UK AIP, gave the misleading impression that the callsign of the contact frequency was either Essex Radar or London Control, when in reality it was the Stansted Radar (FIN DIR) rather than the Essex Radar Controller that works the outbound ac when necessary. It was recommended that the CAA took appropriate action to ensure that the SID charts, referring to Stansted departures, correctly reflected the standard after-departure frequency that could be expected i.e. Stansted Radar rather than Essex Radar. This would reflect Standard Operating Procedures to ensure any possible confusion was removed. Following this recommendation, DAP responded stating that amended charts were published on 17 May 01 but an error is still contained in Note 6 (issue of cruising levels). Further amendment action has been taken and will take effect on 6 Sep 01.

THE B737's FLIGHT SAFETY DEPT confirmed the SOP that the crew would be expected to follow when in receipt of an ATC instruction. The PNF will respond to the call whilst the PF will make the appropriate change in the MCP. This change has to be physically confirmed by the PNF, after which it can be actioned. The crew were able to listen to the LATCC RT post incident and both were shocked that they had read back the clearance incorrectly. The FSO added that an apparent reason for the confusion was the 'plethora' of 8s in the transmission that resulted in the crew being convinced that they had heard FL 80.

UKAB Note (2): The company prefix was followed by two 8s in the 3 number suffix. RT transcript at 0732:45 shows *"B737 c/s, continue on your present heading climb flight level seven zero".* The immediate response was *"present heading two eight five oh beg your pardon two niner zero and climb flight level eight zero B737 c/s".*

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 drew attention to the trail of Human Factor mistakes that attached to this incident. The FIN DIR had issued a climb clearance to FL 70, as intended, but the B737 crew had incorrectly read-back FL 80 which then went unnoticed by the controller. Ultimately, the onus was on the FIN DIR to obtain a correct read-back and it was this undetected error that led to the Airprox. Nevertheless, both pilots on the B737 flight deck had missed the correct cleared ATC level which should have been noticed by following their SOPs. Fortuitously, the NW DEPS SC spotted the developing problem. He did very well to notice the B737 climbing at a rate which would have made it difficult to level off at FL 70 and he was able to warn the Essex Radar ATCO in a timely manner.

As to risk, the avoiding actions given by the NW DEPS and Essex Radar ATCOs combined with the TCAS TA alerts and visual sightings by both crews had been effective enough to remove all risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Following an incorrect read-back that went undetected by the Stansted FIN DIR, the B737 climbed into conflict with the E145.

Degree of Risk: C

AIRPROX REPORT No 42/01

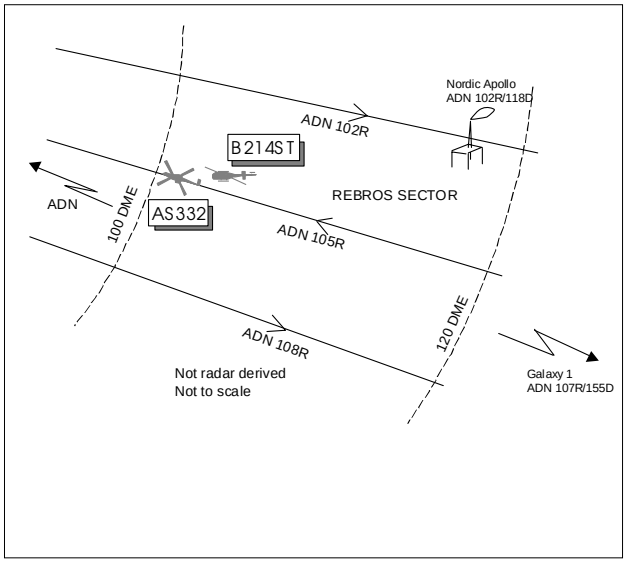
Date/Time: 22 Mar 0920

Position: 5658 N 0050 E (ADN 105R 103D)

Airspace: HMR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	B214ST	AS332
Operator:	CAT	CAT
Alt/FL:	2000 ft (RPS 995 mb)	2000 ft (RPS 995 mb)
Weather Visibility:	VMC SHWR 10 km	VMC SHWR 10 NM
Reported Separation:	0 V 1.5 NM H	NK

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B214ST PILOT reports lifting from the Nordic Apollo (tanker) at 0912 UTC on Nordic frequency 122·77 MHz en route to Aberdeen and climbing initially to 1300 ft McCabe RPS 995 mb. The weather was a mix of I/VMC owing to snow showers in the area with the visibility varying between 10 km and 1000 m. The helicopter was fitted with navigation, anti-collision and landing lights which were all switched on. At ADN range 116 NM he contacted Aberdeen Information on frequency 135·17 MHz requesting to join HMR 105 RAD at range 100 NM at 2000 ft; ATC advised him of no conflicting traffic. He reported level at 2000 ft at about 109 DME, he thought, and went on to say "*estimating 105°/80 DME at 0929 and Aberdeen at 1000";* he was asked to report at 80 DME. As he approached 103 DME heading 270° at 135 kt, he saw an AS332 helicopter, with navigation and strobe lights on, in his 11 o'clock range 1·5 NM at the same level on a similar track. He informed ATC of the conflicting traffic, whilst he uncoupled the ALT and NAV modes from the Flight Director to avoid the slower AS332, which he subsequently overtook. He assessed the risk of collision as very high; the crew had been completing their top of climb checks and had been making RT calls to Aberdeen and the ship. He contacted the AS332 crew after landing to discuss the incident. The AS332 crew remembered making the appropriate "*120 DME, next at 100*" call on the HMR 105° at 2000 ft but did not recall hearing the B214ST's lifting call or any advice from Aberdeen Information on their position.

THE AS332 PILOT reports heading 270° at 130 kt inbound to Aberdeen from the Galaxy 1 rig at 2000 ft McCabe RPS 995 mb. The weather was generally VMC, 250-500 ft below cloud, when clear of snow showers in the area, which reduced the visibility at times below 10 NM. He was approaching 101 DME on the 105° RAD when he heard a pilot report a conflicting ac at the same level and radial and being asked by Aberdeen Information to clarify his position. After his discussion with the B214ST crew post incident, he could not shed any more light on the matter.

UKAB Note: The two helicopters involved in the Airprox were from the same company using the same prefix with a different two number suffix followed by the same letter e.g. DEF12B & DEF44B. However, on frequency at the same time and ahead of the AS332 (DEF12B) was another helicopter (A/C 3) from the same company whose c/s suffix was a combination of one number from each subject ac e.g. DEF14B.

ATSI reports that at the time of the Airprox, the subject ac were in receipt of an 'Enhanced Flight Information Service' from the Extended VHF "REBROS" position, situated at Aberdeen. REBROS was manned by a qualified mentor monitoring a trainee, who, though relatively inexperienced on the REBROS position, held a Certificate of Competence on the 'HELS 1' position.

Both had felt fit and adequately rested and the relevant ATC equipment was serviceable. The mentor described the position as being "very busy" and the trainee thought that it was the busiest that she had ever seen it. The adjacent 'HELS 2' controller was assisting by transferring data on inbound flights to the fpss provided for the radar positions, to which flights are transferred once they enter radar cover.

The Airprox occurred on the ADN VOR 105° radial at a range of approximately 100 NM, outside radar coverage. The AS332 (c/s DEF12B) was inbound on the 105° radial and, at 0913, *reported "...range one twenty next one hundred".* The trainee acknowledged the position report and correctly recorded the information on the AS332's fps. Just over one minute later, the pilot of A/C3 (c/s DEF14B) reported *"...range one hundred call you at eighty".* This report was acknowledged, using the correct callsign but, unfortunately, the information was recorded on the fps of the AS332 (DEF12B). The mentor did not pick up the error and neither did the trainee notice, when writing down the information on the AS332's fps, that it showed that this flight had reported at 120 NM only one minute earlier.

At 0914:30, immediately after A/C3 (DEF14B), made its position report, the pilot of the B214ST (DEF44B) established communication with the REBROS position. He reported at 1300 ft, just airborne from the Nordic Apollo, at range 116 NM from the ADN and requested climb to 2000 ft to join the 105° radial. The trainee instructed the flight to standby and checked her fpss for conflicting traffic. She noted that the AS332 was also inbound on the 105° radial at 2000 ft but the fps indicated, incorrectly, that this flight had reported at 100 NM at 0914 and, therefore, it was assessed that the AS332 did not constitute conflicting traffic to the B214ST. (Under the Enhanced FIS, TI is only required to be provided to flights on the same radial at the same level when position reports indicate that there is less than 10 NM between them.) Accordingly, the trainee advised the pilot of the B214ST that there was no traffic to affect his climb to 2000 ft on the 105° radial.

At 0917:30, a foreign registered helicopter called on the frequency to advise that it was at 4000 ft acting as a 'relay' helicopter for another at low level, carrying out a pipeline inspection. The mentor took over the RT and confirmed the flight's details. He also took the call when, at 0919:00, the B214ST reported level at 2000 ft, at range 106 NM on the 105° radial, estimating 80 NM at 0929. The mentor then handed back the RT to the trainee. When interviewed, the mentor recalled that, for a period prior to taking over the RT, his attention may not have been fully directed towards his trainee as a colleague tried to co-ordinate details of the 'relay' helicopter with him. He thought that this might account for him not picking up the trainee's error. He also explained that he had been standing, in order to get a better view of what was happening but, because the strips are displayed in radial order, starting from the top, those on the subject ac were near the bottom and more difficult to see.

Having taken control of the RT again, the trainee dealt with a number of other ac on the frequency and, at 0920, the B214ST reported *"...we're visual with traffic in our er eleven o'clock er just a couple of miles away two or three miles away it appears to be on the same radial as us er were you aware of that?"* The mentor took over the RT at that point and replied *"...no the only traffic we've got on the one zero five radial is a DEF12B (the AS332) who went through the hundred at time one four".* The pilot of the B214ST confirmed that there was traffic in front of him and added *"... we've good visual with him at the moment".* The mentor then went on to check the position of another helicopter, on the 111° radial, which he thought might be the traffic which the B214ST had observed but the confirmed position discounted it. When advising the B214ST that he did not know what the traffic was, the mentor inadvertently used the AS332's callsign (DEF12B). The pilot of the AS332 (DEF12B) responded by giving his position as *"...one zero one on the one oh five".* Hearing this, the B214ST reported *"...that would make him that traffic who's just er about a mile ahead of us".* The mentor apologised and acknowledged that the B214ST had been given "misinformation". He requested that the pilot of the B214ST advise him if he lost visual contact with the AS332, to which he went on to pass TI on the B214ST. Both flights continued without further incident.

At interview, the mentor and trainee readily acknowledged the errors which had led to this Airprox. The trainee accepted that, when mistakenly writing A/C3's (DEF14B) 100 NM position report on the AS332's (DEF12B) fps, she

should have noticed that the AS332 (DEF12B) had only reported at 120 NM one minute earlier. For his part, the mentor fully accepted that he was responsible for the service being provided and should have picked up his trainee's errors.

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.

The Board commended the honesty of the ATCOs, mentor and trainee, involved. The ATSI advisor commented that the error made by the trainee, who was an experienced controller at the unit on another sector, would have been difficult for the mentor to have noticed, particularly since the sector had been busy and he had been distracted by a colleague's co-ordination request. However, the trainee admitted to inserting erroneously the 100 NM position report information of ac 3 onto the fps of the AS332, while not noticing the 120 NM report on that helicopter had only been received and correctly annotated one minute earlier. This error, which went undetected by the mentor, had led to the Airprox but members were conscious that an underlying factor for this appeared to have been callsign confusion. A pilot member, familiar with N Sea operations, commented that the pilots had followed SOPs when joining and routeing along the HMRs and went on to explain that the alpha-numerics allocated for c/ss used a company system dependant on rig destination and sector number. Consequently ac outbound to rigs on a flight would be issued a rig ID no. followed by the letter 'A'; the c/s for the return flight would change the 'A' to 'B'. Other members made reference to guidance in the CAA callsign confusion safety leaflet; it might be better to 'stagger' the final letter in the c/s randomly through the alphabet to avoid ac being on the frequency at the same time with the same suffix letter. The civil helicopter member noted the suggestions which he would address through the subject ac's Company FSO. There seemed no doubt that some c/s confusion and subsequent erroneous fps marking during a busy period were bound up in the cause of the Airprox. The REBROS ATCO was responsible for the provision of the 'Enhanced FIS' in the class G airspace, but importantly – not separation. The controller had passed TI, based unfortunately on incorrect data, to the B214ST pilot who quite understandably used it in making his decision to climb; ultimately however, he always remained responsible for his own separation.

Some members wondered where the conflict lay, since the 5 kt overtake of the B214ST hardly provoked any danger of running into the AS332 which was seen ahead. It certainly would have been different had this geometry occurred in IMC, but it had not. What had happened was that the B214ST pilot had climbed to the same level as the AS332 after being given 'mis-information' from ATC and the sighting had been fortunate. This area of the North Sea could be hostile during the winter months with associated problems of icing, poor RT coverage with Aberdeen at lower levels and the oil rigs sharing the same frequency which can cause interference difficulties. For these reasons, there had to be a safe system when flying beyond radar cover. Although members felt that the present ATC system was adequate for the task, this incident highlighted that it was not impervious to mistakes caused by human factors. The bottom line was that pilots were responsible for their own separation.

Turning to the risk element, some still believed that this incident had been no more than a sighting report. However, the majority of members felt that the B214ST pilot had been concerned that something basic had gone wrong, a system failure of sorts, which he thought had compromised his flight safety. Taking into account the sighting distance, VMC weather at the time and the slow overtaking speed, the Board concluded that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The B214ST pilot climbed to the same level as the AS332, following receipt of erroneous information from the Aberdeen REBROS trainee/mentor controller.

Degree of Risk: C

Contributory Factors Callsign confusion.

AIRPROX REPORT No 43/01

Date/Time: 25 Mar 0708 (Sunday)

Position: 5158 N 0017 E (5.5 NM NNE Stansted - elev. 348 ft)

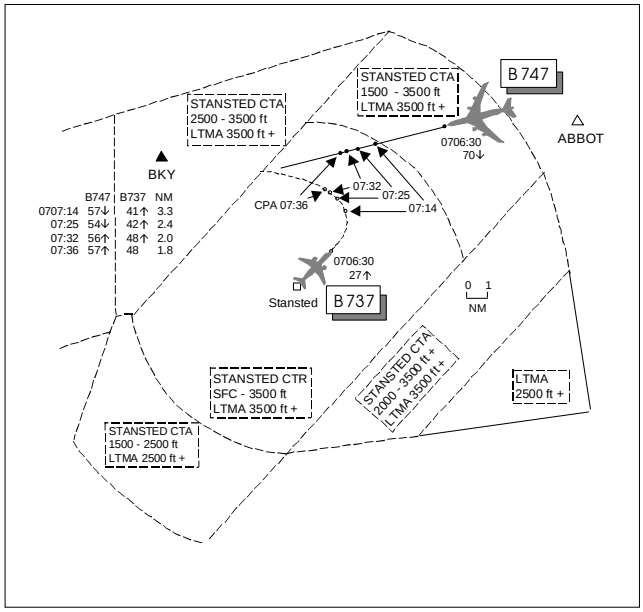
Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-300	B747-400F
Operator:	CAT	CAT
Alt/FL:	↑5000 ft (QNH 1001 mb)	↓6000 ft (QNH 1001 mb)
Weather Visibility:	VMC CLAC >10 km	VMC CLAC >20 km

Reported Separation:

700 ft V >500 m H/800 ft V 600 m H

Recorded Separation: 900 ft V 1.8 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 285° accelerating through 220 kt following a CPT 2S SID outbound to Lyon. The Capt, PNF, contacted LATCC on 126·95 MHz and was given confirmation that 5000 ft was his cleared level owing to crossing traffic at 6000 ft. A TCAS TA annunciated '*traffic*' simultaneously with ATC confirming with another ac on frequency that 6000 ft was its stop altitude. ATC then instructed the B737 crew to stop climb; the PF selected 'alt hold' on the MCP but the Capt was not confident that the AP would react quickly enough. He took control at 4700 ft, disengaged the AP and descended down to 4400 ft; TCAS showed the other ac as 700 ft above which the FO saw on his RHS and which passed >500 m away. He assessed the risk as medium and stated that ATC could not have done any more to prevent it.

THE B747 PILOT reports flying inbound to Stansted descending to 6000 ft QNH 1001 mb at 240 kt. Earlier, the ac had a reoccurrence of a hydraulic warning (HYD OVHT SYS 3), when descending through FL 280, which had been cleared by maintenance before this flight sector; the crew completed the QRH checklist. However, the warning persisted so the crew left off both hydraulic pumps, noting a reduced stabiliser trim rate and spoiler capability with this configuration, which was included in the descent and landing brief. The AP performed several intermediate level-offs normally during the descent. Whilst slowing the ac during the intermediate approach phase the FO, PF, initiated descent to 6000 ft on AP, Flight Mode Annunciation was noted with normal SPD and ALT indications. On approaching 6000 ft, a TCAS TA alerted the crew to crossing traffic, the B737, which they saw below and to their L at about 5000 ft above a solid cloud undercast. The Capt then noticed the PFD white altitude box turn amber, 5700 ft descending, and called for immediate climb; simultaneously the FO disconnected the AP to climb as the LATCC controller issued climb instructions. The B737 passed about 800 ft below and 600 m ahead. In manual flight, heavy nose down trim was noted owing to reduced stabiliser trim rate which the AP was apparently unable to counter. The ac was manually trimmed and the AP was engaged when established on the ILS.

THE B747 FLIGHT OPERATIONS DEPT carried out a formal review of the incident. Their investigation and report found that the crew's perception that the hydraulic problem contributed to the incident was not founded. The Flight handbook states that with this condition only half rate trim would be available but this would only be a factor when hand flying the ac. With single channel AP engaged, which was how the ac was flown during the descent and level offs, AP trim

would normally only be at half rate. However, this problem would account for the 'heavy nose' condition encountered when the AP was disengaged when the crew hand flew the ac back to 6000 ft. Whilst it appeared that the crew had complied with all regulations and procedures during the flight, they did deviate from their assigned altitude. Both pilots would be retrained, receive a simulator evaluation and a special line check prior to returning to line flying. The report concluded with two recommendations:

1. The incident may have been precluded if the company 747-400 ac had an aural altitude alerting system fitted similar to the company 747-200 fleet; this has been recommended by the Director Flight Operations who will co-ordinate with company senior management.
2. This incident be briefed by the Flight Safety Dept at future flight crew meetings highlighting the need to maintain positive control during critical phases of flight in Terminal Control Areas.

ATSI reports that the B747 crew contacted the Stansted Director at 0700:30 passing FL 150 descending to FL 90 inbound to Stansted. The ac continued on its own navigation towards ABBOT and at 0704:30 was given further descent to altitude 6000 ft on QNH 1001 mb; this instruction was correctly read back by the crew. The B747 was then turned onto a heading of 260° to position downwind LH for RW 05.

The B737 departed from RW 05 at Stansted on a CPT 2S SID and established contact with the Stansted Director at 0706:30 passing 3000 ft for 5000 ft.

At 0707:14 the Stansted Director noticed the Mode C on the B747 was indicating 5700 ft and asked the crew to confirm they were maintaining 6000 ft. The Stansted Director immediately instructed the B737 to maintain its present level, which was indicating 4400 ft on Mode C. STCA activated as the B747 was passing 5600 ft, 3 NM NNE of the B737. The Stansted Director then instructed the B747 to climb immediately to 6000 ft and he passed TI to both crews; the B747 arrested its descent at 5400 ft before starting to climb. Meanwhile the B737 stopped its climb at 4800 ft at 0707:32, minimum separation occurring 4 seconds later as the B747 passed 1·8 NM to its NNE and 900 ft above.

The vigilance of the Stansted Director quickly prevented the 'level bust' by the B747 from reducing separation with the B737 any further.

No ATC errors were detected.

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 clear that the B747 crew had descended below their cleared level but were at a loss, from the information received, why this had occurred. Irrespective of the hydraulic system failure, there appeared to have been some other underlying reason for this incident. Pilot members stated that one possibility, which had been known to occur on certain types of ac, was as follows: during a step descent flight profile, if the next cleared altitude was selected prematurely during the capture phase of levelling-off, the AP would change to vertical speed mode and the ac would then continue to descend, ignoring any level-off altitude selected. Another possible alternative put forward was one that could be easy to miss particularly after a long flight and in the heat of the moment. If the QNH was entered in the Primary Flight Display (PFD) but then not selected/actioned by pressing the ALT Setting Knob, the ac would continue to descend on the STD setting 1013 mb; in this case it would have led to a descent to about 5650 ft QNH (FL 60). The radar recording had shown the B747 eventually levelling-off at 5400 ft QNH before climbing back up to 6000 ft. Whatever the reason, the crew appeared slow to react to the 'level bust' but this delay may have been introduced while both pilots visually acquired the crossing B737 after the TCAS alert, before transferring their attention 'heads in' to recover the ac manually. The bottom line was that the cross-cockpit checking procedures, as laid down within the operating company's manuals, should have ensured that the crew complied with the ATC descent clearance.

Turning to risk, the Stansted Director had seen the altitude excursion by the B747 crew as they passed

5700 ft and, after confirming their cleared level, he had instructed them to climb immediately back to 6000 ft. Meanwhile, he had instructed the B737 crew to stop their climb as they passed 4400 ft but, owing to the short notice of the instruction, they topped at 4800 ft before descending back down. TI was passed to both crews, who had also received TCAS TA alerts and had visually acquired each other. The Board concluded that these elements combined, but especially the vigilance and prompt actions by the ATCO, had removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The B747 crew descended below theircleared level.

Degree of Risk: C

AIRPROX REPORT No 44/01

Date/Time: 26 Mar 1901 TWILIGHT

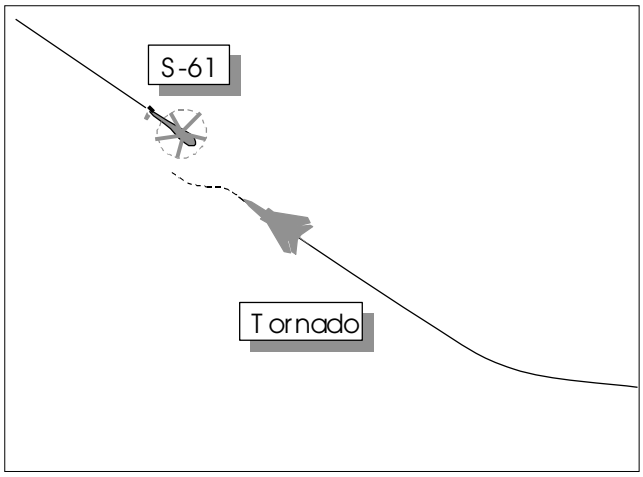
Position: 5700 N 0607 W (E of Rhum)

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

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	S61N
Operator:	HQ STC	Civ Comm
Alt/FL:	520 ft (Rad Alt)	1000 ft (QNH 1011 mb)
Weather Visibility:	VMC CLBC 20 km	VMC CLBC 10 km

Reported Separation: 0.3 NM, 80 ft V /250 yd, 200 ft V

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports heading 300° at 420 kt on a night low flying exercise for which he had the required NLFS bookings. Approaching Rhum he saw a bright white light ahead, he estimated about 10 NM away, and initially thought it was a lighthouse as it had no apparent motion. He turned left to avoid it and on coming abeam it he saw it was a white/orange helicopter which passed about 80 ft above and 0·3 NM to his right as he broke left. The risk of collision was low but would have been certain but for the helicopter's lighting.

THE S61N PILOT reports heading 120° at 110 kt on a Medevac sortie to Ft William, cruising at 1000 ft under a 2500 ft cloudbase. He saw the Tornado on IR when it was about 5 NM away and then visually closing in his 11 o'clock slightly below, initially crossing left to right and then turning towards him. He turned on all the landing lights, confirmed his strobes were on and pointed his ac at the Tornado to indicate his presence. It would have passed down his starboard side but it broke away at about 1·5 to 2 NM and then passed 250 yd away, coming round behind him, about 200 ft below. He considered there was no risk of collision.

UKAB Note: The incident may have been shown on the Tiree Radar but the recordings have been impounded by a BoI into an accident in the highlands.

HQ STC comments that the decision by the S61N

captain to switch all his landing lights on seems to have salvaged a potentially tragic situation. The crew of the Tornado were surprised to find other traffic at their level in the UK NLFS and a combination of the human eye's degraded depth perception capability at night and the crew's belief that the contact was a more distant ground feature led to a very late avoidance manoeuvre.

Whilst it is accepted that Medevac helicopters should have the freedom to operate at a height appropriate to the nature of their task, the Tornado Pilot's station suggested that it would be safer, if possible, to avoid the levels used by low flying military 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 authorities.

It appeared from the pilots' reported altitudes that the vertical separation may have been more than they estimated (in the order of 500 ft), and since both pilots had seen the other ac from some distance away, members agreed that there had been no risk of the ac actually colliding. It was pointed out that there are no lighthouses with steady lights and that perhaps the Tornado pilot should have concluded earlier that what he could see was an ac. This, and other features of the report, led members to believe that the appearance of another ac in the military Night Low Flying System was a surprise to the Tornado pilot. A similar situation had featured in other Airprox and the Board suggested that users of the NLFS should be reminded that they would be deconflicted only from other military ac and that there were many emergency, police and medevac flights at night with compelling reasons to fly at low level in VMC. A lookout should therefore be maintained for such ac. The Chairman agreed to discuss this with IFS (RAF). The Board concluded that the incident was a confliction of flightpaths in Class G airspace which was resolved by the actions of both pilots.

It was pointed out at the meeting that the S61 appeared to have transited the southernmost tip of the Highlands Restricted Area, section 610B*, and it was not clear if the pilot had obtained clearance to do so. When asked afterwards, he believed he had made appropriate arrangements with the Kinloss ARCC on HF; the HRAs affect many tasks to the S and E, and doing this was a normal part of a mission. However, D & D had no record of a closure of HRA 610 B (the normal consequence of an emergency flight through it) being made on that date. Additionally the S61's communications with the ARCC were checked; they consisted of position reports and ETAs, but no mention of penetrating the HRAs. The Chairman agreed to use the Airprox report to remind the S61 pilot's unit of the need to pay attention to this matter.

*AIC 75/96 (Pink 125) and Statutory Instrument 1981 No 1171 refer.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths in Class G airspace, resolved by the actions of both pilots.

Degree of Risk: C

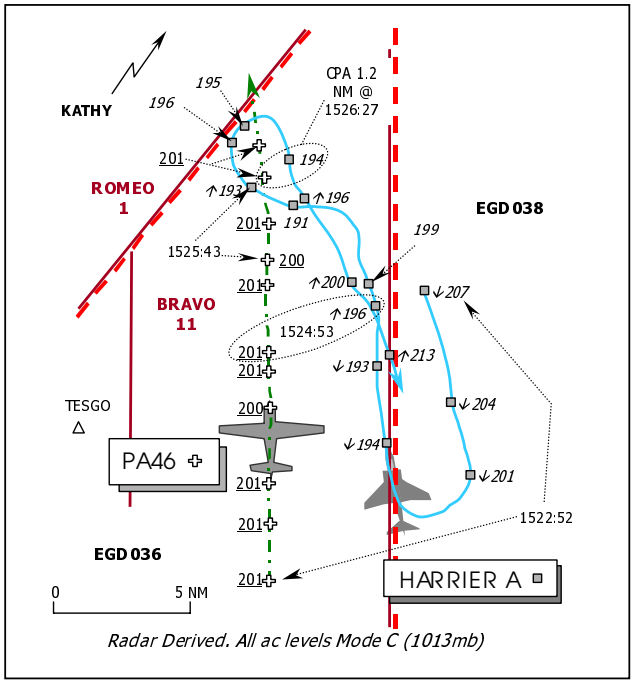
AIRPROX REPORT No 45/01

Date/Time:27 Mar 1526

Position: 5013 N 0120 W (12NM S of KATHY)

Airspace: Airway/Danger Area (*Class*: A/G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA46	Harrier
Operator:	Civ Pte	COMNA
Alt/FL:	FL 200	19000 ft (QNH 1003 mb)
Weather Visibility:	VMC CAVOK Unlimited	VMC Unlimited
Reported Separation:	nil V, 1 NM H	Not seen
Recorded Separation:	700 ft V, 1·2 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA46 PILOT reports his ac has a blue and white livery and HISLs were on whilst inbound to Blackbushe IFR at 200 kt, via airway BRAVO 11, under an ATC service from London CONTROL on 135·05MHz and squawking the assigned code with Mode C. He was flying single pilot, in level cruise at FL 200, 15000 ft above cloud where the visibility was unlimited. Mid-Channel between BARLU and KATHY, heading 010° he spotted a grey Harrier about 4 NM away, flying high energy rolling manoeuvres and high G turns including sustained inverted flight, which was obviously a very high workload for its pilot. ATC informed him of the position of the Harrier and kept him updated. Initially it passed obliquely from R – L ahead of his ac, before it turned SE and crossed again from L - R about 1 NM away down the starboard side at about the same level and then cleared astern. He believed that there would have been a *"huge"* risk of a collision if the Harrier pilot had not seen his ac, but none if he had, which was the reason for filing the Airprox.

He added that when flying in Class A airspace he presumed that it gave him some inherent safety. He contended that if he had infringed controlled airspace (CAS) without a clearance, legal action would have ensued.

THE HARRIER PILOT, Harrier A, reports that whilst conducting embarked ac carrier (CVS) training he was operating as a pair with Harrier B, conducting 2 v 1 air combat training at 350 kt against a single target - Harrier C, within the contiguous Portsmouth Danger Areas EGD036/38/39. They were operating under a FIS and tactical direction from an airborne fighter Controller (FC) in an AEW Sea King (SK) ac and monitored by an FC aboard the CVS. He was squawking 3/A 3701 with Mode C; HISLs were on. An altitude restriction had been imposed when operating in EGD036 due to the Airway – BRAVO 11 - above it, but he believed he had been operating in EGD038/39 flying high energy manoeuvres against the target and was not aware that he had flown in close proximity to BRAVO 11. No calls were received from either the FC in the SK or the CVS that he had strayed into BRAVO 11, nor was he aware of, nor did he see, the PA46. Therefore, he could not assess the minimum separation or the risk involved.

ATSI reports that the HURN SC was operating the 3 WORTHING sector positions in a bandboxed

configuration as traffic loading was 'light'. The PA46 was northbound on Airway BRAVO 11, which is affected by the operation of Danger Area EGD036 active from 0800-1700 UTC - surface to 19000 ft amsl, with occasional notification to 55000 ft amsl. The LATCC-AC MATS Part 2, Page WOR 7-2, states that:

"When Danger Area EGD036 is notified active with an upper limit of less than 30,000 ft amsl, LATCC will have use of B11/UB11. If the notified upper limit extends into B11/UB11 the lowest flight level available to LATCC, determined by the AC Watch Supervisor and based on the Portland Regional QNH, is the one that provides a minimum of 1000 ft vertical separation above the upper limit.
Note: The upper limit will automatically contain a safety buffer above the Danger Area activity. Traffic is not to be cleared below the minimum available flight level until clear of Danger Area EGD036."

UKAB Note (1): The Memorandum of Understanding (MoU) between National Air Traffic Services at LATCC and Flag Officer Sea Training (FOST), the danger area co-ordinating authority, does not include any reference to a 'safety buffer' above the Danger Area activity.

Just before 1515:30, the SC instructed the pilot of the PA46 to descend from FL 220 to FL 200 in conformity with his request and advised him of the active danger area beneath the airway. The SC advised the pilot that further descent could not be given before KATHY, where he could expect vectors for Blackbushe. The notified base of the airway where it overlies EGD036 is FL 195 and the SC was aware that EGD036 was active with an upper altitude limit of 19000 ft amsl. However, he was operating under the erroneous belief that the upper limit equated to FL 190 and that, consequently, the minimum flight level (MFL) available to GAT on BRAVO 11 was FL 200. The SC had noticed military traffic operating in EGD038 to the E of BRAVO 11, (surface – 55000 ft amsl) but became concerned when one of the military ac flew very close to the eastern edge of EGD036, co-incident with the Airway boundary, whilst indicating above FL 200 Mode C (1013 mb).

UKAB Note (2): The LATCC Pease Pottage radar recording timed at 1522:52, shows a 3701 squawk - Harrier A – southbound within EGD038, 1 NM E of its western boundary. Harrier A then turned R onto a northerly track and at 1524:53, indicated FL 196, marginally above EGD036, 0·8 NM W of the boundary. Harrier A then overtook the PA46 about 4 NM to starboard on a parallel track, whilst the latter was tracking along the Airway centreline. Traffic information was passed to the PA46 pilot when Harrier A was at 2 o'clock - 4 NM, which he reported sighting, adding that it appeared to be descending. Shortly afterwards Harrier A made a L turn onto a converging heading, and climbed to FL 199 above EGD036; the SC confirmed that the PA 46 pilot still had the traffic in sight but because of the unpredictable nature of the Harrier's manoeuvres, avoiding action was not issued. The SC instructed the PA46 pilot to head 340°, to drift him L, away from EGD038. Just before 1525:43, Harrier A crossed 2·8 NM ahead of and about 800 ft below the PA46 from R – L, before it turned R about and climbed to FL 196. At 1526:27, Harrier A steadied SE'ly and descended to FL 194, 700 ft below the PA46, but still within EGD036; this was the CPA of 1·2 NM. The SC updated the traffic information as Harrier A then climbed to FL196 at 1526:44, passing 1·6 NM to the SE of the PA46 and still climbing through FL 201. The SC commented that the STCA activated as both ac passed each other and that Harrier A climbed through FL 213 as it crossed the boundary of EGD36/038. An altitude of 19,000 ft on the extant Portland RPS (995 mb) equates to a vertical difference of about 540 ft above FL 190. Recognising that the Harrier's Mode C had not been verified within the permissible tolerance of +/- 200 ft, when the Harrier indicated FL 196 Mode, C or above, it had probably been flying above the upper limit of EGD036.

Throughout the incident the SC believed that the military ac had infringed CAS. The MATS Part 1, Page 1-51, states the action to be taken by controllers, to avoid unknown ac in Class A Airspace:-

Neither avoiding action nor traffic information will 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.

The SC considered that, because the PA46 pilot had sighted the Harrier, the PA46 pilot was in a better position to react immediately to any change in flight path of the jet. Consequently, the SC

thought avoiding action instructions were not necessary. The WORTHING CSC attempted to ascertain which agency was controlling the traffic. According to the UK SSR Code Allotment Plan promulgated within the UK AIP, at ENR-6-2-4, the 3701 squawk is an unverified conspicuity squawk allocated for use to *"Military traffic under service from RN AEW aircraft in the SW Approaches".*

The provision of traffic information, which enabled the PA46 pilot to sight the conflicting traffic, was appropriate in the circumstances, although it may have been prudent to have confirmed if he required ATC to provide any avoiding action.

From Meteorological Office archive data the Portland RPS for the period 14-1500, was 996mb, which changed to 995mb for the period 15-1600; the Airprox occurred at 1526. This decrease in the RPS is significant, because when the RPS falls below 996mb, the minimum flight level (MFL) available for use on BRAVO 11 changes from FL 200 to FL 210. This change was not apparent to either the CSC or the SC at the time and FL 200 was utilised, erroneously, as the minimum available level.

The LATCC-AC MATS Part 2, WOR 7-3, dated 11 July 2000, details the Watch Supervisor's actions when EGD036 is active and may affect Airway BRAVO 11. A note in the Supervisor's responsibilities includes the statement that:

"Watch Supervisors are to take note of the Portland RPS pressure changes, which affect flight level availability".

Consequently, the responsibility for noting any relevant change to the Portland RPS rests with the Watch Supervisor, who commented that, before December 2000, information on forecast RPSs was received at the Supervisor-Assistant's position by AFTN teleprinter message. This allowed the Supervisor and his assistant to check whether any significant changes had occurred and, thence, to ensure that the appropriate sector was notified. On 7 December 2000, an Area Control Information System (ACIS) was installed at the Area Control Room Supervisor-Assistant's position to replace the existing system. ACIS was designed to automate the production of specified data received by AFTN, including forecast RPSs. A sub-system, known as Closed Circuit Television Report System (CCTVRS), enables data to be displayed automatically on various CCTV channels e.g. RPSs on Channel 3. Changes to procedures as a result of the introduction of ACIS/CCTVRS were promulgated to operational staff in Supplementary Instruction 85/00-AC. This states that when the RPS data is updated on Channel 3, CCTVRS will print a channel data sheet containing the newly received data. This sheet is to be placed under the cameras for display by the AC CCTV system. The SI explains that: *"Whenever a Regional QNH* [RPS]*, affecting an item of data that is already displayed, changes in value, a drop-down menu will appear. This requests the user check, enter and print the correct value on the appropriate channel display sheet."* This occurs for example with the Chatham RPS, which affects the Shoeburyness MFL displayed on Channel 4, but it is evident that no drop-down menu appears for the Portland RPS, because it had not been programmed into the system. Consequently, no message was displayed to instruct the user to re-examine the MFL for BRAVO11 displayed on Channel 4. This variation in procedures between Chatham and Portland RPSs and its consequential effect on the MFL available on BRAVO 11 appeared to be generally unknown to AC Desk staff at the time.

This Airprox occurred because the full ramifications of a change of procedure, as notified in SI 85/00, were not made readily apparent to the appropriate operational AC staff. Consequently, Supplementary Instruction 25/01-AC was published, detailing the responsibilities of the Desk Assistant, the WORTHING (HURN) SC and the Watch Supervisor about notifying changes to the MFL on BRAVO11, when EGD036 is active. Moreover, a request was made to LATCC AC Operations to investigate the possibility of ensuring that the system for alerting significant Portland RPS changes is compatible with that for the Chatham RPS. It was agreed that this was appropriate and a request has been made for the relevant programming change to be carried out. No time scale, as to the date of implementation, is available at present, but when it is should preclude a recurrence and enable changes to MFLs to be readily identified and determined.

COMNA reports that the subject GR7 – Harrier A - was conducting a 2 v 1 air combat sortie whilst operating from an ac carrier (CVS) under the control

of an AEW Sea King (AEW SK). The CVS was unaware of the Airprox until they were contacted by Plymouth MILITARY, shortly after the event but neither RT frequencies nor radar pictures can be recorded, hence RT transcripts are not available. Therefore, certain aspects of the occurrence are rather vague.

The sortie was briefed correctly with all aircrew and the ship's FCs, who were to monitor the sortie from the ship's Ops room, in attendance. The 3 Harriers involved – A, B & C - were allocated EGD036 from 5 - 19000 ft, EGD038 and EGD039 from 5 - 24000 ft, Ship's QNH (1003 mb).

UKAB Note (3): Under the terms of the MoU the upper limit of EGD036 is determined by reference to the Portland RPS. However, it is stipulated in Fleet Operating Orders, FLOO's [1995] – 21125.3c SCXA [FOST], that embarked ac may operate on Ships QNH. As the RPS is the lowest forecast QNH for the area this will, in theory, always provide a slight extra margin below the promulgated upper altitude limit of the danger area. Nevertheless, regular comparisons are made with the RPS to ensure the ship's QNH is always a higher value than the RPS.

A fourth GR7 was operating below 5000 ft conducting instrument Carrier Controlled Approaches (CCAs) to the CVS. All aircrew were briefed on the proximity of CAS surrounding their area, in particular airway BRAVO 11. It was decided at the briefing that the Harrier crews would initially use only EGD038/39 and operate below 18000 ft QNH subject to weather. The Harrier pilots asked the AEW SK crew to "*keep an eye on our positions*", to help prevent them straying outside their allocated areas. However, under the FIS and the form of tactical control that applied during the sortie - Loose Control, ultimate responsibility for safe navigation of their ac rested with the individual pilots. The sortie plan consisted of two Harriers – A & B - on CAP (combat air patrol) in the SW corner of the areas, under the control of AEW SK Controller 1 on the primary fighter control frequency. Harrier C, was to CAP in the NE of the areas under the control of the AEW SK Controller 2 on the secondary frequency. Both frequencies were to be monitored by the ship's FCs (FC4 monitoring primary & FC5 the secondary), who would act as standby controllers in the event of a radar failure in the AEW SK. The ship's Air Director (AD), was also present in the operations room and was supervising all the FCs who were operating at the time, including the third FC conducting the CCAs.

The CVS was situated beneath BRAVO 11, about 5 NM E of TESGO as the ac departed and they were subsequently handed over to the two airborne FCs in the AEW SK. The Harriers relative position from a specified datum was passed by the AEW SK, which was at first queried by the pilots but then accepted on a second check. The ship's FC4 recalls this discrepancy and informed the AD accordingly, it is not known whether this discrepancy was passed on to anyone else. As the sortie progressed, the ac moved to the W of the areas because of deteriorating weather conditions from the E, which also forced them to operate slightly higher than had first been envisaged. All ac were operating under a FIS, the Harrier pilots receiving a FIS from the AEW SK crew, which in turn was receiving a FIS from FC4 in the CVS. On at least three occasions during the sortie FC4 passed proximity warnings of BRAVO 11 to the Harrier pilots, who acknowledged the warnings. In addition FC4 remembers passing a warning of *"not above 18000 ft when operating to the West of your current position*". AEW SK Controller 1 also recalled hearing some of the calls and at one stage remembers a reply along the lines of *"happy, clear, Flight Information Service* ". He too was passing similar warnings regarding the proximity of the FIR boundary to the S. The pilot of Harrier A recalls several FIR boundary calls and also that referring to not above 18000 ft. His recollection of any other calls was limited as he had flown 2 similar ACM sorties in the same area that day.

At the time of the Airprox a complicated air situation had developed on radar. Harriers A & B had become separated in the 'fight' with Harrier C, and were displaced by several miles. Harrier A was requesting position information on Harrier B who in turn was requesting target information on Harrier C. Simultaneously, Harrier C, on the secondary frequency was being vectored towards the fourth "no play" GR 7 conducting CCAs. Both the ship' s FCs attempted to resolve the situation when it became obvious that the AEW SK Controller 2 had lost 'ident' on Harriers A & B. The AD also became involved in this situation as the controller of the "no-play" GR 7 was becoming concerned about his ac and, without the benefit of SSR, was seeking

assurances from the AD that the CAP ac were above 5000 ft.

UKAB Note (4): Although FCs afloat on CVS have access to Mode A/C data, it is not continuously shown in the same format as, for example, an ATC labelled display. Individual SSR responses have to be interrogated separately, which is neither a rapid nor simple process. Therefore, any climb or descent by ac under their control will not be readily apparent to the FC.

As it is not possible to monitor more than one frequency simultaneously from each control position in the ships Ops room, the AD has to switch constantly between frequencies to retain the overall air picture. During this period, when all controllers on the ship were concentrating on other ac it is believed that Harrier A entered the airway whilst manoeuvring to regain the air combat picture. The pilot of Harrier A, in the belief that he was within EGD038, concentrated on manoeuvring his ac back into position and acquiring the other two Harriers. AEW SK Controller 1 was trying to pass a significant amount of information to both Harriers A & B but was convinced they had both remained E of the airway boundary within EGD038/39. He did not observe Harrier A entering BRAVO 11. It is possible that the AEW SK's radar equipment may have suffered slight 'picture slip' which went unnoticed by its crew. It is standard practice for the crew to make regular navigation updates and comparisons, utilising their GPS and any reliable primary radar return. Although the AEW SK crew initially "fixed" on the IOW, as the sortie progressed they moved closer to land and eventually were in such a position that primary radar fixing was not an option. However, because Harrier GR7s require significantly more tactical control than Sea Harriers during ACM, it is probable, that the increase in workload may have distracted the AEW SK crew from conducting as frequent navigation checks as they would normally have done. Moreover, this was only the second sortie of this kind carried out since the GR7s had embarked the previous day and all concerned would have been unfamiliar with the peculiarities and extra demands that Harrier GR7s place upon controllers. Further evidence of the AEW SK picture slip would explain the earlier discrepancy noticed by the GR7s and the FC at the start of the sortie.

It is surprising that none of the FCs involved, nor the pilot of Harrier A, saw the PA46 at the time of the Airprox. The AD did however, acknowledge that a civil 'no-play' ac had been identified crossing the FIR boundary to the S of them heading N on BRAVO 11. It is possible the track was discounted as it was following the airway and the AD believed from earlier transmissions that the Harriers had been warned not to fly above 18000 ft. The civil ac was subsequently lost in the ship's radar overhead and without the benefit of continuously displayed SSR data may not have been re-identified on the 'Air Picture'. Neither AEW controller could explain why they did not see the PA46 tracking N, as they thought all their equipment was working correctly and they were ideally positioned at 5 NM S of the I-O-W to detect it. It is possible that they may have confused the PA46 with the fourth Harrier conducting CCAs.

Harrier A's Head Up Display (HUD) was recorded and viewed by the pilot who later confirmed that it had indicated his presence in the airway. Unfortunately the HUD tape was inadvertently over recorded before voice transcripts could be made. Despite passing allegedly within 1 NM of the PA46, the pilot of Harrier A did not see the ac, although it is most likely that he was concentrating on the "fight" to the E and below his position. The pilot of Harrier A probably lost his positional awareness relative to BRAVO 11 and as a result, inadvertently penetrated CAS during a period of particularly high cockpit workload. This may have been compounded by an apparent slippage within the AEW SK's radar equipment, which would have left its FC unaware that Harrier A had entered the airway. It is unfortunate that the PA46 was flying below the MFL for the prevailing pressure conditions, which resulted in the erosion of separation.

Several lessons have been learnt from this Airprox and COMNA have subsequently made a number of recommendations both to the CVS and the AEW SK HQ, including a joint review of the MoU. It is worth noting that the AEW SK MK7, which is due in service very shortly, has a significantly upgraded system that amongst other refinements will eliminate the risk of picture slip.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was evident from the ATSI and COMNA reports that a combination of factors gave rise to this Airprox. The ATSI investigation had revealed a number of deficiencies in the LATCC methodology for assessing the MFL available on BRAVO 11 at the time, following the introduction of ACIS and CCTVRS. It seemed that the important relationship between barometric pressure and flight level availability on the airway, which had been determined by LATCC staff efficiently in the past, had been completely overlooked when ACIS and CCTVRS had been designed, programed and brought on-line. Neither the LATCC system safety case nor daily use for about 3 months had exposed this omission, revealed finally by the investigation of this Airprox. The advisor from NATS briefed the Board that this deficiency had now been addressed and the program updated to include the Portland RPS/BRAVO 11 requirement. All of this explained why the PA46 pilot had been instructed to fly at FL 200, which was below the MFL of FL 210 that should have been used in line with the Portland RPS at the time. Moreover, these errors were clearly unbeknown to the SC and CSC and a controller member intimately familiar with the operation of the HURN Sector revealed that LATCC staff were concerned to discover this revelation. Since the PA46 had been cleared to fly below the MFL on BRAVO 11 because of a change of equipment/procedure that contained a programing error, albeit unknown to the LATCC staff, the members agreed that this was part of the cause.

When Harrier A was above FL 196 (unverified Mode C) yet within the lateral confines of BRAVO 11/ EGD036, it had been shown that the ac was probably within CAS. The COMNA report revealed that this was subsequently confirmed by analysis of the ac's HUD video, but was unknown to the Harrier pilot at the time. This surprised some pilot members familiar with the Harrier's moving map display and navigation system, which was generally considered to be the most accurate system under examination here. The moving map should have showed the danger area/airway boundaries and it should have been clear to the pilot that he was W of EGD038 and close to CAS. What was unexplained here was how a position error of about 6 NM could go undetected. Though the INS would have to be aligned before take-off with an updated position from the ship, possibly an error might have been introduced at that stage, but it was unclear if the pilot's and FC's concern over a possible position error detected earlier was resolved completely. Nevertheless, by his own admission the pilot of Harrier A inadvertently flew further W than intended when above 19,000 ft Ship's QNH and he had not seen the PA46 at all. Members were surprised that firstly the sensors in the AEW Sea King and secondly in the ship had all failed to give a warning to the FCs of the proximity of the Harrier to the PA46. Moreover, a civil controller questioned the efficiency of the AEW and ship's radar if they displayed the Harrier but not the slower PA46 on a steady track in close proximity. The Board was extremely concerned that 4 FCs, the AD (who can only monitor one of the FCs RT frequencies at a time) and other staff within the ships 'Ops Room' had not detected this confliction before it occurred. The COMNA member stressed that under FIS/ Loose Control the pilot remained entirely responsible for his navigation and own separation from other traffic. Whilst this might be the case some members contended that avoiding airliners in CAS was a top priority, higher than a training exercise and the FCs aboard had a 'professional' obligation to assist the pilot in keeping clear of GAT. The Board was told that the new Sea King AEW Mk7 will provide the airborne FC with better equipment than his counterparts onboard. It was stressed that the radar equipment fitted to the CVS does not include labelled displays with continuously displayed Mode C level data and members expressed concern at this, particularly in view of the exercise undertaken in the extremely complex and congested airspace around the UK. They believed this was a major part of the problem – the FCs afloat lacked the basic flight information in a readily recognisable manner and, consequently, the confliction was not readily apparent to them in the tense exercise 'combat' scenario. When asked whether this poor situation was the norm, the COMNA member explained that it was. This led other controller members to question the wisdom of fast-jets flying ACM in such close proximity to CAS and in this case to GAT, without any

forewarning to the pilot. Several members felt there were strong grounds to recommend the fitment of labelled displays to ship's equipment so that FCs could readily determine the Mode C level of transponding traffic. This would be one way in which the potential for a recurrence of this Airprox could be minimised. Others suggested that another ATSU should be used to provide all the normal benefits of radar surveillance from ground based radars over this type of exercise. Indeed Plymouth Military was established for this very purpose for exercises in the Plymouth danger areas; it transpired that the most suitable radar head available to Plymouth Military was the Portland Watchman, which should have theoretical coverage of BRAVO 11, but which was 'out of service' at the time. Others suggested that London Radar might be used under their 'Special Tasks' responsibilities; they had the same radar sources available as LATCC and would be able to co-ordinate with civil sectors - a function they had performed admirably in the past. However, the Mil ATC Ops advisor pointed out that London Radar might not have the requisite staff to fulfil this task. After critical debate the Board concluded that the other part of the cause was that the Harrier pilot exceeded the upper limit of the danger area and flew close to the PA46, which he did not see.

Turning to risk, the SC had detected the potential confliction before the STCA alerted him and passed traffic information to the PA46 pilot enabling the latter to acquire the Harrier, which fortuitously never got closer than 700 ft/1·2 NM according to the radar recording. In other circumstances this might have persuaded members that no risk of a collision had existed. However, the PA46 was GAT flying IFR in CAS below the MFL, unbeknown to the SC, and in conflict with a Harrier that should have stayed within the danger area. Moreover, the PA46 pilot could reasonably have expected standard separation from all other ac while flying in CAS and all the safety nets put in place for the Harrier pilot had failed to ensure that he was warned about the PA46, which he did not see at all. Taking all these factors into consideration the members concluded that the safety of the ac involved had indeed been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA46 was cleared to fly below the MFL on BRAVO 11 because of a change of equipment/procedure that contained a programing error, which was unknown to the LATCC staff.

The Harrier pilot exceeded the upper limit of the danger area and flew close to the PA46, which he did not see.

Degree of Risk: B.

AIRPROX REPORT No 46/01

Date/Time: 29 Mar 1144

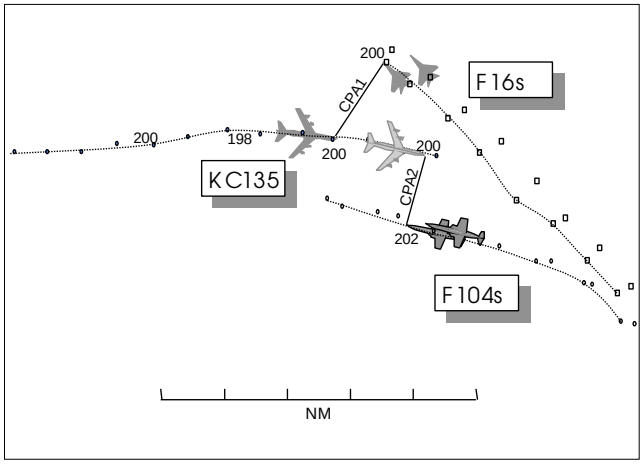
Position: 5224 N 0052 E (5 NM NE of Honington)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	KC-135	F16s, F104s
Operator:	Foreign Mil	Foreign Mil
Alt/FL:	FL 200	FL 200
Weather	VMC CLAC	VMC CLNC
Visibility:	Unltd	10 km+

Reported Separation: 300 ft V, 1-2 NM /4000 ft H

Recorded Separation: 1·4, 1 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KC-135 PILOT reports heading 090° at 290 kt en route to the MLD hold at FL 200 under a RIS from London Mil. He first saw 2 fighters in level flight, same level, heading about 280°, closing from 3-4 NM in his 1 o'clock. His TCAS prompted him to descend and turn left. (UKAB Note: Radar recordings show the KC135 turning right.) One pair of fighters passed to his left inside 2 NM and 300 ft above and a second pair passed inside 1 NM to his right at the same level. He considered there had been a moderate risk of collision. The second pair then passed close behind, his TCAS advising a climb – he followed this but the other traffic also climbed, passing inside 0·5 NM and 500 ft.

THE F16 PILOT reports leading a pair heading 330° at 420 kt in communication with London Mil and an AWAC ac. The AWAC gave no warning of the KC135 but they had radar contact from 40 NM and saw it from 20 NM. His pair passed to the N of it by 400 ft and 1000 ft above it. The following **F104 PILOT,** also heading 330° at 420 kt, reports becoming visual with the tanker at 10 NM and turning left at 4 NM to pass it by 1·5 NM and 500 ft above it.

MIL ATC OPS reports that the KC135 pilot was receiving a RIS from London Radar Controller 11 (CON11) whilst tracking toward the Mildenhall TACAN hold (POKER) and descending to FL 200, having recently left the Westcott Radar Corridor. At a similar time, the 2 F16s and the 2 F104s were crossing the Clacton Sector under the control of Clacton Mil (CLN) at FL 200 whilst inbound to the UK. During the transit, the leaders of both formations clearly stated that they wished to 'continue VFR' once clear of Controlled Airspace. As the 2 formations passed 5 NM E abeam Wattisham, (at about 1142:00) CLN terminated the radar service and released the crews to their en-route frequency; at the time, a confliction with the KC135 was not evident. At 1143:40, CON11 provided the KC135 crew with traffic information (TI) on the lead element of the TLP a/c (the F16s) *"...traffic one o'clock at a range of five miles crossing right to left, a stream of aircraft indicating Flight Level two zero zero,"* to which the KC135 pilot responded *"...has traffic in sight."* CON11 then added *"Roger, looks like you've got a pair between the twelve and one o'clock and some more between your one and two o'clock, also indicating two zero zero"* and the pilot responded *"C/S has both planes in sight, we're descending for our traffic advisory."* About one min later, the KC135 pilot remarked *"..we went right between a flight of four - two on the left, two on the right - we had TCAS give us a descent."* At 1147, after a busy period of RT transmissions involving CON11 and other ac on frequency, the KC135 pilot continued *"...even if the aircraft had MARSA with us, we, we should have been*

informed. We're going to be filing a hazard just to let you know, because we were co altitude." CON11 then transmitted *"C/S roger, you understand you're under a Radar Information Service, where I call the traffic out to you and it's up to you to take the avoiding action on the aircraft,"* to which the pilot replied, *"Yes Sir, I understand that, but even if they called MARSA* (Military Accepts Responsibility for the Separation of Aircraft) *on us, we only initially had sight of two of them...we tried to manoeuvre away from them...and it actually took us closer to the other two."* The pilot subsequently confirmed that he wished to report an Airprox.

The LATCC radar replay shows the TLP ac tracking NW in a 5 NM trail at FL 200 with the 2 F16s in the lead, and the KC135 tracking about 090º, also at FL 200. The relative positions of the KC135 and the lead pair at 1143:40 indicates that CON11's first TI call was accurate. The lead pair (F16s) pass about 2.5 NM ahead of the KC135 at 1144:20, with the KC135 being seen to descend to FL 198 as the ac converge. The KC135 then turns about 15º R to pass 1·4 NM abeam the F16s. Almost simultaneously, the F104s, which are now 4·5 NM SE of the KC135, turn about 30º L to track about 290º. At 1144:52, the F104s and the KC135 pass starboard to starboard, with just under 1 NM/200 ft spacing.

CON11 painted a reasonable picture of the traffic situation as seen on the radar at the time, but it would appear that the significance of the phrase *"a pair between the twelve and one o'clock and some more between your one and two o'clock"* (i.e. that there were more than 2 ac approaching) was not absorbed by the KC135 crew. As a result, the KC135 pilot manoeuvred R to avoid the first pair, an action that subsequently brought him closer to the trailing ac, which he saw late. As an observation, the KC135 pilot appeared to consider that the term 'MARSA' may have had some significance in the encounter. This term however, only applies to military ac operating within a formation and their separation from each other, and does not apply to encounters between a formation and other traffic.

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.

Some of the information in Part A left members wondering if the provisions of RAS and RIS and the meaning of the term MARSA are clearly explained in documents available to the F15 crews. While this was relevant to some of the remarks and actions of the KC135 crew, members agreed that it was not relevant to the cause of the Airprox which they agreed was a confliction of flightpaths in Class G airspace. The KC135 pilot was given effective traffic information by CON11 and the fighters took appropriate avoiding action. It would have been better if the F16s had in fact climbed as they thought they had when reporting, but they had passed ahead of the KC135 by what the Board accepted was a satisfactory distance for VFR separation. The F104s had turned right to pass behind the tanker and Members agreed there had been no risk of collision.

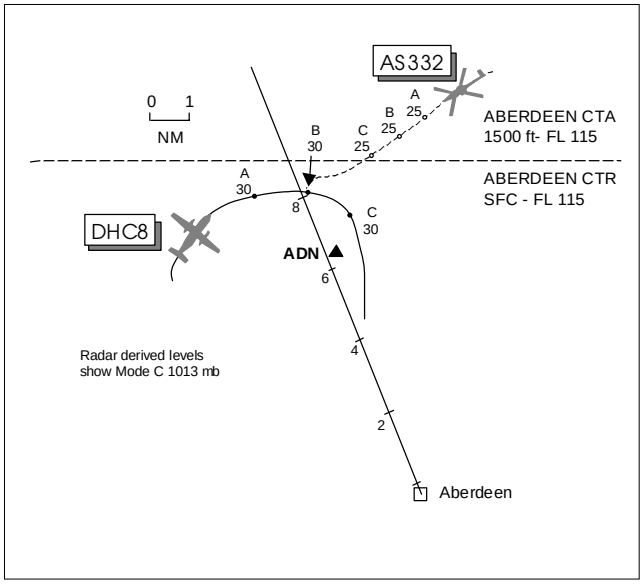
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction resolved by the fighter and KC135 pilots, with assistance from CON11.

Degree of Risk: C

AIRPROX REPORT No 47/01

Date/Time:	28 Mar 0923	
Position:	5720 N 0215 W (2 NM NNE ADN VOR)	
Airspace:	CTR	(*Class:* D)
Reporter:	Aberdeen APR	
	First Aircraft	*Second Aircraft*
Type:	DHC8	AS332
Operator:	CAT	CAT
Alt/FL:	2500 ft (QNH 995 mb)	2000 ft (QNH 995 mb)
Weather Visibility:	IMC KLWD NK	IMC KLWD NK
Reported Separation:	NK	NK
Recorded Separation:	500 ft V 1.6 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ABERDEEN APR reports that the DHC8 was No 1 in the approach sequence for an ILS to RW16 at Aberdeen; No 2 was the AS332 followed by an ATP with a de-icing problem diverting back to Aberdeen after an earlier departure. He positioned the DHC8 downwind RH at 3000 ft while the AS332 was on L base to the NE of ADN VOR heading 225°. Meanwhile, the ATP was >10 NM N of ADN. His intention was to descend the ATP without speed control and with minimum delay by vectoring the subject ac on 'tight' instrument approach patterns. The DHC8 was turned onto heading 080° R base and descended to 2500 ft followed by a closing heading of 130° to intercept the ILS LLZ; the AS332 was at that stage 5 NM NE of ADN at 2000 ft. However, the DHC8 did not appear to turn immediately onto 130° and he had noticed a similar delay previously when it was turned onto base leg. As the ac tracked across the extended C/L, and as he was about to give it a further R turn onto heading 200°, the pilot reported "*going through*" and requested to close from the other side. He issued a R turn onto heading 200° but again the ac was slow to react and he informed the DHC8 crew of possible impending TCAS alert on traffic, the AS332 helicopter, to the NE of them range 2 NM at 2000 ft. Next he turned the AS332 R onto heading 240° to increase horizontal separation and then descended the DHC8 to 1800 ft. The DHC8 was seen to track about 175° although he expected it to track 210° with a SE wind (130°/15 kt). After further vectoring and descent and as the ac tracked through the C/L again he instructed the pilot to execute a missed approach; the subsequent approach was completed without incident.

UKAB Note (1): Met Office archive data shows the Aberdeen METAR 0920Z 13014 KT 2800 –RA SCT003 BKN005 05/04 Q0995 TEMPO 1500

THE DHC8 PILOT reports flying inbound to Aberdeen from Birmingham at 160 kt in IMC. During the instrument approach to RW 16, the FMS was slow to capture the LLZ both on an initial closing heading and on a further attempt after passing through the C/L; a go-around was executed. The FMS and radio frequency were reset and the second approach was flown with the FMS coupled but with a view to possibly disconnecting and flying the approach manually if required; a normal approach and landing was completed. He also stated that during the previous approach into Birmingham the same fault had occurred. The ac was fitted with TCAS but no warnings were received.

THE DHC8 FLIGHT OPERATIONS DEPT reports that contrary to the Captain's report, the crew were not using the FMS to fly the ILS but were flying a coupled approach as per SOP; the system did not capture the LLZ as expected which was exacerbated by the crew being slow to respond to the failure. Following this incident, the company has taken three actions: -

1. The Flight Training Dept. have written an article in the monthly Flight Operations newsletter reminding crews of the importance of monitoring LLZ capture.
2. The Flight Manager Technical has written to all Captains reminding them of their responsibility to enter any apparent equipment faults in the Technical Log.
3. The Captain involved in the incident has been debriefed/rebriefed by the Flight Operations Safety Manager.

THE AS332 PILOT reports heading 240° inbound to Aberdeen at 2000 ft QNH 985 mb at 140 kt. He was informed by ATC, after landing, that he had been involved in an Airprox but he had not received any traffic information or avoiding action, he had not seen any conflicting ac during the flight owing to IMC and TCAS was not fitted to his ac.

ATSI reports that the Aberdeen Approach Radar Controller (APR) had felt fit and adequately rested and the relevant ATC equipment was serviceable. He was operating under a light workload at the time of the Airprox but the decision by the crew of a departing ATP to return to Aberdeen, due to technical problems, meant that it was not a totally routine traffic scenario. The crew of the ATP did not declare an emergency but informed the APR that they were returning to Aberdeen for engineering assistance. Notwithstanding this, the APR did not wish to delay the ATP unduly and, in order to achieve this, he planned to keep the radar circuits of the subject ac, which were estimating the ADN ahead of the ATP, as tight as possible.

RW 16 was in use at Aberdeen with the DHC8 and AS332 approaching from the SW and NE respectively. The APR decided to make the DHC8 number one and positioned it for a "tight" RH circuit to turn final ahead of the AS332, which was vectored onto L base.

UKAB Note (2): The radar data shown indicates Mode C levels on 1013 mb, consequently, with the Aberdeen QNH being 995 mb, altitudes are 500 ft lower than indicated.

Events proceeded normally until the DHC8 was on R base heading 080° at 2500 ft, with the AS332 in its 11 o'clock position at a range of 5 NM, level at 2000 ft and heading 225° (diag. position A). At that point, the DHC8 was instructed to turn R heading 130° to close the ILS LLZ and report established. Aberdeen are approved to use a minimum radar separation of 3 NM and this would have been achieved without difficulty if the DHC8 had responded to the heading change in the normal manner. Unfortunately, the DHC8 was very slow to take up the new heading and flew through the ILS LLZ, still on an E heading, bringing it into conflict with the AS332.

The pilot of the DHC8 reported: *"…. slightly through recapture it from the other side".* The APR responded by instructing the flight to turn R heading 200° to enable it to close the LLZ from the L. By that stage, lateral separation had reduced to approximately 2.9 NM (diag. position B) and continued to reduce but vertical separation remained at 500 ft. The APR instructed the AS332 to turn R onto heading 240°, to widen its circuit slightly, and advised the DHC8: *"… traffic you may see on er TCAS is a helicopter at two thousand feet northeast of you by two miles".* No TI was passed to the AS332 crew and the APR acknowledged that this had been an omission on his part. He also thought, with the benefit of hindsight, that a `harder' turn for the AS332 may have been warranted but pointed out that, in practice this would have gained little given the relative performance and positions of the subject ac.

Lateral separation reduced to a minimum of 1.6 NM (diag. position C) before starting to increase again as the DHC8 turned R. Once again, the DHC8 did not appear to take up its assigned heading of 200° and appeared to settle on a S track. The APR continued its descent, to remain below the ILS GP, and instructed it to turn further R heading 210° but again the flight failed to capture the LLZ. The APR decided that a successful approach could not be achieved and instructed the flight to go-around. A further circuit and approach was carried out, which proved to be uneventful. In the meantime, the AS332 had also completed a successful ILS approach.

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 controller involved and reports from the appropriate ATC authorities.

The initial discussion focused on the ATC aspects of the incident. Some members wondered if the APR had created the situation by vectoring the subject ac on 'tight' radar patterns to avoid delay to the ATP, which was returning with a technical problem but not in an emergency. ATCO members thought that the paths concerned seemed reasonable, but with little room for any 'slack'. The subject ac were on opposing base leg tracks, separated vertically by only 500 ft. Any deviation from the APR's intended vectoring plan risked a separation loss, which is what happened, although there was never any risk of collision. Only one person (the APR) had the 'whole picture' and with hindsight, it may have been prudent of him to have explained his intentions on 'tight' radar patterns to the pilots involved. Leaving conjecture aside, however, members wondered why the DHC8 had not turned and passed ahead of the AS332 on a closing heading for the ILS. The DHC8 pilot seemed to suggest the fault lay with the Flight Director (FD) which had been slow to capture the LLZ on this and the previous trip, but pilot members felt there was more to it than that. The ac had continued on base leg almost to the C/L, before commencing its turn R, which pilot members surmised was the A/P attempting to capture the ILS as it crossed the LLZ beam. They felt the DHC8 crew should have been monitoring the FD more closely and noticed that the system had not captured the LLZ as expected. Moreover, regardless of the crew's slow reaction to the system delay, they should in any case have responded to the APR's instruction to turn R and it was this that had ultimately caused the Airprox.

Turning to risk, although the subject ac were both flying in IMC and had flown closer than normal with less than the prescribed separation, they were always under positive control with 500 ft vertical clearance. It was agreed in these circumstances that there had been no risk of collision.

UKAB Note (3): Post meeting it was confirmed by the DHC8 operator that a technical fault had been found within the FD which has now been rectified.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The DHC8 pilot was slow to respond to the Aberdeen APR's instructions.

Degree of Risk: C

AIRPROX REPORT No 48/01

Date/Time: 5 Apr 1511

Position: 5542 N 0456 W (15 NM NW of Prestwick - elev 167 ft)

Airspace: Scottish FIR (*Class:* G)

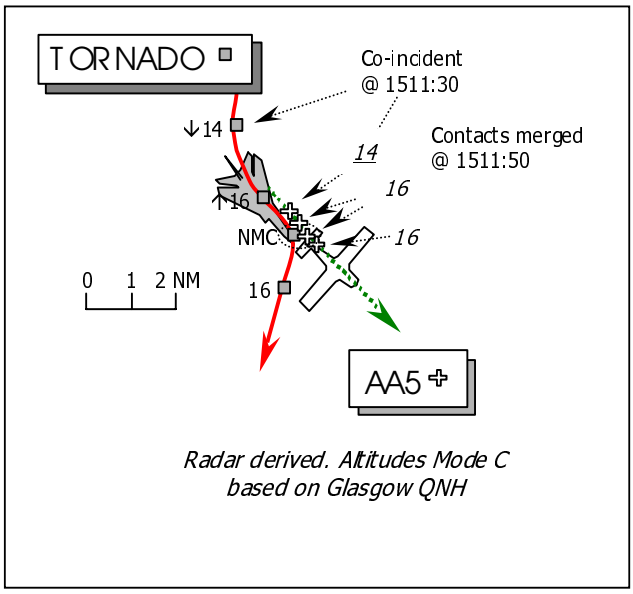
	Reporting Aircraft	*Reported Aircraft*
Type:	Grumman AA5	Tornado GR4A
Operator:	Civ Trg	HQ STC
Alt/FL:	1700 ft (QNH 994 mb)	1730 ft (Rad Alt)
Weather	VMC NIL	VMC Cloud/ Haze
Visibility:	>10 km	20 km in rain

Reported Separation:

100 m H/<50 ft V 500 ft H/150 ft V

Recorded Separation:

Contacts merged < 0·2 NM H/ nil ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GRUMMAN AA5 PILOT, a flight instructor, in a very comprehensive report, states his ac is white with a blue stripe and navigation lights, anti-collision beacon and HISLs were all on during a trial flying lesson. He was occupying the RHS as the PF with his customer in the LHS and a squawk of A7000 selected with Mode C, whilst flying from Prestwick via West Kilbride VRP, Inverkip VRP, Ardmore Point VRP and back to Prestwick. He had just switched from Prestwick APPROACH to TOWER on 118·15 MHz, and was returning to the airfield under a FIS in class G airspace flying beneath cloud at 1700 ft Prestwick QNH (994 mb), in good VMC, with an in flight visibility of >10 km.

Tracking along the coastline about 1 NM out to seaward heading 145 (M)° at an IAS of 105 kt, mid-way between West Kilbride and Ardrossan Harbour, he was first alerted to the other ac when he heard a *"whoosh and a loud roar of jet engines"* behind his R shoulder. He immediately looked around and saw a Tornado at 4 o'clock, initially in a R bank 100 m away. He believed it was less than 50 ft above his ac because he was looking at the jet almost horizontally, as it then rolled to the L into his 3 o'clock and flew away at right angles to his own track, leaving him with the impression of looking into two large black jet pipes. The Tornado pilot waggled the wings as he flew away and disappeared from view in a slight descent. This 'unofficial way' of telling him they had seen him, did not reassure him given its previous proximity. During the whole period of this sighting it was flying at high speed and from first hearing to last sighting he perceived the occurrence lasted less than 5 seconds, though he is aware that time can get distorted during incidents like this.

After noting the time of the occurrence he filed an Airprox report with TOWER over RT, asking if APPROACH could see any other traffic around on radar as he thought these ac tended to travel in pairs.

He added that the Airprox had occurred in the "Open FIR", and he was well acquainted with the relevant rules for "separation and collision avoidance". However, he believed that an actual risk of collision had existed (he quoted an "A" risk) because the Tornado had approached from behind and without the pilot's avoiding action manoeuvre he believes that it would either have hit his ac or flown very, very close to it; if this had happened

the Tornado's wake would almost certainly have caused a major upset to his flight path and may have caused structural damage to his ac.

Lessons can be learned from this Airprox he believes; whilst cognisant of the dangers of flying below 1000 ft agl, he questioned why this Tornado was flying at 1700 ft amsl at high speed. Moreover, he questioned whether it can ever be safe for any ac's crew not receiving a RIS or RAS to fly above 250 kt below 10,000 feet in class G airspace, except in designated areas.

THE TORNADO GR4A PILOT reports that the ac is camouflage grey, HISLs and navigation lights were on whilst leaving the Firth of Clyde heading 154°(T) at 421 kt on a low-level sortie. He was listening to the Glasgow APPROACH frequency but was not under an ATS, flying straight and level at 1730 ft Rad Alt, about 500 ft below and 10 NM clear of cloud with an in-flight visibility of 20 km in rain. He was flying through a part of the LFS where the minimum transit height above the Gannet Helicopter Operating Area for FW ac is 500 ft.

The Grumman AA5 was first seen at L 11 o'clock about 500 ft away and 200 ft below his ac. He applied 90° of R bank into a hard R turn onto a heading of 190° to avoid the other ac, which passed 500 ft to port and 150 ft below his jet. He subsequently waggled the wings, but the white AA5 had been difficult to spot against a predominantly white background. The Cockpit HUD video was retained which showed the AA5.

UKAB Note (1): The UK Mil AIP at Vol III Pt 1–2-14-2, strongly advises that to aid deconflicition from HMS Gannet helicopters operating within the Gannet Helicopter Operating Area, fast-jet crews unable to contact NAVY PRESTWICK on the specified UHF frequency, should consider flying at a minimum height of 500 ft above its defined co-ordinates.

UKAB Note (2): The ScACC Lowther Hill radar recording reveals the geometry of this encounter was broadly as described by both pilots. The recording displays altitudes Mode C, related to the Glasgow QNH, which from archive data was 995 mb. The Tornado is shown at 1511:30, descending through 1400 ft Mode C and turning onto a SE'ly track about 2 NM astern of the AA5, which was tracking steadily SE at the same altitude. The Tornado indicated 200 ft above the AA5 ten seconds later. Both ac contacts merge in azimuth on the next sweep at 1511:50, the AA5 at 1600 ft, but no mode C is shown by the Tornado. The Tornado pilot's hard R avoiding action turn is evident as both ac diverge and the next sweep shows both ac at the same altitude of 1600 ft.

ATSI comments that the AA5 pilot left the Glasgow APPROACH frequency and called Prestwick APPROACH at 1508, for rejoin instructions from the N and gave his position as Great Cumbrae. The controller was in the process of closing the Approach Radar (APR) position and 'bandboxing' APPROACH with TOWER, due to the lack of traffic. The APR instructed the AA5 pilot to route down the coast for RW13 at Prestwick and to report at Irvine. Having acknowledged this at 1509, the AA5 pilot was transferred to the Prestwick TOWER frequency for circuit joining instructions. The APR reported that there was no conflicting traffic visible on radar at this time and so there was no reason to retain the AA5 on frequency. He then set about closing down the APR position as there was no radar traffic.

Shortly after 1509:30, the AA5 pilot contacted TOWER and was instructed to join L base for RW13 and to report at Irvine, which was correctly acknowledged by the pilot. A short time later, at 1512, the AA5 pilot informed the TOWER that he had been involved in an Airprox with a Tornado, a minute earlier, which was travelling SW and had passed in very close proximity. The pilot stated that he could hear the Tornado's engine noise. Soon after the Airprox had been reported, at approximately 1513, the Tornado crew contacted Prestwick APPROACH. The APR returned to his position as TOWER was now busy receiving the details of the Airprox. The Tornado crew advised that they had come reasonably close to a civil ac a few minutes earlier and enquired if the controller was working it. The APR informed the Tornado pilot that the ac was now working TOWER. The Tornado crew stated that they wished to reassure the pilot that his ac had been seen and the Tornado had achieved some separation from it. This was passed onto the AA5 pilot by TOWER who said that it didn't explain why the Tornado had come too close. The AA5 pilot confirmed that it was his intention to file an Airprox and this information was passed onto the Tornado pilot who subsequently left the APPROACH frequency.

As the Tornado crew had been 'listening out' on the Glasgow APPROACH frequency but had not called the unit the flight details were not known to either Glasgow or Prestwick. Therefore, the Prestwick controllers were unable to pass any traffic information to the AA5 pilot who was operating at 1800 ft Prestwick QNH (994 mb), VFR, in Class G airspace under a FIS from Prestwick. The incident was discussed with the APR who added that it was very unusual to see high-speed, low-level, military traffic following the Ayrshire coast, as they normally routed close to the Arran coastline.

HQ STC comments that examination of the Tornado's HUD video tape shows that the AA5 appeared to the Tornado pilot tail-on, to the L and low. As a result of the ac aspect and size, the visual acquisition was late but a positive manoeuvre by the Tornado pilot increased separation and advertised his presence. It is understandable that the AA5 pilot was startled by the encounter and it is indeed uncommon to encounter fast jets operating at 1750 ft in the UK LFS. However, the prevailing weather conditions had prompted the pilot to cruise at a non-standard height, albeit maintaining the normal low-level cruise IAS of 420 kt.

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.

It was readily apparent to the Board that the AA5 pilot would have been unable to see the Tornado at all before the Airprox occurred, as the jet closed at high speed from directly astern. Conversely, the Tornado pilot should have seen the AA5 ahead, even in rain and members were told that the Tornado windscreen was effective in dispersing rain. In mitigation, the AA5 was presented tail-on to the Tornado pilot and would have been a very small target indeed, making it difficult to acquire visually. Although the GR4 radar has an air – air mode, it is used only for air combat. During normal transit flying, as in this case, ground mapping mode would be selected. Hence, this had been a very late spot indeed for the Tornado pilot – he reported 500 ft away. Some GA pilot members queried why the Tornado should be flying at this unusual height of 1730 ft Rad Alt over the sea, bearing in mind the entreaties of the MOD to GA pilots to avoid the band from 250 – 1000 ft whenever possible, as the commonly used heights for low–flying jets. They felt there ought to be a similar compunction on the part of the fast-jet pilot to stay below the levels commonly used by GA pilots. The Gannet Helicopter Operating Area might have been one factor and the STC member suggested that time considerations were another. One of the sortie objectives for the crew would be to achieve a specific 'time over the target'. Avoiding showers, might have necessitated climbing to a higher altitude whilst maintaining a set ground speed. The STC member understood the point that military fast-jet pilots were encouraged to stay below 1000 ft and here the GR4 pilot had made a conscious decision to fly above that, but in his view it was a sensible decision in these circumstances. Nonetheless, other fast jet pilot members pointed out that if the situation dictated a transit above 1000 ft then consideration should be given to a reduction in GS to give more time to acquire other ac visually, react to any sighting and avoid by a suitable margin. Noting the AA5 pilot's comments about flight below 10,000 ft at speeds in excess of 250 kt, members agreed this was a matter for the MOD to address. As things stand, MOD policy permits flights at these speeds, with or without a radar service, and the Tornado pilot had flown within the regulations. It was also pointed out that the general availability of a radar service at low-level was not consistent across the FIR, especially in Scotland. Nevertheless, some members questioned the Tornado crew's airmanship in flying in the vicinity of an aerodrome merely listening out on the Glasgow APPROACH frequency. Although they called Prestwick eventually, it was after the event and just to reassure the AA5 pilot. It would have been far better to have called an ATSU, giving it some useful information which others might benefit from.

The members agreed that the fundamental cause of this Airprox was a late sighting by the Tornado pilot, which allowed practically no time for his subsequent avoiding action - 500 ft was less than 1 sec flying time at a combined closing speed of about 316 kt. Only a moment had elapsed from sighting to instinctively applying 90° R bank and pulling into a tight turn to avoid the AA5, but not by much. Moreover, once in the turn the Tornado crew

would have been unable to see the AA5 at all beneath the belly of their ac, which led members to conclude that an actual risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Tornado pilot.

Degree of Risk: A.

AIRPROX REPORT No 49/01

Date/Time: 30 Mar 1700

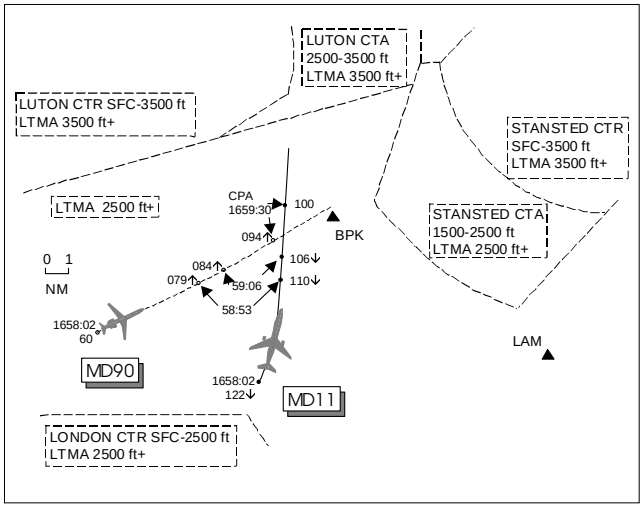
Position: 5145 N 0010 W (2·5 NM W of BPK VOR)

Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	MD90	MD11
Operator:	CAT	CAT
Alt/FL:	↑FL 100	↓ FL 100
Weather Visibility:	VMC CLAC UNL	VMC CLAC 20 NM

Reported Separation: 300-400 ft V 2 NM H/NK

Recorded Separation: 600 ft V 1·5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MD90 PILOT reports flying outbound from Heathrow heading 060° at 350 kt climbing to FL 100. After passing FL 70 he noticed a descending MD11 on a crossing track R to L which he realised was also close to FL 100 as he was about to level off; he queried this with ATC. The MD11 passed 300-400 ft above and 2 NM ahead of his ac. He took no avoiding action as he had maintained visual contact with the conflicting traffic throughout the encounter; the ac was not TCAS equipped.

THE MD11 PILOT reports flying inbound to Stansted heading 005° at 250 kt. The sector length was over 8 hours but had involved an 0330 hr local time departure arriving in the London area 14 hours later. During the arrival procedure, he was given a multiple step down descent during which he received numerous TCAS alerts. This, he opined, was a normal occurrence when routeing over Heathrow towards Stansted owing to the flight profile and the busy airspace at that time of day. Although he did not receive any RA warnings, during one TA alert the RFO noticed an ac, whose type he could not identify, passing behind but it was not at an unsafe distance. The FMS system had been slow in operation and it had been necessary for the crew continually to monitor it for accuracy.

THE MD11 FLIGHT SAFETY DEPT reports that the crew would be expected to follow the procedures as stated in the Company Flight Operations Manual (FOM): -

Altitude Verification- Upon receipt of a new altitude clearance-

With A/P engaged: The PF sets the new altitude in the FCP. The PNF verifies that the correct altitude is set in the FCP and states the new altitude

clearance (e.g. FLXXX). If verbal verification is not received from the PNF, the PF points to the FCP. If verbal verification is still not received, the PF commands *"Confirm Altitude".*

With A/P not engaged: The PNF sets the new altitude in the FCP. The PF verifies that the correct altitude is set in the FCP and states the new altitude clearance (e.g. FLXXX). If verbal verification is not received from the PF, the PNF points to the FCP. If verbal verification is still not received, the PNF commands *"Confirm Altitude"*

ATC Clearances- The two crewmembers must monitor all enroute clearances, one of them recording the clearance and the other checking the receipt and readback.

ATSI reports that the controller involved was working as the LATCC TC NE Departures Sector Controller; the sector was 'split' and the SC assessed both the workload and traffic loading as low. The relevant ATC equipment was all serviceable at the time of the Airprox and no other factors, which may have adversely affected the SC's performance, were identified during the course of the investigation.

The MD90 contacted the sector at 1654:10, having departed Heathrow, passing 4700 ft and climbing to 6000 ft on a BPK 6F SID. Two minutes later the MD11 called, having been co-ordinated into the sector descending to FL 140 following a LOREL 1S STAR for Stansted. The ac was 6 NM E of Heathrow heading towards BPK and was cleared to continue descent to FL 120 to be level by BKY.

The SC waited until the MD90 had crossed the track of a Heathrow inbound before instructing it to climb to FL 100. Shortly after this instruction was given, the SC turned the MD11 onto a radar heading of 005° and gave further descent to FL 110. Analysis of the RT tapes revealed that this transmission was clear and correctly read back by the crew of the MD11. At that time the MD11 was in the MD90's 2 o'clock position at a range of 7·6 NM and passing FL 122 (1658:02).

The SC stated that it was her intention to position the MD90 in a tactically advantageous position for the next sector, allowing for the presence of potentially conflicting overflying traffic. In order to achieve this, at 1658:50 the MD90 was turned onto a heading of 060°. This would also ensure that the MD90 would pass behind the MD11 and facilitate a quicker cross, thus enabling further climb to be given to the MD90. Almost coincident with the turn instruction for the MD90, STCA activated for 5 seconds. At the time, the MD90 was passing FL 76 and the MD11 FL 112, and so the SC put this down to a 'nuisance alert' probably caused by the climb rate of the MD90.

On replaying the radar recording of the TC NE Deps. position, STCA is seen to activate again at 1658:57 and remain on until 1659:06, by which time the MD90 was passing FL 84 and the MD11 FL 106. This should have alerted the SC to the fact that the MD11 had descended below its cleared level of FL 110, however, the SC stated this STCA did not activate on her radar display. This was supported by her Watch Manager, who attended the interview and was close to the radar position at the time of the Airprox. The SC went on to explain that normal practice is for anyone in the TC Operations Room who observes an STCA alert, which is clearly not a 'nuisance alert', to shout to the controller(s) involved and draw their attention to it. No one did this on the evening of the Airprox and so, in the opinion of the SC, not all the STCA activations were shown on the displays in the TC Operations Room.

As the MD11 continued through its cleared level of FL 110, it was only 3·6 NM from the MD90 (1658:53). The SC stated that at that time she had been occupied monitoring the overall traffic picture, ensuring necessary co-ordination had been achieved and planning future actions. STCA re-activated at 1659:10 and remained on for 17 seconds which, again, the SC maintains was not visible on her display. At 1659:30, separation was at its minimum of 1·5 NM and 600 ft, with the MD11 in the MD90's 10 o'clock position and tracking away. STCA came back on and changed from 'white' to 'red' at 1659:33. The SC reported that this did appear on her radar, but was too late for any effective action to be taken by her.

On observing the high severity STCA the SC started to transmit to the MD90 but, in mid sentence redirected the call to the MD11 confirming that its cleared level was FL 110. The MD11 crew replied *"We're level one hundred as you told us".* As the subject ac had passed and separation was increasing, the SC did not believe that there was

any point in passing TI or avoiding action. The MD11 was then cleared to descend to FL 90 and the MD90 was cleared to climb to FL 150, which is the level associated with the relevant standing agreement for transfer to the next sector. The MD90 then queried whether the MD11 had also been at FL 100. When questioned, the crew of the MD11 replied that they thought they had read back FL 100.

Neither pilot stated that they wished to file an Airprox but subsequently the crew of the MD90 filed on landing. Due to the discrepancies between what the controller recalled, with regard to the STCA, and what was observed on the radar recording, following the Airprox a report was requested from the Department of Analysis & Research, within NATS, detailing the timings of the STCA system in respect of the two subject ac. Their report states that the STCA system low severity parameters were triggered between 1658:49 and 1659:45 and the high severity parameters between 1659:33 and 1659:41; this largely accords with what was observed when the radar recording was replayed.

NATS was asked to provide an assurance that activations of the STCA equipment are always transmitted to and faithfully reproduced on relevant radar displays. In response to this, NATS advise that they have confidence that alert messages recorded on the NODEL tapes correspond to what the system generates. However, they believe that there are two possible ways in which this data may differ from that seen by controllers. Firstly, a display error may cause a difference and, secondly, if the controller acknowledges the alert this is not recorded as it is 'local' to the display. If an alert was acknowledged on a display whilst in the low state then it would disappear and automatically reappear when high severity status was reached. On this occasion, examination of the radar replay indicates that the low severity alert period was unbroken and there is no evidence to indicate a display problem.

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.

Initial discussion concentrated on the apparent discrepancy between what STCA alerts had been recorded on the radar replay and what the TC NE SC and her Watch Manager had seen on their displays at the time of the incident. Firstly, the replay had shown a discontinuous STCA low severity (white) alert starting at 1658:50, which had been seen by the SC, followed by intermittent white alerts which eventually changed to high severity (red). The SC had been adamant that after seeing the first alert, but without acknowledging it, no other alerts were seen until, at 1659:30, when a white alert turning to red, almost immediately, was displayed. Civil ATCO members, experienced with LATCC TC operations, said they would normally cancel an alert only when they were satisfied that the subject ac were not in actual conflict. They added, however, that some ATCOs used this 'prompt' to confirm with both crews their compliance with ATC clearances/assigned levels. It also emerged during discussion that the act of cancelling these 'heads up' STCA alerts to remove the flashing labels from the screen could become a reflex action done subconsciously. Secondly, NATS reported that the low severity alert had triggered and that the replay had shown the alert period as unbroken. It subsequently transpired, however, that two versions of replay software were used (unwittingly) during the investigation phase. The first version had produced the event, as described in the ATSI report, but another version, the NODE L replay seen by the UKAB and later by ATSI, had shown a continuous white alert from 1658:50 until finally changing to red at 1659:33. If this version of STCA had been displayed on the SC's radar display and she had subconsciously accepted it (ie cancelled it), this would explain why the next alert went straight to high severity red and not 'white then red', as seen by ATSI on the original replay, and the SC/Watch Manager. This explanation, although plausible, remained conjecture at the time of the meeting, and the CAA awaited further reports from NATS as to the integrity of the replay and actual display system software.

Notwithstanding the STCA element of the incident, Board members were clear that the cause of the Airprox had been the MD11 crew's descent below their cleared level whilst not following their company SOPs as set out in the FOM. In the opinion of pilot members, mention by the MD11 crew of the FMS system being slow had not affected the outcome. The crew had correctly acknowledged their descent

clearance to FL 110 but then erroneously flew down to FL 100; the RT transcript showed that on being challenged by the SC as to their cleared level, the crew had replied FL 100.

Turning to the risk, the SC had placed both ac on tactical headings aiming to track the MD90 behind the MD11, with the intention thereafter to climb the MD90 once they were separated in azimuth. The MD90 crew had visually acquired the MD11 at an early stage of the incident and had watched the ac cross ahead and above. For their part, the MD11 crew had received a TCAS TA and had seen the MD90 passing behind. All these elements combined led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The MD11 crew descended below their cleared level.

Degree of Risk: C

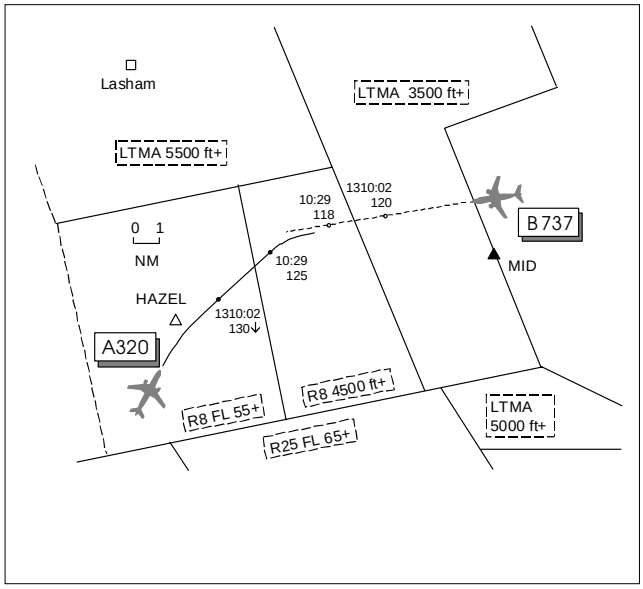
AIRPROX REPORT No 50/01

Date/Time: 31 Mar 1310 (Saturday)
Position: 5104 N 0050 W (8 NM W MID)
Airspace: CTA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-400	A320
Operator:	CAT	CAT
Alt/FL:	FL 120	↓ FL 70
Weather	VMC NK	VMC NK
Visibility:	>10 km	>10 km

Reported Separation: 500 ft V 50 m H/700 ft V NK H

Recorded Separation: 700 ft V 2·8 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 265° at 315 kt outbound from Gatwick and climbing to FL 120. Shortly after levelling off, he received a TCAS TA followed by an RA "descend" and although the weather was clear he initially did not see the conflicting traffic. He followed the TCAS RA in accordance with procedures by descending 300 ft; the other ac was seen on TCAS to descend to a level within 500 ft of his own before climbing to pass 50 m horizontally and 1000 ft above on his LHS. No instructions were received from ATC and he assessed the risk of collision as medium to high. He also commented that the TCAS warning was difficult to hear owing to the Active Noise Reduction (ANR) headsets in use with RT calls and he believed that TCAS warnings should be routed through the headsets.

THE A320 PILOT reports flying inbound to Heathrow following a STAR via HAZEL. He was given a radar heading and descent clearance to FL 70 to pass FL 130 abeam HAZEL; he responded to the instruction which was not corrected by ATC. He was then instructed to change frequency and

to report his radar heading which he subsequently did. Shortly thereafter, he saw on TCAS an ac on a conflicting flight path so he asked ATC to confirm his cleared level; ATC replied FL 130. During this conversation, he descended to FL 127 whilst the other ac was passing FL 115 (it had been cleared to maintain FL 120). A TCAS TA then an RA alert were received so the Capt, PF, initiated a non-violent avoiding action manoeuvre with the AP connected; a split second later TCAS annunciated "*clear of conflict"*. He assessed the risk as minimum as he had seen the conflicting ac, a B737, throughout the evasion manoeuvre.

ATCI LATCC reports that this Airprox occurred NE of HAZEL at 1310 UTC after the A320, which was subject to a standing agreement, had been transferred to TC OCKHAM Sector. Prior to transfer, the A320 had received a radar control service from the AC HURN Sector. The HURN Sector workload was described as moderate but it is considered that the scenario was complex and RT workload was high. The Sector was manned by a trainee SC, of about 100 hours experience, supervised by a mentor; they had taken over the sector at 1300 UTC.

At 1259:15 the A320 was instructed *"to descend when ready FL 260, expect FL 130 level by HAZEL."*
The crew acknowledged and at 1303:30 reported level at FL 260. The A320 was then given descent to FL 180. From 1305 until 1306 the trainee was attempting to establish two-way communications with an overflying ac. Route instructions were passed to this ac before two-way contact was actually made and this created confusion on RT that went largely unresolved; RT workload then became high. At 1306:50 the A320 crew reported level at FL 180. HURN Sector then instructed as follows, *"A320 c/s, continue present heading and descend FL 130, be level abeam Hazel, speed two seven zero knots or less."* The transmission was delivered quickly. The A320 pilot read back, *" copy, present heading down err seven er zero, confirm? and to be level er 130 abeam Hazel, A320 c/s.*" The HURN SC did not reply to this and continued immediately to deal with other sector traffic. At 1307:52, with Mode C indicating FL 173, the A320 was transferred to TC OCK frequency 134.12 MHz.

The HURN Sector were not aware that any incident had occurred until TC later reported that the A320 had descended below the HURN-TC OCKHAM standing agreement of FL 130 level by HAZEL.

The A320 crew made contact with the OCK SC at 1308:06 and reported heading 025° but they did not report their cleared level and were not asked to confirm it; soon after they were instructed to resume their own navigation to OCK. Meanwhile, the B737 from Gatwick to Madrid was climbing to level at FL 120 heading 265° also in contact with the OCK SC.

At 1310:06 the A320 crew requested, "*London, A320 c/s, confirm level clear for us?"* At that moment the A320 was indicating FL 130 Mode C and 7.8 NM from the B737 indicating FL 120 Mode C. The OCK SC replied immediately, "*you're cleared FL 130, maintain FL 130."* Although the A320 acknowledged, "*copied we'll maintain 130",* Mode C showed that the ac was still descending, and OCK SC reiterated, "*.....confirm maintaining FL 130."* The A320 crew then reported, "*we are now at FL 125 and climbing FL 130.....".* The SC called the B737 to inquire, "*B737 c/s, did you copy that?".* The B737 crew replied *"B737 c/s is in a TCAS descent now traffic thousand above".*

Minimum lateral separation (1310:29) was 2.8 NM with 700 ft vertical as the B737 descended and the A320 commenced climb to regain FL 130. STCA flashed a low severity alert briefly then changed to a high severity alert as the ac crossed whilst the SMF was not activated; it was incorrectly believed that the OCK SC's action had prevented a loss of separation. Standard separation was quickly re-established without further ATC intervention; there had been little opportunity to give avoiding action or TI.

At 1311:00, when the ac tracks had crossed, the B737 crew reported resuming climb to FL 120 and was then instructed to climb to FL 150 and transferred to en-route.

ATSI endorsed the LATCC ATCI report.

THE A320's FLIGHT SAFETY DEPT reports that the crew would be expected to follow the SOPs prescribed in the company General Operations Manual:-

1) The PNF assumes responsibility for ATC communications in flight.
2) The PF checks and executes the ATC

clearance received.

3) The PNF checks that the PF actions are executed in accordance with the clearance.

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 discussion retraced the sequence of events that had led to the Airprox. It was acknowledged that the HURN SC (trainee) had correctly issued the descent instruction to the A320 crew but members wondered why the incorrect read-back had not been challenged. The RT transcript showed that the A320 pilot had read-back some of the multiple ATC instruction correctly but he had queried his cleared level *"down err seven er zero, confirm?"*. Some members thought that the SC may have misheard this as possibly the speed control restriction of 270 kt but the A320's reply was shorter in length than the SC's transmission which should have alerted him to the read-back omission/error. Members also wondered whether too much information had been passed by the SC in one transmission. ATCO members said speed of delivery was more important to consider here than content as that could cause difficulties with non-native English speaking crews, as in the A320's case. Whatever the reason, the SC trainee had not corrected the readback; he had passed 4 `parcels' of information to the A320, heading-cleared level-level gate (HAZEL)-speed, but only 3 `parcels' came back in the response. Moreover, this was not corrected by the mentor. Although the A320 crew had asked for confirmation of their cleared level, FL 70, this went unanswered by the SC; the pilots should have queried it again with the SC if there had been any doubt. This lapse in RT discipline on both sides had been the fundamental to the cause of this Airprox.

Moving on, the A320 was transferred to the next sector, TC OCKHAM. On initial contact, the crew did not report their cleared level and neither did the OCK SC ask for confirmation of it in response; this further lapse in RT procedures also contributed to the incident. It was only when the Airbus approached FL 130 did the crew ask for level confirmation. They had seen the other ac on TCAS, the B737 on a crossing track, which had been cleared to maintain FL 120 and perhaps this had given the A320 crew some unease about their cleared level given by the HURN SC. At the end of the day, the A320 crew arrested their descent and climbed back to FL 130; meanwhile the B737 had already commenced a descent in response to a TCAS RA alert.

Looking at risk, the A320 crew had seen the B737 on TCAS and then acquired it visually, finally stopping descent at FL 125 before climbing back to FL 130. The B737 crew had already commenced descent following an RA alert and watched the A320 as it passed 1000 ft above. These elements combined led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

An undetected read-back error by the HURN SC, leading to the A320 descending below its cleared level.

The A320 pilot did not give his cleared level and the OCK SC did not seek confirmation.

Degree of Risk: C

AIRPROX REPORT No 51/01

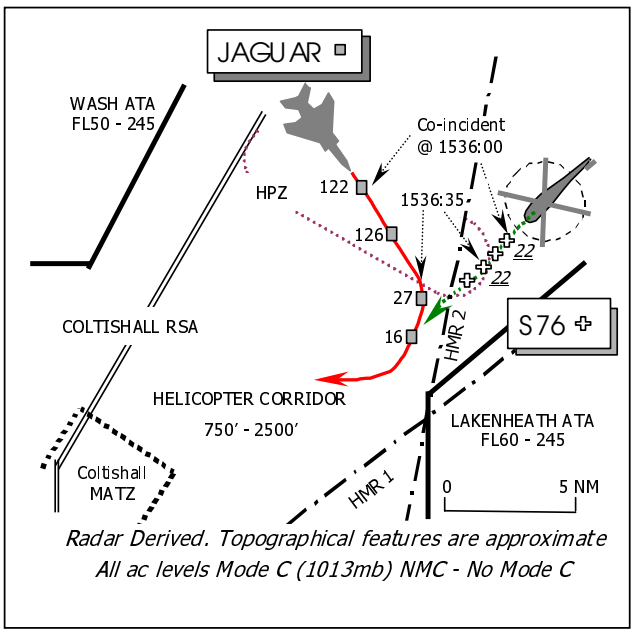
Date/Time: 11 Apr 1536

Position: 5250 N 0150 E (26 NM NE of Norwich)

Airspace: Helicopter Corridor (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Sikorsky S76	Jaguar T4
Operator:	Civ Comm	HQ STC
Alt/FL:	2500 ft (RPS 1024 mb)	↓ 10 000 ft (RPS)
Weather	VMC CAVOK	VMC
Visibility:	10 km +	>10 km
Reported Separation:	3 NM H, nil V	Not seen

Recorded Separation 2·5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SIKORSKY S76 HELICOPTER PILOT reports his ac has a red/white/blue livery, navigation, forward search lights and HISLs were all on whilst returning from an oil rig to Norwich. They were in receipt of a RIS, he thought, from Anglia RADAR level at 2500 ft RPS (1024 mb), whilst squawking A0227 with Mode C.

About 052° (M) Norwich 26 NM DME, heading 240° (M) at 145 kt, his co-pilot spotted an ac about 3 NM ahead diving through their altitude and then pulled out of its dive and departed to the NW. The minimum separation was about 3 NM and no avoiding action was taken against the other ac, which was a Jaguar military jet. At the same time Anglia RADAR called them to advise them of fast moving traffic in their 12 o'clock – 3 NM, they replied that they were visual with the jet as it departed to the NW. The controller explained that the jet had been at FL 170+, but then its Mode C disappeared; when its Mode C reappeared the other ac was at 2000 ft then 500 ft below his helicopter's altitude and the descent had taken just a few seconds.

They had no warning of the Jaguar before they saw it ahead themselves; the danger being that it could have descended on top of them had they been 3 NM further along their track and blind to ac in a dive from above them. Furthermore, ATC was also unaware of the Jaguar's level due to its high rate of descent.

UKAB Note (1): Meteorological Office archive data confirmed that the Yarmouth RPS for the period was 1024 mb.

THE JAGUAR T4 PILOT, a QFI, reports that his ac is camouflage grey, but HISLs were on whilst conducting a general handling sortie under VFR in the Wash Aerial Tactics Area (ATA). He was in receipt of a RIS from London MILITARY, squawking the assigned code with Mode C, but the helicopter flown by the reporting pilot was not seen.

THE ANGLIA RADAR CONTROLLER reports that he was providing a 'modified' RAS using the primary and secondary Cromer Radar to the S76 crew at 2500 ft RPS, squawking 0227 with Mode C. Traffic levels were *"light"* and he had observed an unknown ac operating to the N of the S76, which was transponding a validated and verified squawk, but operating in a random manner at least 10,000 ft above the S76. Consequently, he thought it unnecessary to pass traffic information or avoiding action until the unknown ac's Mode C failed to show for about 3 or 4 sweeps of the radar display and

the unknown ac turned in the general direction of the S76. The next Mode C indication showed the unknown ac about 3 NM ahead of the S76 and pulling away from it at 3000 ft. He passed traffic information, whereupon the S76 crew reported the unknown ac was in sight so no avoiding action was issued.

MIL ATC OPS reports that the Jaguar crew was receiving a RIS from London MILITARY Controller 13 (CON 13), whilst conducting general handling in an altitude block from 5 - 24,000 ft Humber RPS (1025 Mb), squawking 6132 with Mode C, in the vicinity of the Wash ATA. As the Jaguar manoeuvred, its SSR responses became intermittent and, shortly afterwards, the ac disappeared from radar coverage. At 1536:40, CON 13 transmitted *"C/S, disappeared from solid radar, Flight Information Service"*; the transmission was not acknowledged and so CON 13 repeated the message about 30 seconds later. The Jaguar pilot acknowledged the second transmission by responding *"C/S, is now happy to go en-route and freecall Coltishall APPROACH"*. CON 13 instructed the Jaguar pilot to change squawk and freecall Coltishall, which was acknowledged.

The recording of the Debden Radar, the same radar head that CON 13 was using at the time, shows the Jaguar manoeuvring SE from the Wash ATA. At 1535:43, the Jaguar is tracking SE indicating FL 192, but 3 seconds later its SSR response is intermittent before it is displayed without Mode C. At 1536:10, the Jaguar's Mode C reappears as the ac descends through FL 148, but disappears again at 1536:22 indicating FL 114. The Jaguar's Mode 3/A briefly returns 6 sec later before totally disappearing at 1536:35. At 1536:40, the time that CON 13 downgraded the service to a FIS, the Jaguar's SSR returns are not visible, although 4 trail dots can still be seen; these also vanish by 1537:01. At 1537:37, after the Jaguar had left CON 13's frequency, a 6742 squawk is seen 3 NM NW of the position where the Airprox occurred indicating 2900 ft Mode C (1013 mb) but without a primary return; a cross-reference with other radar recordings confirms that this is the subject Jaguar, shown whilst the pilot is recycling his squawk.

It had been agreed that CON 13 would provide a RIS to the Jaguar crew whilst they manoeuvred their ac in a block between 5 - 24,000 ft RPS (1025 mb). CON 13's use of the Debden Radar was appropriate to the task, however with hindsight, the RIS should have been 'limited from below' as the lower limit of the agreed operating block - 5000 ft - was close to the base of solid radar coverage in the eastern portion of the Wash ATA. As the S76 did not appear on the Debden radar picture, CON 13 was unaware of its existence and unable to provide traffic information under the RIS. Nonetheless, even if the S76 had been displayed on the Debden radar, it is doubtful that CON 13 would have passed traffic information to the Jaguar crew, as the helicopter was below the agreed manoeuvring block.

CON 13 was unaware that the Jaguar pilot was manoeuvring below his nominated base level because the ac's SSR responses became intermittent, which is not uncommon during a general handling sortie. When the Jaguar's primary return disappeared from cover, CON 13 transmitted a timely and relevant warning to the Jaguar pilot and correctly downgraded the service to a FIS in accordance with current practice.

HQ STC comments that the Jaguar captain was conducting a QFI check on a newly arrived pilot. At the time of the incident he was aware that the diving manoeuvre would take him outside the agreed block but elected to continue nonetheless, in order to achieve the training objective. That said, he has acknowledged that this decision did not leave him best placed to be passed accurate traffic information on all relevant strangers and has accepted that responsibility for separation remained solely with him. To that end, the 3 NM separation reported by the S76 captain might be deemed adequate given the level of service that Anglia were providing and the flight conditions which prevailed at the time. Nevertheless, the Jaguar captain's unplanned penetration of the Helicopter Corridor suggests questionable airmanship and awareness, and constitutes a breach of Military Operating Procedures. He has been debriefed accordingly.

UKAB Note (2): The LATCC Cromer radar recording reveals that this Airprox occurred broadly as described by the reporting S76 pilot at 1536:35, about 26 NM NE of Norwich. The Jaguar is shown SE bound indicating FL 122 Mode C (1013 mb) at 1536, whilst the helicopter is shown SW bound maintaining 2200 ft (1013 mb) throughout the encounter. No Mode C (NMC) is shown by the Jaguar 5 sec later, and after one SSR response

indicating FL 126 at 1536:15, NMC is apparent for the next 20 sec. At 1536:35, the Jaguar is shown at 2700 ft (1013 mb), suggesting a ROD of about 30,000 ft/min and turning starboard at 12'30 - 2·5 NM ahead of the S76, the horizontal CPA. The Jaguar continues descending to 1600 ft (1013 mb), which equates to 1930 ft RPS (1024 mb), and turns westbound as the S76 maintains 2200 ft (1013 mb), about 2530 ft RPS.

UKAB Note (3): This Airprox occurred in Class G airspace between the Wash and Lakenheath ATAs. This airspace is also encompassed by the Southern North Sea Helicopter Corridor, 750 – 2500 ft amsl and the Coltishall Radar Service Area. The Mil AIP, at Vol 3 Part 2-2 Annex A Southern North Sea – *para 8 - Military Operating Procedures,* requires: *Pilots of military ac intending to penetrate….the corridor airspace are to contact Anglia RADAR no later than 10 NM before entering the area…Pilots wishing…to penetrate the corridor in IMC or VMC, may do so provided a co-ordinated crossing is obtained from Anglia RADAR. They are to maintain a listening watch on the Anglia RADAR frequency until clear of the corridor….Aircrew are reminded that civil helicopters frequently operate up to the upper limit of the oversea corridor (2500 ft ALT). If overflight is intended, there is a need to ensure adequate vertical separation.*

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 STC member emphasised that the Jaguar QFI had initiated the diving manoeuvre as an essential part of the unit arrival check on a new pilot. It was unfortunate that it took the Jaguar below the minimum operating level that had been passed to CON13. Some members considered there was an airmanship lesson here - pilots who decide to fly outside the vertical limits of any pre-notified operating block should ensure that the controller is informed beforehand; they should regard it as an intrinsic part of the pilot/controller contract when establishing an ATS. Unknown to the Jaguar QFI the S76 was below the radar coverage of the Debden Radar (and not shown on the controller's display at the time),– so CON 13 was unable to provide any warning. Although the Cromer Radar showed both ac to Anglia Radar, this radar source is not available to London Radar controllers in the Military Operations Room at LATCC. The Jaguar's descent was so rapid that the Mode C display was unable to keep up. This explains the Anglia RADAR controller's surprise when he saw the Mode C indicated that the Jaguar had descended about 10,000 ft in 20 sec to bottom out at about 1930 ft amsl. A civil controller pointed out that pilots of high performance ac should bear this in mind when conducting high energy manoeuvres, because of the detrimental effect on the service that can be provided to other airspace users. For example, it will impede the operation of Short Term Conflict Alert (STCA). Members agreed that there was nothing that the Anglia RADAR controller could have done to avert this erosion of separation. Even if the rapid descent could have been detected, he would not have been able to provide effective avoiding action to get the slow S76 out of the way of the fast-jet.

The Board concurred with the STC member, that the Jaguar crew was entirely responsible for their own separation from other traffic in the FIR - a point the Jaguar pilot had acknowledged. Considering that the S76 crew had seen the Jaguar as it descended - 2·5 NM away (a little closer than they actually reported) - some members believed that this was a sighting report. Others disagreed, pointing out that the Jaguar QFI, operating in his own local area, should have been thoroughly conversant with penetration procedures for the Southern North Sea Helicopter Corridor which were agreed by the MOD. These warn military pilots that "…*civil helicopters frequently operate up to the upper limit of the oversea corridor (2500 ft ALT)"* – where the S76 was flying and that there was "…*a need to ensure adequate vertical separation"*. This placed a responsibility on the Jaguar QFI to comply with these arrangements or stay out of the corridor. The Board agreed, therefore, that the cause of the Airprox was that the Jaguar QFI entered the Southern North Sea Helicopter Corridor without complying with promulgated procedures.

The Board's assessment of risk is always based on what actually happened, not what might have happened. Therefore, the S76 pilot's view about what might have occurred if they had been 3 NM

further along their track, whilst an entirely understandable concern was not considered. Unlike the Jaguar pilot who had not seen the S76 at all, the helicopter crew had seen the Jaguar some 2.5 NM ahead. Bearing in mind the geometry and the S76's speed of 145 kt the Board agreed unanimously that no risk of a collision had existed in these circumstances.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Jaguar QFI entered the Southern North Sea Helicopter Corridor without complying with promulgated procedures.

Degree of Risk: C.

AIRPROX REPORT No 52/01

Date/Time: 16 Apr 1700

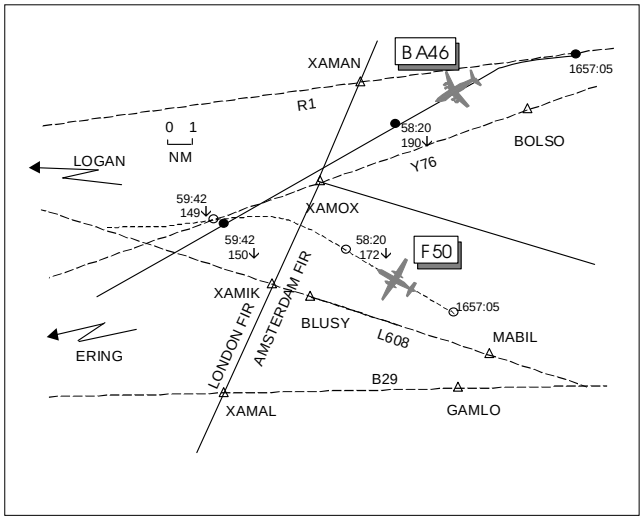
Position: 5141 N 0204 E (5 NM NW BLUSY)

Airspace: CTA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	BA46	F50
Operator:	CAT	CAT
Alt/FL:	↓ FL 70	↓ FL 70
Weather	VMC CLAC	VMC CLAC
Visibility:	>10 km	>10 km

Reported Separation: 600 ft V <1 NM H / 0 ft V <1 NM H

Recorded Separation: 100 ft V 0.5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BA46 PILOT reports flying inbound to London City descending to FL 270, to be level 20 NM before REFSO, at 350 kt and he was receiving an ATC service from Maastricht Control. The visibility was >10 km in VMC on top of a cloud layer. On levelling at FL 270, he handed over to the FO and then vacated the cockpit briefly. On his return and prior to taking over control, he received a briefing on the latest ATC clearances and instructions, which by now was from London Control on frequency 118.47 MHz; this included descent to FL 70 to be level at TRIPO, crossing LOGAN at FL 120 or below. During the briefing a heading instruction of 250° was received, which was read back and executed by the FO then, on completion of the hand over, he took control. To comply with the descent clearance for LOGAN and TRIPO, the rate of descent was at times between 2-3000 ft /min and shortly after taking control he was instructed to change frequency to London on 120·52 MHz. The next frequency was very busy, the lady controller was processing many ac and it was a long time before he was able to establish radio contact. During this waiting period an Airprox occurred with a F50, which he had seen clearly on TCAS and then saw visually at 1·5-2 NM; he did not follow the avoiding action *"climb"* indicated by the TCAS RA alert. He estimated the minimum vertical separation as 600 ft and he passed <1 NM behind the other ac, whose type and airline colours he could recognise. He finally established radio contact and pointed out the incident to ATC who returned him to the previous frequency (120·52 MHz). He again filed a report of the Airprox and

remained on the frequency until passing TRIPO. After landing at London City, the Capt of another company BA46, also inbound at the same time but ahead of them, informed him that there may have been a mix up with their very similar callsigns when changing frequencies. He had not noticed the other similar c/s until then, when it had been pointed out, and had certainly not been aware of it earlier; both he and his co-pilot were convinced that they had understood and read-back their own company c/s number correctly as well as the appropriate frequencies.

THE F50 PILOT reports inbound to London City heading 300° at 260 kt and he was receiving a radar control service from London on 118·47 MHz. The visibility was >10 km in VMC 10,000 ft above a cloud layer and the ac's nav and strobe lights were switched on. After commencing descent from FL 180 about 20-30 NM from LOGAN, the FO saw a BA46 in his 3 o'clock range 4-5 NM converging at high speed. Shortly thereafter, TCAS TA then RA alerts were received which they followed by increasing the ROD from 1000 to 3300 ft/min. ATC issued an avoiding action L turn onto heading 270° and the BA46 was seen passing behind in his 7 o'clock position less than 1 NM; no avoiding action was seen or heard to be taken by the traffic.

UKAB Note (1): There was another BA46 ahead of the BA46 involved in the Airprox from the same company. Both ac had a c/s suffix that differed only by one digit e.g. XYZ2874 and XYZ2870.

ATSI reports that the westbound traffic on the Clacton Sector (i.e. Clacton Low - Sector 14 & Clacton High - Sector 13) was being controlled by one SC sitting at the radar 3 position next to the Clacton CSC. The SC described the traffic loading and workload level as 'moderate' but he did not regard this as a factor which may have contributed to the Airprox. Prior to taking over the position, he had been working as the 'boy', in a 'man and boy' mode, dealing with a heavy surge of traffic through the sector. Much of this traffic had been transferred to the adjacent sectors by the off-going controller and the SC estimated that he accepted the operational position some 3 minutes later.

The subject BA46 (XYZ2870) had been co-ordinated into the sector descending to FL 270 inbound to LOGAN via REFSO and established radio contact at 1651:30. Already on frequency was XYZ2874, another BA46 which was approx. 20 miles ahead of subject BA46. The F50 was also on frequency and had entered the sector at FL 180 approaching COSTA on track for LOGAN. All three ac were inbound to London City and so were cleared for ALKIN 2B STARs which require routeing LOGAN - TRIPO - RIDLEY - SPEAR - ALKIN.

The SC involved in the Airprox took over the sector at 1655 by which time both the F50 and the other BA46 were descending to FL 120 to be level by LOGAN, while the subject BA46 was descending to FL 190. The SC stated that, during the handover, he became aware of a number of similar callsigns that would be on frequency. These were ABC2885 & ABC2585 as well as XYZ2874 & XYZ2870. Although the handing over controller did not point out this fact the accepting SC was cognisant that c/s confusion could be an issue during his time on the position. Although it is often common practice to annotate strips with similar c/ss, this was not done on this occasion.

At 1655:25 the SC issued an instruction to the other leading BA46 (XYZ2874) to descend to FL 70 level by TRIPO. Unfortunately, although the RT recording shows that the clearance was clearly addressed to XYZ2874, both XYZ2874 and XYZ2870 responded to this call, but analysis shows the subject ac's reply (XYZ2870) to be slightly louder than that of the other BA46 (XYZ2874). At interview, the SC advised that he was convinced at the time, in his own mind, that the correct ac had responded and so did not believe there was a need to verify that the other BA46 (XYZ2874) had acknowledged the instruction.

The subject BA46 was quickly overhauling the F50 to the N. The SC had formulated a plan to cross over the flights, to assist the next sector by positioning the BA46 ahead of the F50; vertical separation would be used until lateral had been established. The SC then turned the F50 10° R, onto a heading of 310°, to facilitate crossing tracks with the BA46; at that stage, the SC still believed the subject BA46 was descending to FL 190. At 1657:05, the subject BA46 (XYX2870) was instructed to fly a radar heading of 250°.

UKAB Note (2): This heading instruction was

transmitted during the period of the flight deck handover to the Capt of the subject BA46 and was correctly readback by the FO.

At 1657:10, the F50 was cleared to descend to FL 70 level at TRIPO, to be FL 120 or below abeam LOGAN. At 1658:00, the SC instructed the other BA46 (XYZ2874) to contact the next sector. Unfortunately this instruction was taken and acknowledged by the crew of the subject BA46 (XYZ2870) but this second readback by the wrong crew was not detected by the controller nor was any comment passed by the crew of the other BA46 (XYZ2874), the intended recipients.

At 1658:20, the subject BA46 was passing FL 190, in the descent to FL 70, on a converging track with the F50 which was in its 10 o'clock at 6 miles, passing FL 172 also for FL 70. At 1658:30, the SC observed that the subject BA46 had descended through FL 190 and so instructed the ac to maintain FL 180. At this point, the crew of the other BA46 advised the SC that they believed the subject BA46 (XYZ2870) had wrongly taken the instruction, addressed to them (XYZ2874), to change frequency.

The SC passed an *"avoiding action"* instruction to turn L heading 270° to the F50. The crew then reported the traffic in sight and advised that they were descending at 3000 ft/min to avoid the other ac. They also reported that it did not appear the crew of the BA46 were taking any avoiding action during the encounter. At 1700:10, over 2 minutes after taking the instruction to change frequency, the crew of the BA46 established contact with the next sector (TC SE) and reported that they were descending to FL 70, on a radar heading of 250° and had just had a very close TCAS encounter. The TC controller, using the callsign XYZ2874 (the other BA46), which was the flight she was expecting, advised that *"no traffic was showing on her radar"*. The pilot confirmed his c/s was XYZ2870 and the controller asked him to give his position, which was reported as just W of LOGAN. The TC controller realised that the ac had changed frequency in error and instructed it to revert back to the previous frequency, i.e. the Clacton Sector. She asked her Co-ordinator to ring the Clacton Sector to find out what had happened. The Airprox occurred beyond her displayed radar range. The Clacton SC was asked whether he considered telephoning TC SE once it became apparent that the wrong ac had changed frequency. He advised that, in his experience, there was often difficulty in obtaining an answer when telephoning TC and so left this action to the CLN CSC. However, the TC Co-ordinator rang the Clacton CSC at 1700:30, asking whether the subject BA46 should be on their frequency. The CSC replied *"No"* and so the Co-ordinator, having explained that the ac had reported a TCAS with the F50, said that he would transfer the subject BA46 back to the Clacton Sector frequency.

At 1701:30, the Clacton SC again instructed the other BA46 to change frequency to TC SE and, at 1702:40, the subject BA46 re-established contact with the Clacton SC and confirmed that he was descending to FL 70, heading 250°, and had just had a 'near-miss'. By that stage the subject BA46 had passed behind the F50 and the tracks were diverging, lateral separation being restored at 1700:49. The minimum separation occurred at 1659:42, when the BA46 passed through the 6 o'clock position of the F50 at a range of 0·5 NM and 100 ft above. The flights were subsequently 'streamed' prior to transfer to TC SE.

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 commended ATSI for their comprehensive and clear report. In the chain of events that led to this Airprox, the subject BA46 Capt said he had been unaware that another company BA46, with a similar c/s, was enroute at the same time. When both BA46 crews responded to ATC's descent clearance to FL 70, some ATCO members thought that the double transmission should have been detected by the SC at the time. A replay of the RT tape revealed that the subject BA46 crew's response was louder during the simultaneous transmission, but not sufficiently so, perhaps, to stand out in a busy RT environment. In the event the undetected action by the subject BA46 crew formed a part cause in this incident.

Another point was the similarity in callsigns, which had been recognised beforehand by the SC, yet

he was convinced that the correct BA46 crew had responded to his instructions. It was also apparent from the RT timings and the crew's report that the subject BA46 had been operating single crew when the ATC descent clearance had been issued. This suggested that the subsequent BA46 cockpit handover briefing from the FO to the Capt, when he returned to the flight deck, had been fundamentally flawed. Pilot members thought that the captain would have been better advised to make a confirmatory check with ATC on any clearances that had been received during his absence, instead of accepting his FO's ATC brief at face value. These factors, it was felt, had not caused the outcome, but they had contributed towards it.

A significant complication was introduced when the BA46 crew subsequently acted on a frequency change instruction addressed to the other BA46 - a change that unfortunately also went unnoticed by the SC. The knock-on effect meant the SC was unable to stop the BA46's descent, when it was seen to pass through FL 190 and into confliction with the F50. In the Board's opinion these factors formed a further part of the cause to this Airprox. It was also clear that the simultaneous transmissions and subsequent erroneous descent, coupled with the incorrect frequency change, had been promoted by c/s confusion. This well known RT problem has been been explained in great detail by the Aircraft Callsign Confusion Evaluation Safety Study report CAP704-ACCESS and within AIC 107/ 2000 RTF CALLSIGN CONFUSION. ATSI informed the Board that the CAA had contacted the BA46's airline asking them to address this particular callsign problem; both parties were still engaged in correspondence on the subject at the time of the meeting.

Another concern was that the subject BA46 crew had ignored a TCAS RA alert *"climb"*, which may have been contrary to company procedures, and had instead knowingly flown close to the F50 - within half a mile horizontally and 100 ft vertically. The BA46 pilots had seen it ahead and had taken visual separation, but, in trying to comply with their erroneous ATC descent clearance, they had (unwittingly no doubt) forced the F50 into a high ROD (3300 ft/min) as its crew tried to comply with their TCAS RA. These manoeuvres had been executed whilst overhauling the F50 and had resulted in a marked loss of separation within Class A airspace. Consequently, members judged this to be another part cause in this incident.

The SC had issued the F50 an avoiding action turn when it was revealed the BA46 had left his frequency in error. However, the BA46 crew's actions were considered by the Board to have compromised the safety of both ac. Furthermore, crews should be aware of the wider implications in ignoring a TCAS RA alert. Before taking visual separation avoidance, pilots must be certain that the traffic seen is the traffic in question and that 'visual' avoidance action taken does not impose additional risk to the traffic being avoided, or other traffic nearby, particularly within busy Class A airspace containing TCAS equipped ac.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

The BA46 single crew took the wrong instruction to descend to FL 70, which went undetected by the Clacton SC owing to simultaneous transmissions.

The BA46 crew changed frequency in response to instructions to another ac.

Despite a TCAS RA warning, the BA46 crew flew within half a mile and 100 ft of the F50 in Class A airspace.

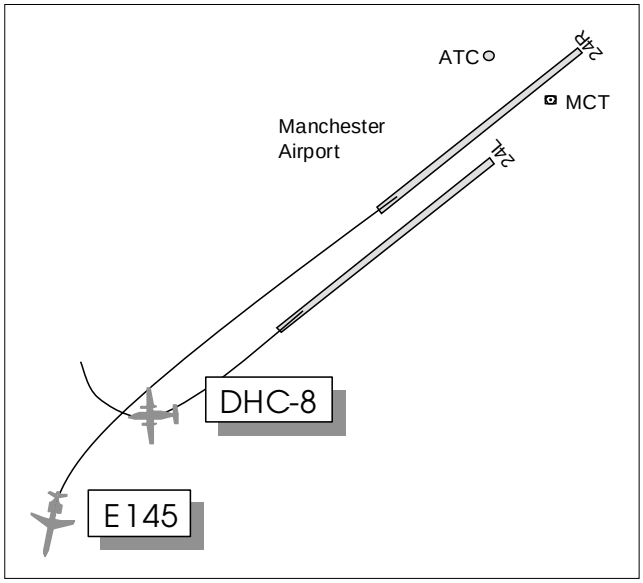
Degree of Risk: B

Contributory Factors
Accepting an ATC clearance without a confirmatory check.

Callsign confusion.

AIRPROX REPORT No 53/01

Date/Time:	23 Apr 0651	
Position:	5320 N 0218 W (1.5 NM SW of Manchester Airport)	
Airspace:	CTZ	(*Class:* D)
	Reporting Aircraft	*Reported Aircraft*
Type:	DHC-8	Embraer 145
Operator:	CAT	CAT
Alt/FL:	700 ft ↑ (QNH 999 mb)	1000 ft ↑ (QNH 999 mb)
Weather Visibility:	VMC HZBC 1.8 km	VMC HZBC 4 km
Reporting Separation:	400 m, 500 ft V	/400 m
Recorded Separation:	600 ft/400 m	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DHC-8 PILOT reports being cleared to take off from Manchester's RW 24L on a POL 1Y SID, involving a climbing right turn onto 345° at 3·2 NM from the MCT, about 1 NM off the end of the runway. On initial climb-out, heading 230° at 150 kt he received a TCAS TA (audio inhibited); the traffic was on TCAS for about 15 seconds seemingly on top of them. They then saw the traffic (an EMB 145) slightly above and to the right; it had apparently taken off from RW 24R, on a different frequency, overtaken his DHC-8 and started a left turn directly into his flightpath, passing 400 m away and 5-600 ft above. He was satisfied no immediate manoeuvre was required despite the loss of separation. Once the ac had crossed he was cleared to turn right onto 350°. He considered the risk of collision was high and that the TCAS warning had been necessary and useful.

THE EMBRAER 145 PILOT reports that he was cleared to take off from Manchester's RW 24R for a CONGA SID involving a climbing left turn onto 163° at 2 DME which is adjacent to the end of RW 24L. Passing 500 ft, heading 240° at 160 kt, he saw the DHC-8 in his 9 o'clock departing from RW 24L and received an associated TCAS TA. He considered that to follow the SID turn would be unsafe and delayed it for about 2·8 NM until the separation had increased, advising ATC. He estimated the separation as the ac crossed was 0·67 NM and 400 ft.

UKAB Note: LATCC radar recordings show the vertical separation (Mode C) of the 2 ac as they pass is 600 ft. The runway centrelines at Manchester are 390 m apart.

ATSI reports that the incident occurred during preparation for the activation of the second runway (24L/06R). The weekday operational hours for this runway, according to the Manchester Airport MATS Part 2, are from 0600-1200 and 1500-2100 local. The UK AIP, Page AD 2-EGCC-1-12 (25 Jan 01), provides the following information regarding the use of runways: "General operating principles for two runway segregated operations. The two runways at Manchester are 390 m apart and staggered by 1850 m in order to comply with ICAO rules for Simultaneous Operations on parallel or near-parallel Instrument Runways (SOIR). Therefore in normal operations, arrivals can operate independently on one runway whilst departures use the other. The standard operating mode for westerly operations will be for landing traffic to use Runway 24R and departures Runway 24L". For dual runway operations two Air Controllers are

required. When the westerly runways are in use, the Air 1 Controller controls 24R and the Air 2 Controller is responsible for 24L.

The Air 1 Controller described her workload as beginning to build up from light to moderate in the period leading up to the incident. The Air 2 Controller assessed his workload as light.

The incident occurred at 0651 UTC, somewhat later than the stated opening time of 24L (0500). Neither controller could recollect exactly why the runway opening had been delayed but presumed it was a factor of the poor weather, as the runway was being operated in 'visual' mode only. The Air 1 Controller commented that, as a consequence of the later than normal opening, traffic was starting to build up significantly whilst single runway operations were in force.

At 0641, both the ac involved in this incident established communication with the Air 1 Controller; the EMB 145 whilst taxying for RW 24R and the DHC-8 whilst proceeding to Holding Point F1 for a 24L departure. An agreement had already been reached between the Air 1 Controller and the Tower Supervisor for these ac to be, respectively, the last departure from 24R and the first from 24L. It is the Tower Supervisor's responsibility to: "Co-ordinate with Air and Approach the first movements on runway 24L/06R". (Manchester Airport MATS Part 2, Page ADC 1-4.)

The Air 1 Controller said that, due to a number of ac still to depart from 24R and with a runway inspection taking place on 24L, she decided to hold the DHC-8 to the north of 24R. At the time, in accordance with local procedures prior to the opening of the second runway, there were two vehicles operating on 24L: one carrying out a runway inspection (Checker); the other a bird scaring detail (Seagull). These vehicles were on the UHF 3 channel. She said that she informed the Air 2 Controller, who was now in position, about the two vehicles and it was agreed that UHF 3 would be cross coupled with the Air 2 frequency. This was accomplished by 0647, when Seagull reported having vacated 24L and was answered by the Air 2 Controller. The Air 1 Controller stated that she notified the Air 2 Controller that the DHC-8 would be the first ac for departure from 24L. She added that she also advised him that there would be two more departures from 24R, although she did not specify which ones they were. She commented that he was looking directly at her when the message about the departures was passed. The Air 2 Controller confirmed that he understood about the DHC-8 but that he was not aware of any co-ordination being effected with regard to the 24R departures. The Air 1 Controller instructed the DHC-8 to cross 24R behind a landing ac and, when it had vacated, transferred it to the Air 2 frequency.

The Air 2 Controller instructed the DHC-8 to hold at V5 and immediately afterwards Checker reported that it had vacated the runway. He believed that, because the appropriate runway checks had been completed, 24L was now open and available for use. He informed the Tower Assistant accordingly, so that a message could be broadcast on ATIS, but did not pass on the information to anyone else because it was his understanding that he did not have to. The DHC-8 had been allocated a departure slot which meant that it could not depart before 0652 and, at 0648, the Air 2 Controller decided to clear it to line up on 24L to await its slot time on the runway. Meanwhile, the penultimate departure had been cleared for take off on 24R. Subsequently, the EMB 145 was passed a conditional clearance to line up behind the next landing ac. Both ac were thus cleared to line up on their respective runways at the same time i.e. the DHC-8 on 24L and the EMB 145 on 24R for departure on potentially conflicting SIDs.

The EMB 145 was cleared for take off by the Air 1 Controller at 0650. Approximately 20 seconds later the Air 2 Controller cleared the DHC-8 for take off. Neither controller realised that the other had cleared their respective ac for take off at almost the same time. The Air 2 Controller stated that, before clearing the DHC-8 to take off, he had glanced at the Air 1's FPS display. He noticed that there was an FPS in the runway bay but assumed it related to an ac that had been cleared to cross the runway whilst proceeding to 24L. The Air 1 Controller said that she had no reason to believe that 24L was open as she had not received any confirmation of this fact. Also, she had told the Air 2 Controller about the remaining ac to depart from 24R. The Air 2 Controller had regarded 24L as being open, despite the fact that he had not agreed this with either the Air 1 Controller or the Tower Supervisor. The Manchester Airport MATS Part 2, Page ADC

2-2, states that the responsibilities for the Air 2 Controller include: "Co-ordination with the Tower Supervisor regarding the opening/closing of Air 2 and Runway 24L/06R" and "Co-ordination with Air 1 concerning the opening/closing of Runway 24L/06R". The Air 2 Controller commented that, because of the lay-out of the VCR, whereby it has a split level, it is difficult to co-ordinate directly with the Tower Supervisor. The Air 1/2 Controllers are situated on the lower level at the front of the VCR, the former on the left facing out, with the supervisor's position being towards the back on the upper level. The Air 2 Controller also mentioned that, in addition, during the initiation of dual runway operations, the supervisor is invariably busy co-ordinating the opening with other agencies. When asked at interview, the Air 2 Controller thought that he would probably have seen the E145 rolling along 24R as he looked towards 24L. However, he believed he would have assumed it was an arriving ac completing its landing run rather than a departure.

The Air 1 Controller stated that, as the EMB 145 was climbing quickly, she soon transferred the ac to Manchester Control. Meanwhile, the Air 2 Controller, having cleared the DHC-8 for take off, turned his attention to his FPS display to check the departure sequence of the subsequent ac. Shortly after the DHC-8 had departed, he said that he observed an ac climbing on departure. He explained that the ac had not been in view earlier because of a pillar which can obscure the initial climb-out. Additionally, although the ac would have been showing by then on the Aerodrome Traffic Monitor (ATM), he tends to concentrate on the Surface Movement Radar (SMR) display which is situated directly in front of him. The SMR has a section at the bottom of the screen showing the approach and climb-out phase but, on this equipment, ac on departure appear at a later stage than on the ATM and, consequently, he thought that neither departing ac would have been displayed on the SMR at that time. He assumed initially that the ac he could see was the DHC-8 although he quickly realised that it was a jet ac and not a DHC-8. For an inexplicable reason, his train of thought led him to the conclusion that the type must have been incorrectly filed and would need to be changed. This occurred even though he had seen and recognised it earlier as a DHC-8. It was only when the DHC-8 transmitted: *"we've got traffic on the nose what's that all about"* that he noticed that there were two ac climbing out. His first reaction was to instruct the DHC-8 to make a left turn away from the jet traffic which he deduced had taken off on 24R. However, as he started to transmit, he realised that the jet was in a left turn, well above the DHC-8. Consequently, he instructed the DHC-8 to turn right heading 350° to try and increase separation. This heading was, subsequently, amended to 320° to reflect the initial SID routeing and the flight was transferred to Manchester Control at 0652.

Various Supplementary Instructions had been published prior to the introduction into service of RW 24L/06R. These instructions were incorporated into the Manchester Airport MATS Part 2 in the amendment dated 12 April 2001. One of the Tower Supervisor's duties, prior to the opening of 24L is to: "co-ordinate with Air and Approach the first movements on runway 24L/06R". Another responsibility is: "overseeing the opening and closing of runway 24L/06R". On this occasion, both the GMC and the Air 1 Controller were made aware, by the Tower Supervisor, of the last departure from 24R and the first from 24L but it would appear that no direct communication was made with the Air 2 Controller.

The Manchester Airport MATS Part 2, Pages ADC 2-1 and 2-2 state the responsibilities of the Air 1 and Air 2 Controllers, including: Air 1 Controller - "Co-ordination with the Tower Supervisor regarding the opening / closure of Runway 24L/06R prior to / on completion of dual runway operations" and "Providing a handover to the Air 2 Controller on the opening of Runway 24L/06R prior to the commencement of dual runway operations". The Air 1 Controller was fully aware, following co-ordination with the Tower Supervisor, of the traffic arrangements for the opening of 24L. She did provide a handover to the Air 2 Controller concerning the vehicles already operating on the runway and believed that she had informed the Air 2 Controller of the traffic situation. However, there would appear to have been a breakdown in co-ordination at this point as the latter said that he was unaware of the remaining departures from 24R. As stated previously, the Air 2 Controller's responsibilities include: "Co-ordination with the Tower Supervisor regarding the opening / closing of Air 2 and Runway 24L/06R" and "Co-ordination with Air 1 concerning the opening / closing of Runway 24L/06R". He did not fully comply with

either of these responsibilities; the only communication the Air 2 Controller had with the Tower Supervisor with reference to the opening of 24L, was when he was requested to open the position. By his own admission, he did not inform the supervisor before he opened and utilised the runway. Presumably, he believed he was aware of the traffic situation when he was handed the DHC-8 to depart from 24L, as he did not query with the Air 1 Controller if there were any more departures from 24R. Also, he did not inform the Air 1 Controller before using 24L.

The MATS Part 2, Page ADC 1-4, also lists general Aerodrome Control duties regarding the opening of 24L/06R. Included is to "switch the airfield lighting panel to dual runway operations as required and to ensure that UHF 3 is cross-coupled to the Air 2 frequency when opened". Both controllers were aware of the need to select UHF 3 on the Air 2 position and this was carried out. With regard to switching the lighting panel, the Air 2 Controller admitted that he would have been expected to have carried this out but due to an oversight it had been overlooked prior to 24L being used. He explained that, in his opinion, the selection of the lighting is not so critical during westerly, compared with easterly operations, because there is no need for approach lights on 24L as it is not generally used for landing ac. However, in contrast, the Air 1 Controller regarded the switching of the lights as a signal that 24L/06R was in use.

At the time of the Airprox, there was no ready means of checking that all necessary actions and co-ordination had taken place prior to the opening of RW 24L/06R. It is understood that a check list is in the process of being prepared to rectify this problem. Notwithstanding that this incident can be attributed to a breakdown in co-ordination, it would appear that there is no definitive, fail-safe method by which the Air 2 Controller can assume control of the second runway with the full knowledge of the Air 1 Controller. Consideration could be given to using a particular phrase to indicate when a controller takes/hands over control of the second runway and this should be verbally read back by the other controller concerned. Additionally, the provision of an unambiguous method of ensuring that operational staff are aware of the operational status/availability of RW 24L/06R should be sought. ATSI has therefore recommended that NATS Management at Manchester investigates the feasibility of providing an unambiguous, fail-safe method of indicating to the relevant staff the operational status/availability of the second runway.

A Unit Safety Notice was issued by NATS, Manchester, (NOTAC 4/2001) on 24 April 2001, reminding controllers of their responsibilities with regard to the opening and closing of 24L/06R. It states that "as part of the co-ordination it **shall** be the responsibility of the **Air 2** ATCO **NOT** to allow any departures off 24 Left until such time that the last departure off 24 Right is airborne **AND** has been positively identified to the **Air 2** ATCO by **Air 1**".

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.

In a lengthy discussion of this Airprox, the Board initially considered that the cause was a breakdown of co-ordination in the Tower involving Air 1, Air 2 and the supervisor, all of whom had some responsibility to prevent this from happening under existing instructions. The Board was advised that training for 2-runway operations had been adequate, but it was suggested that the practice of co-ordination between Tower controllers was new to Manchester and this may have influenced Air 1 and Air 2's thought processes. As the discussion developed, members inclined to the view that although the instructions made it clear *what* was to be done, there was imprecise guidance on *how* it was to be done, and this left the opportunity for all concerned to believe they knew what was going on when this was not the case. Members were advised that this had been recognised and new instructions (summarised below) had been introduced since the Airprox. However, even under the existing instructions, members believed that whatever Air 1 and the supervisor may or may not have done, Air 2, as a matter of normal controller practice, should have confirmed positively with Air 1 that her last departure on 24R had gone before clearing the DHC-8 to take off from 24L. Members were unclear what Air 2 thought the last departure from 24R was, and it was fundamental that he should have cross checked this with Air 1 and not

simply made an assumption from Air 1's FPS display. The Board concluded that the cause of the Airprox was that Air 2 had cleared the DHC-8 to take-off without adequate co-ordination.

In discussing the risk of collision, the Board accepted that the E145 pilot had seen the DHC-8 in time to take appropriate action to remove the risk of the ac actually colliding, but considered nevertheless that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Air 2 cleared the DHC-8 to take-off without adequate co-ordination.

Degree of Risk: B

Following the Airprox, Manchester reviewed the co-ordination procedures for opening the second runway. The following enhancements have already been introduced, in addition to Manchester Unit Safety Notice NOTAC 4/2001 (see Part A).

*A blocking strip **"Runway 24R Departures"** shall be used by Air 2 in his/her active runway bay before Runway 24L is opened. It shall only be removed following the required co-ordination* (NOTAC 4/2001) *and the physical receipt of the last 24R departure FPS from Air 1. The "co-ordination effected" symbol is to be written in box 9 of the last 24R departure FPS by Air 1 before transfer to Air 2.*

Aircraft are not to be lined up on Runway 24L until these conditions have been met.

A review of the handover process has also taken place and a procedure introduced to formalize the structure and management of handovers at operational positions.

AIRPROX REPORT No 54/01

Date/Time: 23 Apr 1430

Position: 5558 N 0250 W (17 NM E of Edinburgh)

Airspace: Scottish TMA (*Class:* D)

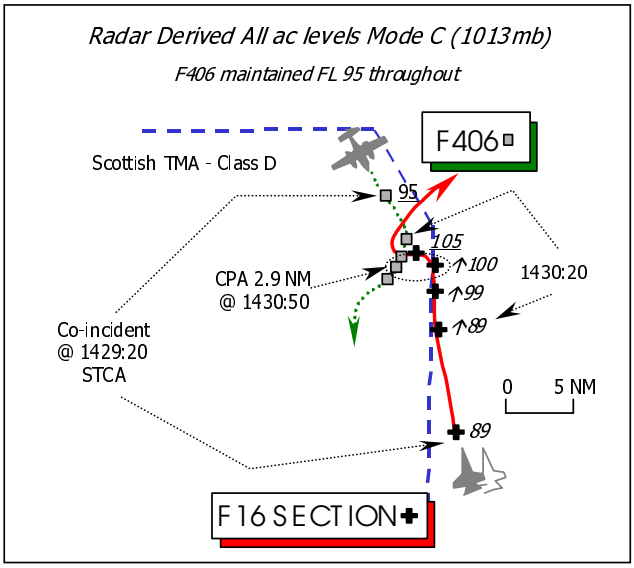
Reporter: ScACC TAY SC

	First Aircraft	*Second Aircraft*
Type:	F406	F16x2
Operator:	CAT	Foreign Mil
Alt/FL:	FL 95	↑FL 110
Weather Visibility:	IMC IN CLOUD 15 NM	VMC CLOC

Reported Separation: - TAY SC - <3 NM

4 NM H 6 NM H/2000 ft V

Recorded Separation: 500 ft V @ 2·9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ScACC TAY SECTOR CONTROLLER (SC) reports that the F406 pilot was in transit through the NE corner of the Scottish TMA (which had been co-ordinated with the GALLOWAY Sector) southeast bound for Newcastle under a RCS at FL 95. A pair of unknown military ac was observed squawking 3/A 2611 – the F16 section - tracking N just outside the eastern edge of CAS indicating FL 90 Mode C. The projected tracks converged about 2 NM outside the TMA, so to keep the F406 clear of the other ac he decided to keep it inside the TMA and co-ordinated this with the TALLA sector. Traffic information was issued to the F406 crew after the STCA triggered and an avoiding action R turn onto a heading 195° was given. He had expected the military traffic to turn away from CAS, but when they showed no sign of doing so he instructed the F406 pilot to turn further R onto a heading of 220°. The subject ac were about 3 NM apart at this point and the Mode C of the military traffic indicated it was climbing from FL 90 to FL 103 before the unknown pair turned W into the TMA, he thought about 1 NM behind the F406. The unknown pair penetrated the TMA for about 5 miles, he thought, before turning away to the NE.

THE F406 CARAVAN 2 PILOT reports he was flying at 215 kt, IMC in cloud at FL 95 on a heading of 176° when he was informed by ATC of converging traffic 500 ft below his ac; TCAS is not fitted. About 17 NM E of Edinburgh ATC issued an avoiding action 60° R turn which he complied with immediately. A few seconds later he spotted the 2 military ac well clear, he thought at least 4 NM away, but he was unable to identify the ac type because of the distance. He added that in his opinion the incident did not warrant an Airprox report, but nonetheless he was happy to contribute to the investigation.

UKAB Note (1): A review of the TAY Sector RTF transcript reveals that the SC issued traffic information to the F406 pilot at 1429:30, about 10 sec after the STCA enunciated *"…a pair of military ac northbound in your…half past eleven at…15 miles showing level nine zero".* This was acknowledged by the F406 pilot who advised he was IMC. About twenty sec later the SC issued avoiding action *"..to keep clear of that traffic..turn right heading 195",* which was read-back. At 1430:20, the SC instructed a further R turn onto a heading of 220° and passed further traffic information *"..traffic's now in your..10 o'clock at a range of 3 miles down your left hand side"*. This was acknowledged by the F406 pilot who added that *"..we're just becoming victor mike charlie and visual with the traffic"* at 1430:40.

THE F16 PILOT reports he was leading a section of two camouflage grey ac; HISLs were on. His No2 was positioned on the starboard beam flying in wide battle formation. They were inbound to Leuchars and the leader was squawking 3/A 2611 with Mode C under a RAS, he thought, from Spadeadam Range. Heading 360° at 420 kt after departing the range, Spadeadam informed them of traffic 9 NM away at FL 95 – the F406 - which had already been acquired on AI radar 20° L of the nose from a range of 15 NM, so they altered course to the right and continued the climb to FL 110. They became visual with the other ac at 6 NM - 40° L of the nose, he thought 2000 ft below their level, but ATC did not issue avoidance vectors. As they approached frontal clouds on their track ahead, radio contact was intermittent, but after the reported Airprox time they had to turn to avoid heavy showers to the NE, they then turned onto 040° to avoid CAS. He perceived that there had been no danger following their avoiding action R turn.

MIL ATC OPS reports that the F16 section was inbound to Leuchars from Spadeadam range at 7000 ft under a RIS from Spadeadam RADAR. Despite a requested heading of 350º, the F16 section had been turned onto N by RADAR to keep clear of the Scottish TMA. At 1429:47, whilst opening the landline to Leuchars DIRECTOR (DIR) to commence a radar handover, RADAR transmitted to the F16 leader*"…traffic left eleven o'clock, ten miles, left right indicating Flight Level nine five."* This traffic information referred to the F406, to which the F16 leader responded *"…radar contact".* As the handover commenced at 1430:19, RADAR asked the F16 leader to confirm the section's level and received the reply *"…nine zero climbing this time due to cloud."* RADAR responded at 1430:24,*"…copied that, previously reported traffic's now left ten o'clock, five miles still maintaining Flight Level nine five inside the TMA"* to which the leader responded "*Affirm*…C/Ss *are visual, climbing above".* The handover to DIR continued normally until, at 1431:04, DIR pointed out the F406, *"traffic left nine o'clock"* to which

RADAR responded *"Yes it's been called."* DIR then continued *"*C/S *one and two are identified....they are going into the TMA at the moment."* RADAR immediately transmitted to the F16 leader*"...turn right heading zero three zero to remain clear of the TMA."* The leader acknowledged *"...in a right turn and entering cloud this time"* at 1431:20. RADAR commented to DIR *"I can't believe that, hang on, I'll get them out of there before they come to you."* At 1431:42, RADAR transmitted *"...expedite your right turn onto zero four zero, you're now in controlled airspace"* which the F16 leader acknowledged reporting steady on the heading. At 1432:16, RADAR advised the F16 lead pilot that they were *"...now clear of controlled airspace, contact Leuchars Director..."*. As he left the frequency, the lead pilot apologised for the infringement of CAS. Spadeadam was advised that an Airprox had been filed about two days later; whilst the controller concerned remembered the infringement, he did not consider that the ac came close enough to constitute an Airprox.

The F16 leader had been warned twice about the confliction by RADAR under the RIS; the relative positions of the ac indicate that RADAR's traffic information at 1429:47 and 1430:24 was accurate and resulted in visual contact with the F406. Although the F16 leader reports that the turn was made to avoid a heavy rain shower, no mention of this was made on the RT prior to the turn that resulted in a penetration of the Class D TMA. If the F16 leader had informed RADAR about what was apparently a large build up of weather ahead, the controller would have been able to upgrade the radar service to a RAS and may have been able to negotiate an alternative routeing.

UKAB Note (2): A review of the ScATCC (Mil) Lowther Hill radar recording reveals that the F16 section tracked N, 1-2 NM E of the Scottish TMA boundary climbing to FL 89, whilst the F406 was crossing the Forth estuary, 2 NM inside the TMA boundary, tracking about 155º at FL 95. The ScACC STCA, which is not available to SPADE or DIR, activated between the subject ac at 1429:20 and continued to enunciate until 1430:40, when horizontal separation was about 3·5 NM and the F406, which was moving very slowly in relation to the F16s, commenced a R turn onto a SW'ly heading. The ac passed port to port at 1430:50, with a horizontal separation of about 2·9 NM and the F16s situated on the TMA boundary, northbound, indicating 500 ft above the F406. The F16 section turned L onto a heading of about 270º at 1431:10, climbing to FL 105 - 1000 ft above and passing about 3 NM astern of the F406 - which maintained FL 95 throughout. The jets then descended back through FL 95 at 1431:50, turning sharply NE about 2·85 NM W of the eastern TMA boundary to clear CAS at 1432:10.

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 apparent that the TAY SC had sensibly routed the F406 through the NE corner of the Scottish TMA, to provide a measure of increased protection to the flight within Class D airspace. This was at the expense of additional co-ordination initially. Some civil controllers thought this would have produced a significant increase to the SC's own workload, which then increased still further when the SC was confronted unexpectedly with unknown fast jets that subsequently penetrated the TMA. Members recognised the SC's predicament, faced suddenly with a situation where he was unable to exercise the normal degree of control within CAS. Up until the jets crossed the boundary into the TMA, separation was deemed to exist between the F406 in Class D and the F16s in Class G. However, when the STCA was triggered the avoiding action turns issued by the SC to the F406 pilot did much to prevent the situation from becoming more serious. Members also noted that the Spadeadam RADAR controller was concentrating on the handover to Leuchars DIR at a critical moment, but concluded that RADAR had done all that could reasonably be expected of him in the circumstances under the RIS that pertained.

Observing that the F16 pilot said he was in receipt of a RAS, the IFS advisor noted that foreign military crews do sometimes misunderstand some of the salient differences between a RIS and a RAS. Though fuller information for military aircrew is contained in the RAF FLIP – Flight Information Handbook – the difference was worth repeating: a RIS will provide solely traffic information, whereas

under a RAS when flying IFR, advisory avoiding action is also proffered. Nonetheless, the F16 pilot had been aware of the F406 for some time, from his AI radar, and Spadeadam RADAR had also forewarned the lead F16 pilot about the proximity of the TMA. These points should have been sufficient warning for the lead pilot to ensure that he steered his F16 section clear of CAS, presupposing that the ac navigation equipment fit was capable of assisting him in this straightforward task. In mitigation the F16 pilot had commented on the build-up of cloud ahead to RADAR as evinced by the RT transcript. Pilot members, however, were not persuaded and thought the L turn to avoid cloud and thereby penetrating the TMA was most unwise. It was indicative of a breakdown in situational awareness, a point echoed by the IFS advisor. The F16 leader would have been much better advised to tell RADAR about their impending weather predicament ahead. This would have allowed RADAR to effect more positive avoiding action of not only the F406, but also the TMA. The Board concluded, therefore, that the lead F16 pilot's reasons for entering CAS were not well founded. Although the CPA occurred as both ac passed port – port with the F16s situated on the boundary, it was the L turn into CAS as the jets passed astern of the F406 that members thought was of prime concern to the TAY SC. In the Board's opinion doing so without warning or clearance was the cause of this Airprox.

With regard to risk, although the SC believed that the F16s had passed 1 NM astern, the radar recording showed that it was about 3 NM. Given the visual sighting by both pilots following the traffic information provided by both ATSUs, coupled with the vertical separation that also pertained – 500 ft at the CPA and 1000 ft when the F16 passed astern - the Board agreed that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F16 section entered CAS without a clearance.

Degree of Risk: C.

AIRPROX REPORT No 55/01

Date/Time: 23 Apr 1314

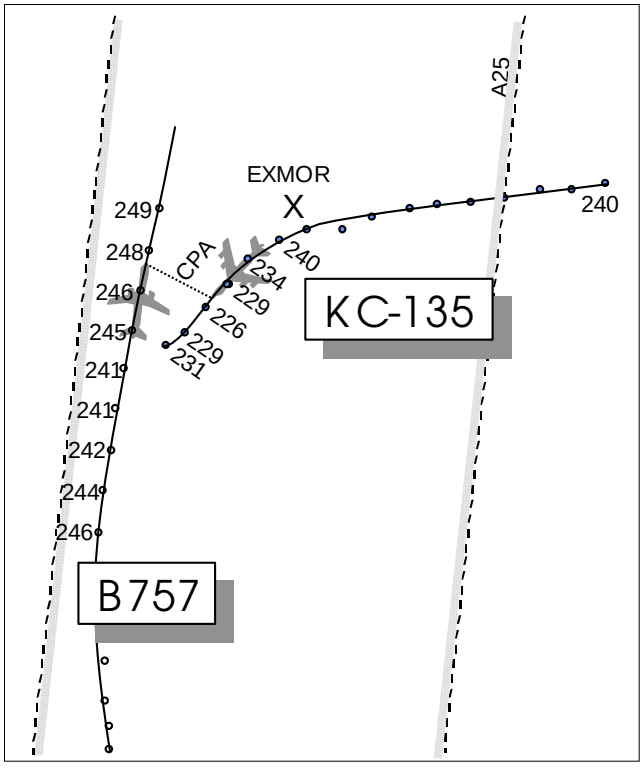
Position: 5108 N 0326 W (4 NM SW of EXMOR)

Airspace: Airway A25 (*Class:* A)

	Reporting Aircraft	*Reporting Aircraft*
Type:	KC-135	B757
Operator:	Foreign Mil	CAT
Alt/FL:	FL 240	FL 245 ↓
Weather	VMC CLBC	VMC CLOC
Visibility:	Unltd	50 km
Reported Separation:	0.5 NM, 1000 ft+	/2.5 NM

Recorded Separation: 1·75 NM, 2000 ft

BOTH PILOTS FILED



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KC-135 PILOT reports heading SW at 400 kt under radar control from London Military at FL 240. London Mil advised of traffic 20 NM ahead which had been co-ordinated, but a few minutes later called for an immediate hard left turn for traffic. Almost immediately a TCAS TA sounded with a target 100 ft below and slightly left, and within a second or 2 this changed to an RA, firstly to climb, then to descend. He banked left and descended to FL 225, picking up the ac visually, a B767 he thought, as it climbed through his level passing left to right 0·5 NM away. He considered the risk of collision had been high.

THE B757 PILOT reports heading northwards along A25 at 300 kt and cleared by LATCC to descend to FL 240. During the descent he received a TCAS TA which changed to a 'Climb' RA before he had time to assimilate the traffic information. His FO (handling) followed the RA until clear of the conflict, having climbed 800 ft. The RA had been necessary; he estimated they had descended to within 100 ft of the other traffic which passed 2·5 NM to starboard, but the risk of collision was low.

MIL ATC OPS reports that the KC135 was the third of a stream of three westbound KC135s, each spaced by about 30 NM; it was at FL 240 under a RAS from London Radar (LRAD) Controller 31 (CON31), whose workload was assessed as being of medium intensity because of a significant amount of external co-ordination. Anticipating the KC135's crossing of Airway A25 in the vicinity of EXMOR, CON31 identified conflicting northbound traffic (the B757) approaching Berry Head (BHD) at FL 350. The B757's SSR label indicated that the ac was inbound to Birmingham (hence it was likely to descend shortly) and the controller was also aware that it had been prenoted to another LRAD controller, to leave CAS at BCN. CON31 contacted the BHD CSC at 1308 and requested co-ordination *"...My three three one three squawk, just south east of Bristol Lulsgate at twelve miles tracking two six zero"* (CSC says "*Yes*") *"Maintaining two four zero against your (B757 C/S)".* The BHD CSC replied *"Well (B757 C/S) will be descending to two four zero, he's currently going to three one zero are you crossing on that track.?"* CON31 confirmed that his ac was crossing on its current track *"...maintaining two four zero if possible"* and the CSC responded *"Okay we'll avoid that."* At 1312, following a request from the KC135 to climb to FL 250, CON31 passed traffic information (TI) *"...maintain Flight Level two four zero for co-ordination...traffic left ten o'clock twenty miles, left to right will be co-ordinated above".* As the KC135 approached EXMOR, the two ac were in a direct confliction in plan and CON 31 monitored the descent of the B757, expecting it to level at FL 250. At about 1314:30, as the B757's Mode C indicated FL 247, CON31 transmitted *"*KC135 C/S*, avoiding action, turn hard left, hard left heading two three zero, traffic was left ten o'clock ten miles left to right...."* The KC135 crew acknowledged the turn adding *"...we have him on TCAS."* The radar replay indicates that the ac passed with about 1·75 NM horizontal separation, although by this time both crews had also reacted to TCAS RAs, the KC135 descending through FL 227, the B757 climbing through FL 247.

The confliction had been spotted at an early stage and CON31 established co-ordination in good time, making a particular point to identify the KC135 on radar by a specific position report, in addition to its SSR code. In a subsequent landline conversation, the BHD CSC appeared to be convinced that the ac they had co-ordinated was squawking 3312. This SSR code was allocated to the middle ac of the KC135 stream, about 30 NM ahead of the subject KC135 and, at the time of the co-ordination agreement, was about 5-6 NM E of EXMOR.

ATSI reports that the Berryhead Suite was manned by a SC, operating the Lands End and Berryhead Sectors 'bandboxed', and a CSC. This was the SC's first duty since the introduction of RVSM so he thought that the operation had a 'new feel' to it but he did not think that this had any direct bearing on the Airprox. His recollection was that the combined sector had been moderately busy with a "medium" traffic volume but high RT loading. This accorded with the CSC's workload assessment.

The B757 was northbound on UA25, cruising at FL 390, inbound to Birmingham. As well as having similar, numerically consecutive callsigns, the 3 KC135s had consecutive SSR codes, 3311, 3312 and 3313. At 1306, some 9 minutes prior to the Airprox, CON31 telephoned the CSC and co-ordinated a 'Cleared Flight Path' for the KC135s in

AARA 12, situated to the west of UA25, at FL 250 for one hour. At that stage, no mention was made of the crossing of UA25/A25.

At 1308:10, CON31 telephoned the CSC to request co-ordination on the third KC135 in the stream, against the B757. By that time, the first had crossed A25 and the second was about to enter. These two ac were crossing A25 "taking 5". (London Military are approved to take ac through CAS under LATCC's jurisdiction without co-ordination, provided a minimum of 5 NM lateral or 5000 ft vertical separation from airways traffic is maintained.) CON31 had correctly assessed that there was no 'airways' traffic to affect the first 2 but he had observed the B757, which by that time was in the descent to FL 310, and rightly identified that its flight profile might conflict with the third KC135.

The position of the KC135 given by CON31 in the request for co-ordination was accurate, however, the CSC's attention went to the 3312 squawk (the 2nd KC135) about 30 NM ahead, about to enter A25. Both the CSC and SC, to whom the flight was pointed out, rightly assessed that the second KC135 would present no problem to the B757 and consequently re-directed their attention to other tasks. Because of the judgement that the crossing KC135 would pose no problem to their traffic, no pink 'crossing strip' was raised. Even if it had been, it is probable that the CSC would have annotated the strip with the 2nd KC135's details and it is, therefore, considered that, on this occasion, this action would not have affected the outcome. Thus, CON31 was left with the impression that the civil controllers would ensure that the subject ac were adequately separated while the civil controllers remained unaware of the potential confliction. The CSC indicated that it was his normal practice to read back the SSR code when accepting such co-ordinations. He was well aware that, had he done so on this occasion, it may well have brought his error to light. MATS Pt. 1 (page E(Attach)-13) places a responsibility on civil controllers to <u>obtain</u> a readback of "*any operationally significant information contained in telephone and intercom co-ordination messages,"* including SSR codes. This places the responsibility upon the offering controller to obtain a readback but there is no equivalent requirement in JSP318A and so it was not incumbent on the Consol 31 controller to insist on a readback.

In the meantime, the B757 had been cleared to descend to FL 310 on radar heading 360°. At 1310:31, it was cleared to FL 260 and, at 1312:50, was further cleared to FL 240 on its own navigation to the Brecon VOR. FL 240 was the level at which it had previously been co-ordinated to enter the Bristol Sector. When the B757 was cleared to FL 240, the 2nd KC135 was well clear of A25 to the west but the 3rd was 22 NM to the NE, converging. The SC remained unaware of the developing conflict and, at 1314:00, instructed the B757 to contact the next sector. At that stage, the B757 was descending through FL 245 with the KC135 10 NM to the north-east maintaining FL 240. As the pilot of the B757 acknowledged the instruction to change frequency, a "Traffic, Traffic" automated cockpit warning message, presumably generated by TCAS, can be heard in the background on the RT recording but this was not picked up by the SC at the time. The SC was asked whether he had observed the B757 on radar prior to transferring it. He confirmed that he had glanced at it "fleetingly" but had not registered the conflict. He pointed out that the Airprox position was towards the north-east extremity of his displayed radar range and also added that a lot of FIR traffic operates to the east of A25/UA25 so, unless it had been specifically brought to his attention, it was unlikely that he would have noticed the KC135. The SC's horizontal radar display had 'Main Mode' selected and, consequently, the KC135's data block only displayed its SSR code not its callsign, which may have been more conspicuous. (The Suite is also equipped with a vertical radar display on which 'Bypass' is normally selected and which would have displayed the KC135s' converted callsigns.)

At 1314:50, prior to establishing communication with the next sector, the B757 pilot came back to the SC and advised: *"... we've just had a Resolution Alert er American traffic down our right-hand side one hundred feet below".* The SC had already turned his attention to other sector traffic and, initially, was unaware of the identity of the conflicting traffic. The B757 had reached FL 241 but climbed back to FL 249 in response to the TCAS RA. Observing this and noting the presence of the '3313' squawk, which had turned left and descended, presumably in response to instructions from CON31, the SC instructed the B757 to maintain FL 250. The pilot advised that he would be filing an 'Airmiss' report. Standard separation was only

briefly eroded, due to the combined effects of the B757 following the TCAS RA and the avoiding action taken by the KC135. A short time later, the B757 was cleared to FL 240 again and transferred to the next sector.

The radar recording indicates that, as the B757 reached FL 241, the KC135 was in its half past one at a range of 5·9 NM, level at FL 240. Thereafter, the former climbed rapidly in response to the TCAS RA and the latter commenced a descending left turn, passing through the B757's 3 o'clock position at a range of 2·5 NM. By that stage, standard vertical separation had been re-established. The period during which standard separation did not exist only amounted to some 10-15 seconds. The minimum separation recorded was 4·4 NM/500 ft, 3·8 NM/800 ft. At their closest lateral separation (1.75 NM) the vertical separation had increased to 2000 ft. The STCA was triggered at 1314:24, ie between the time the B757 was transferred to the next sector and the pilot coming back on the frequency to report that he had received a TCAS RA.

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 Board was advised that the BHD CSC, having focused on the 3312 squawk, then missed the other clues. Members, surprised that he did not think it odd that CON31 was seeking co-ordination on traffic so clearly not in confliction, were advised that in the CSC's experience military ac manoeuvre frequently and co-ordination is sometimes sought in such circumstances. This led to a discussion on whether the root of the problem lay in the CSC's reply, "Yes", which did not contain a readback of the squawk or position. The readback, at least of the squawk, was a mandatory requirement, as is a correct readback of ATC instructions to pilots. Even if the CSC had read back the SSR code when CON31 telephoned to co-ordinate, there was no way of being sure whether he would have read back the correct code (3313), or the one he thought was being referred to (3312), but, in either case, it would have improved the likelihood of his error being detected. ATSI advised that the Editor of MATS Pt. 1 has, therefore, been recommended to revise the wording of the current entry on the *"Readback of Messages"* to make clear that there is equal responsibility upon both the offering and receiving controller to obtain/provide a readback. In hindsight, members discussed the possibility that, had CON31 anticipated the possibility of confusion with a stream of similar squawks, he might have considered passing the position first, to get the CSC looking in the right place, before passing the squawk, and this failure to communicate might have been avoided. The incident, and the CSC's enduring conviction that the co-ordination had referred to the 3312 squawk, was a clear illustration of 'normal' human error, and anticipation that such errors are likely can enable people to act to prevent them.

Members concluded that the cause of the Airprox was that the BHD CSC misidentified the traffic being co-ordinated, and consequently the SC descended the B757 into confliction with the KC135.

The Board wished to commend CON31 for his foresight which enabled him to take immediate, effective action on noticing the B757's continued descent, as well as the very prompt response by the KC135 pilot to these instructions. Members also noted favourably the full and prompt reaction of both pilots to their TCAS RAs, all of which actions had removed any risk of the ac actually colliding.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The BHD CSC misidentified the traffic being co-ordinated, and consequently the SC descended the B757 into confliction with the KC135.

Degree of Risk: C

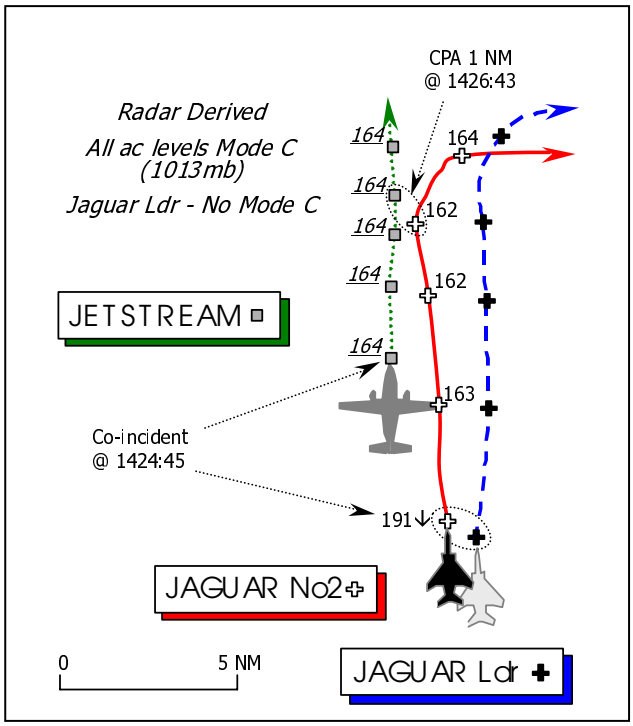
AIRPROX REPORT No 56/01

Date/Time: 26 Apr 1426

Position: 5542 N 0150 W (17 NM SE of St ABBS VOR)

Airspace: Scottish FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Jetstream 31	Jaguar GR3 pair
Operator:	CAT	HQ STC
Alt/FL:	FL 165	16,000 ft RPS (1005 mb)
Weather Visibility:	VMC CLAC >10 km	VMC CLOC >10 Km
Reported Separation:	200 ft V > 1 NM H	2-3 NM H
Recorded Separation:	200 ft V, 1 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BAE JETSTREAM 31 PILOT reports the ac has a white colour scheme with red/blue stripes, navigation lights, anti-collision beacon and HISLs were on whilst flying IFR from Teesside to Aberdeen at 190 kt. They were receiving a RIS from ScACC on 124·5 MHz and squawking A7431 with Mode C; TCAS is not fitted. Flying 5000 ft above cloud at FL 165, heading 360° about 15 NM SE of St ABBS, ATC alerted them to 2 contacts converging from astern. Four times ScACC gave traffic information, advising them that the contacts were converging even closer at a similar level until they were reported to be "*very very close*". They could see nothing, as the other ac was astern, until they finally saw a single military jet pulling away to starboard. They were unable to take any avoiding action because they could not see the other ac; the controller advised that it had been 100 – 300 ft below them and had closed within 1 NM.

The ScACC controller subsequently advised them that the pilot of the jet had apparently had their ac in sight for 10 NM and they therefore questioned why the jet's pilot continued to converge so dangerously close at a high converging speed with no radar co-ordination? It appeared to them that a scheduled commercial passenger flight was being used as target practice by the military, but opined that they were *"sitting ducks with no chance of taking avoiding action"*.

THE JAGUAR PILOT reports that his ac was camouflage light grey, but HISLs were on, whilst flying as No 2 of a pair of Jaguar GR3s conducting a medium level electronic warfare (EW) trials sortie at a TAS of 455 kt. The formation was receiving a RIS from CRC Buchan, and he thought also from Spadeadam, at 16,000 ft RPS (1005 mb); a squawk of 3/A 1503 was selected with Mode C. He was heading N and to port of his leader as the western ac of the pair in battle formation 2-3 NM apart and split by 2000 ft. Traffic information was passed by Spadeadam "…you have traffic left 11 o'clock 5 NM similar heading at FL 165" and at 1425:56, BUCHAN reported "…you have 1 stranger, tactical 340° at 4 NM heading north". Both he and his leader reported visual contact. He then turned 90° away from the Jetstream onto E and climbed; 10 sec later the lead pilot did the same. He assessed that they passed by the Jetstream no closer than 2-3 NM, with *"nil danger"* and *"nil risk of a collision"*.

THE ScACC TAY SECTOR CONTROLLER (SC) reports that the Jetstream crew was flying IFR

under a RIS at FL 165 en route to Aberdeen in, he thought, Class F airspace about 15 NM SE of St ABBS VOR. Two targets were observed approaching from the E squawking A1503 and traffic information was passed to the Jetstream crew that the unknown military ac would pass behind. When the two military ac were about 6 NM behind the Jetstream, they both turned onto a northerly heading and climbed to the Jetstream's level. At all times traffic information was passed to the crew, but he opined that prescribed separation had been eroded to 1 NM horizontally/200 ft vertically. The unknown ac were subsequently identified as a pair of Jaguars.

ATSI commented that there was little to add to the TAY SC's report. The radar service being provided had been agreed between ATC and the Jetstream pilot as a RIS, and comprehensive traffic information was passed to the pilot on the military ac.

MIL ATC OPS reports that the Jaguar pair were conducting a trials sortie as part of the 'Concept of Operations' trial for the RAF Spadeadam Coast Emitter Site (SPACES) overhead Boulmer, which took place between 24-27 Apr 01 and was promulgated in ACN 01-04-0097. SPACES is an EW emitter site, simulating threat radar, against which aircrew can conduct evasive manoeuvres and dispense chaff in order to break radar lock; in this incident no other ac were involved. The Jaguar pilots were in receipt of an air defence (AD) radar service from Buchan, but were also in communication with the Spadeadam range controller (not an ATCO) who provided cueing information to the threat systems and acted as the Jamming Control Authority, on the range ICF. The Spadeadam ATCO i/c was acting as an observer to comment on the ATC aspects of the trial and was also monitoring the allocated Buchan frequency on a standby radio, though only the Jaguar pilots' transmissions could be received. Having completed the first 'run', the Jaguars turned N, tracking to a position over 20 NM N of Boulmer. During the transit, Spadeadam ATCO i/c observed northbound traffic - the Jetstream - ahead of the Jaguars, which they were catching up. At 1424:45, having heard nothing on the Buchan frequency that sounded like an acknowledgement of traffic information, Spadeadam ATCO i/c transmitted to the Jaguar pilots on the ICF *"C/S Spadeadam Air Traffic, you have traffic left eleven o'clock range five miles, similar heading indicating one six five".* The traffic information was accurate and was acknowledged by the lead Jaguar pilot who continued on track.

UKAB Note: The LATCC Great Dun Fell radar recording shows the Jetstream tracking N at FL 164, with the pair of Jaguars astern and to the S, but gradually overtaking to starboard at about twice the Jetstream's groundspeed. Only the No 2 Jaguar is squawking and ascended to FL 191 at 1425:32, before descending. At 1426:18, the Jaguars were flying a 1 NM line abreast formation, with the No 2 ac on the L, indicating FL 162 and on a track which would take it about 1·5 NM E of the Jetstream. The No 2 then turned about 20° L, pointing directly toward the Jetstream. At 1426:43, the No 2 closed in the Jetstream's 5 o'clock to the CPA of about 1 NM, 200 ft below it, before turning sharply 50° R and rejoining the lead Jaguar, in the Jetstream's 3 o'clock and clearing to the E as reported.

HQ 2 GP AIR SURVEILLANCE AND CONTROL SYSTEMS SAFETY AND STANDARDS UNIT (ASACS SSU) comments that the Fighter Marshal (FM) at CRC Buchan was conducting an operational trial with the Jaguar pair to the E of Boulmer, operating under a RIS between 5 – 24,000 ft TYNE RPS (1005 mb). In addition, the Jaguars were monitoring the Spadeadam Range Control ICF. The SPACES Trial, detailed in an ACN, was a small scale EW trial involving ac that would be conducting high-energy manoeuvres including high speed runs and rapid rate turns and descents; these ac may have been unable to comply with the rules of the air. It was also stated that ac would be dispensing chaff.

The Buchan FM first detected the Jetstream heading N at FL 165, when the Jaguar pair were about 15 NM E of the Jetstream, heading W at 7000 ft RPS setting up for an inbound run. The Jaguars continued heading W and then turned onto N behind the Jetstream and started climbing to 17,000 ft RPS towards it with a high overtaking speed; at this stage the Jetstream had not been called in to the Jaguar pair. The first warning to the Jaguar pair about the Jetstream came from the Spadeadam ATCO i/c on the Spadeadam ICF, when at a range of 5 NM. The FM first issued traffic information at a range of 4 NM. This was tardy. The traffic information was acknowledged

by the Jaguar pair who said they were visual with the Jetstream, and continued N until almost abeam the Jetstream before turning starboard and clearing away to the E.

The FM called the ScACC TAY SC belatedly to pass information that the Jaguar pair were visual with his traffic; the SC and the Jetstream pilot were understandably indignant, as they believed that they had been deliberately intercepted. However, the information does not support their assumption. Although the FM was late with both his traffic information and the call to the TAY SC, there was no intention by Buchan whatsoever to intercept the Jetstream. The FM just fulfilled his obligation under the RIS to warn the Jaguar pair, who chose to close on the Jetstream whilst repositioning for another run during the SPACES trial and flew close enough to cause concern to the Jetstream pilot for the safety of her ac.

HQ STC comments that although Buchan were slow to pass traffic information on the Jetstream, both Jaguar pilots were visual with it by 4 NM, giving in excess of 60 sec to the merge. It is, therefore, extremely difficult to understand why the Jaguar formation maintained a converging heading for so long. Furthermore, the Jaguar pilot's estimate of separation is so vastly at odds with the radar recorded range that the accuracy of his whole report must be questioned.

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.

Pilot members both military and civilian, understood the Jetstream pilots' concerns as the jets closed at high-speed and their inability to see the Jaguar until it pulled away on their starboard side. As a RAS was not available from ScACC in Class G airspace - it is company policy only to provide a RAS in Class F airspace on an ADR - the Jetstream pilot did not have the benefit of any advisory avoiding action from the TAY SC and had to rely solely on the traffic information provided. Some members noted that the TAY SC had reported that the Airprox occurred in Class F airspace which was not the case. Some also disagreed with the interpretation that 'prescribed separation' was lost as none is prescribed under a RIS in the Open FIR where separation is solely the responsibility of the pilot. Nonetheless, it was clear that the SC had done well to keep the Jetstream crew appraised with a steady flow of traffic information as the jets approached. Some civil pilots thought that CAS would be useful on this route but it was suggested that the density/frequency of traffic would not justify the establishment of an airway; however, this was a matter for the Directorate of Airspace Policy, not the UKAB. Some CAT pilot members thought it was preferable for CAT ac to route through CAS wherever possible, even if that required a significant detour as would have been required here. That was a matter for the company and the Board recognised the commercial implications that were involved. Operators had to choose between a more direct track through the 'see and avoid' environment of the Open FIR with all that it entailed, or longer routeing inside the protection of CAS.

Although the No2 Jaguar pilot perceived that both Spadeadam Range and CRC Buchan were providing him with a RIS, the MIL ATC OPS and ASACS SSU reports revealed that it was the CRC FM who was charged with this task. Spadeadam ATC should have been mere bystanders, but the Board noted and praised the proactive stance taken by the Spadeadam ATCO i/c, who exercised sound judgement and conscientiously passed traffic information though he was not providing an ATS to the Jaguar pair at the time. A fine balance had to be struck here in the interests of flight safety and in this instance members felt the ATCO i/c had done the right thing. Conversely, the FM was late in passing traffic information even though he had detected the presence of the Jetstream much earlier. For the range involved, once it had been ascertained that the Jaguar pilots had acquired the Jetstream, it was too late to tell the TAY SC and some members thought that if the FM had been a bit more proactive a different outcome may have resulted.

In the STC pilot member's view this was a very unfortunate incident, which definitely should not have occurred. It was not an intercept in the sense that the Jetstream was being deliberately

used as a target, as its pilot thought – although it was easy to understand why both the SC and the Jetstream crew had believed otherwise. The STC member went on to state that the No2 Jaguar pilot had flown much too close to the Jetstream and there had been no reason, operational or otherwise, for doing so. The view at Command HQ was that this occurrence reflected badly on the standards of airmanship normally expected of military pilots. Members agreed and judged the encounter as very unprofessional which also attracted criticism on the Jaguar leader who could have ensured that the Jetstream was given a wider berth. The Board concluded that this Airprox resulted from the No2 Jaguar pilot flying unnecessarily close to the Jetstream, so as to cause concern to its pilot and the TAY SC. Turning to an assessment on risk, as the Jaguar pilots had acquired the Jetstream visually following the traffic information, and could have given it a wider berth at any stage in their comparatively nimble jets, the members agreed that there had not been a risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The No 2 Jaguar pilot flew unnecessarily close to the Jetstream, so as to cause concern to its pilot and the TAY SC.

Degree of Risk: C.

AIRPROX REPORT No 58/01

Date/Time: 30 Apr 1049

Position: 5501 N 0718 W (4·7 NM finals RW 08 @ Londonderry (Eglinton) - elev 22 ft)

Airspace: Scottish FIR (*Class:* G)

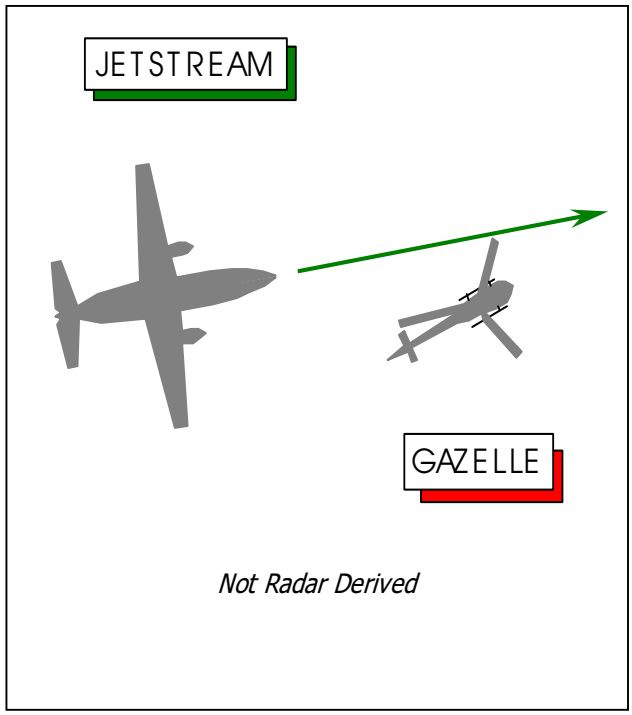
	Reporting Aircraft	*Reported Aircraft*
Type:	Jetstream 41	Gazelle AH1
Operator:	CAT	JHC
Alt/FL:	1600 ft ↓ (QNH 1016 mb)	3000 ft (QNH 1016 mb)
Weather Visibility:	VMC CLOC 25 km	VMC CLAC 40 km

Reported Separation:

400 ft V, nil H

50-100 m H, 800-1000 ft V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JETSTREAM 41 PILOT reports flying IFR inbound to Londonderry (Eglinton) airport at 160 kt; TCAS was not fitted. They had earlier reported visual contact with the airport to Eglinton ATC, who then cleared them for a visual approach for RW 08 from FL 50. Overhead the EGT NDB they turned onto 260° and descended to 1700 ft Londonderry QNH (1016 mb). About 4 NM to the W of the airport they turned L onto 080° for final approach to RW 08; upon rolling wings level at 5 NM they spotted a

military Gazelle helicopter with slow forward speed at 12 o'clock about 400 ft above them at around 4·7 NM DME. Flying in good VMC with a forward visibility of 25 km, they maintained visual contact as they underflew the helicopter, which he believed was at about 2000 ft ALT, but no avoiding action was taken. He informed ATC who was not aware that the helicopter was there; following this transmission the Gazelle pilot called and informed ATC of his position. He assessed the risk as *"high"* and added that if they had flown the full NDB procedure they would almost certainly have been a lot closer to the helicopter.

THE GAZELLE AH1 CAPTAIN reports his helicopter is camouflage grey/green but HISLs were on; he was executing an operational task from Ballykelly to Omagh, when he was diverted to Londonderry for a higher priority task involving a suspect device on the W side of the city. He was occupying the LHD seat in command of the ac acting as the observer, with the pilot in the RHD seat. They were flying about 500 ft above cloud with an in-flight visibility of about 40 km. Overhead the River Foyle, heading 060° in a high hover, straight and level, he thought at 3000 ft QNH with no forward speed, he was looking through binoculars at the W side of the city when he first saw the other ac through his binoculars passing below them. Reverting to normal vision he assessed the other ac was about 800 - 1000 ft below when it passed 50-100 m away inbound to Eglinton with no risk of a collision. He added that the RHS pilot was totally blind to the other ac and they had been very busy map reading to the incident location, plotting grid references and communicating over 2 tactical radio nets.

UKAB Note (1): The 0920 Londonderry (Eglinton) weather was reported as surface wind: 030/9; 18 km in rain showers; SCT 1000 ft, SCT 1800 ft, BKN 2800 ft; QNH 1016 mb; QFE a/d 1015 mb.
UKAB Note (2): This Airprox occurred outwith the coverage of recorded radar.

THE LONDONDERRY (EGLINTON) COMBINED AERODROME/APPROACH CONTROLLER reports that whilst executing an NDB/DME procedure to RW 08 the Jetstream crew declared 'visual' with the field at 1046, and was cleared to continue visually to join R downwind for RW 08. A C152 was carrying out LHD circuits to RW 08. Three minutes later at 1049, the Jetstream crew reported they had passed 500 ft below a hovering Gazelle helicopter; he responded that he had no knowledge of the reported traffic. However, when the Jetstream was finals for RW 08 at 1050, he received a call from the Gazelle crew informing them of their position and altitude over the city and apologised for the late call. After landing the Jetstream captain informed him he would be submitting an air safety report. Later that day at 1206, he received a phone call from the Gazelle pilot, who informed him that he had been effecting top cover for an incident in the city, that his tactical radios were busy and he had forgotten to report his position and altitude.

UKAB Note (3): A review of the Eglinton APPROACH (APP) RTF transcript reveals that the Jetstream pilot reported the presence of the Gazelle to Eglinton shortly after 1049:30, *"..do you know that there's a Gazelle helicopter above us about 500 feet"?* APP advised that he was not aware of the helicopter to which the Jetstream pilot responded at 1049:50,*"..he's at 4 point 6 miles at 500 feet above us we're at…1300-1400 feet this time so he must be at 2000 feet on the final approach to 08"*. Just after 1050:40, the Gazelle made their first call to APP *"…just approaching…about to work in the overhead at…2000"*. APP acknowledged the call with the QNH (1016 mb) and queried if they were the helicopter 4½ W of the airport, which was confirmed by the Gazelle crew.

UKAB Note (4): The UK AIP at AD 2-EGAE –1-5, promulgates Londonderry (Eglinton) ATZ as a circle radius 2·5 NM, centred on RW 08/26, from the surface to 2000 ft above the aerodrome elevation of 22 ft.

HQ JHC comments that it would appear that there was not a risk of collision in this case. The Gazelle was entitled to be in its position, hovering in Class G airspace, VMC. However, the Gazelle crew did not adhere to their local *advisory* flying order, which states that ac operating in the Londonderry area should operate on the Eglinton ATC frequency. However, the Gazelle crew was very busy as they had been diverted to an operational task over the City. Whilst crews are aware of the approach criteria for RW 08 into Eglinton, there is no CAS to protect the procedure. Thus pilots may operate under VFR in and around the airspace that contains the procedure.

In order to minimise the potential for a recurrence, steps have been taken by the local HQ to ensure all crews are reminded of the necessity to call Eglinton ATC when operating in this area, additionally, all new arrivals in theatre are briefed on the procedures to be followed. The advisory flying order is the best solution to minimise the chance of a repeat occurrence without the need for the provision of CAS, which would not be warranted by the number of IFR approaches into Eglinton.

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, a report from the air traffic controller involved and reports from the appropriate operating authorities.

The advisor from JHC briefed the Board that in this 'theatre' it was normal practice for the RHS Gazelle pilot to communicate with ATC, while the LHS ac 'Captain' communicated on the tactical radio nets. In this instance the gazelle pilot was new 'in theatre' and relatively inexperienced. If the VFR Gazelle crew had communicated their presence to the Eglinton ADC here, in accordance with their own local order's sage *advice*, traffic information would in all probability have been passed to the IFR Jetstream crew by ATC. Members recognised the difficulties that encumbered the Gazelle crew when engaged on their operational tasks. These might compete for priority over communication with ATSUs - that was a matter for the crew to decide - but air safety was also important. Indeed, the Gazelle crew had eventually called Eglinton APP, but unfortunately too late to advertise their presence before the encounter in the FIR to the W of the airport. The lesson here was striking the right balance between concentration on the mission against the principles of good airmanship when operating in the 'Open FIR' under the principle of 'see and avoid'. With regard to 'lookout' alone, the VFR Gazelle crew would probably have been unable to spot the Jetstream any earlier than they did as it approached from well astern.

Although the Jetstream pilot speculated that IF he had flown the full NDB procedure they would have been closer to the helicopter, he had not done so, but had instead reverted to a visual approach from overhead the airport. The Board's assessment of cause and risk was always determined on what *actually* happened and not what *might* have happened. In this case the relative geometry of the encounter seemed plain enough but without the benefit of recorded radar it was difficult to determine the track flown by the Jetstream before it had turned inbound relative to the Gazelle. Some members wondered if the Jetstream crew had flown past the Gazelle without seeing it earlier, whilst outbound, and this seemed feasible. Another point was that the Jetstream crew had sighted the Gazelle about 400 ft above them, as they steadied inbound, which suggested that the helicopter had been at an altitude of about 2000 ft, and not the 3000 ft reported by the Gazelle captain. The RT transcript lends further support to this contention, as the report by the Gazelle crew to Eglinton ATC at 1050:40, "*…to work in the overhead at…2000",* suggests that the helicopter was flying at 2000 ft amsl at the time of the Airprox; albeit this was just over a minute after the occurrence, within which, it was recognised, the Gazelle pilot might have descended from 3000 ft, down to 2000 ft. The Board was unable to resolve this anomaly with any certainty, but the general opinion amongst the members was that the helicopter may have been at 2000 ft. If that was the case then 4·7 NM finals to RW08 was probably not a good place to hover without telling ATC, notwithstanding the operational task.

There was a clear message here for CAT crews who operate regularly to airports isolated from CAS. VFR traffic WILL almost certainly be encountered in the vicinity and within airspace, which contains IFR procedures. Moreover, flying IFR procedures in such circumstances remains a subordinate activity to the prime responsibility of operating under the principle of 'see and avoid'. In this instance, having sighted the helicopter, the Jetstream crew elected to continue along their pre-determined flight-path inbound to Eglinton without any deviation to avoid the Gazelle. This led members to deduce that the Jetstream crew judged their selected separation was satisfactory, otherwise concerns over the ac's safety would have induced them to take avoiding action to increase separation in the time available to them. As they did not the members thought the Jetstream crew had been taken by surprise when the Gazelle was detected, somewhat

late, above them. In the end the Board concluded that this Airprox was the result of a late sighting by the Jetstream crew and that no risk of a collision had existed in the circumstances reported.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Jetstream crew.

Degree of Risk: C.

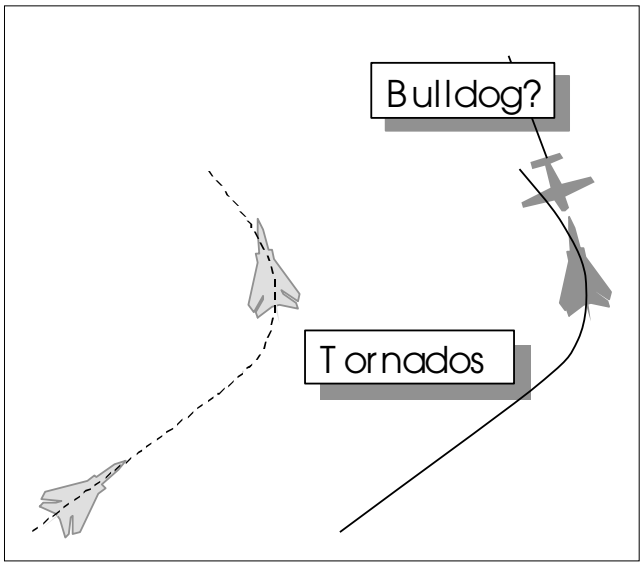
AIRPROX REPORT No 59/01

Date/Time: 1 May 1330

Position: 5650 N 0304 W (22 NM N of Dundee)

Airspace: LFS (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado GR	Untraced light ac
Operator:	HQ STC	
Alt/FL:	500 ft (Rad Alt)	
Weather Visibility:	VMC CLNC 15 NM	
Reported Separation:	150 ft V /NK	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports acting as the right hand ac of a pair evading a bounce at low level. He was flying a 4 g left turn at 480 kt from 060° to 330° when a light ac which he thought was a Bulldog, passed about 150 ft above on a southerly heading. It had appeared in his RH quarter panel and there was no time for avoiding action; the incident was over as he saw it. The risk of collision had been high; if they had been at the same height they would have collided as both crew members were looking out into the turn. He considered he should have seen it as he was looking in that direction shortly before, while his navigator was looking at the bounce closing behind their No 2 who was 4 km to the left of him.

UKAB Note: The Tornado pilot was convinced the ac he saw was a red and white Bulldog. No such ac still in RAF service was in Scotland and AIS (Mil) ascertained that there was no other RAF training ac in the area at the time. The incident occurred below recorded radar coverage and AIS (Mil) followed up some 75 lines of enquiry over a period of 3 months in what has proved to be an unsuccessful trace. None of the Bulldogs now civil registered was in the area at the time; although several other Bulldogs sold by the RAF have yet to be registered it has not been possible to determine if any of them were (illegally) airborne in the area. AIS (Mil)'s enquiries covered all the other known clubs, operators and museums within range and the possibility of it being a Beagle Pup.

HQ STC comments that the Tornado crew, during a period of high cockpit workload as they manoeuvred the ac to negate an air threat, did not

become visual with the light ac until it was too late to take avoiding action. It is possible that the conspicuity of the 'Bulldog' was significantly reduced against winter landscape but nevertheless, the lesson is an old one: lookout is of paramount importance, particularly when operating at low level, and it is the clear responsibility of all crews to clear the ac's flightpath before manoeuvring.

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 Board agreed that fast jet crews, who have dispensation to operate above the national speed limit of 250 kt below FL 100, have a primary responsibility to see and avoid other ac while doing so. Moreover, members fully understood what was involved when evading a bounce, and where a 'bounced' crew's attention is likely to be focused; this was always subordinate to safety, however. The untraced ac was entitled to fly at 500 ft and appeared to have been somewhat above that. It was suggested that its pilot may not have seen the Tornado since he had not reported the Airprox, but there was the possibility of an unregistered flight and the pilot not wishing to draw attention to the fact. That aside, members accepted it was extremely difficult to see light ac head on at low level from a fast jet, and welcomed the honest report from the Tornado pilot, but agreed that the cause of this Airprox was that he had not seen this one until it was too late to take any avoiding action. The Board assessed that there had been a real risk of collision in this incident and agreed with the Tornado pilot that it was extremely fortunate that they had not been at the same height.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively a non-sighting by the Tornado pilot.

Degree of Risk: A

AIRPROX REPORT No 60/01

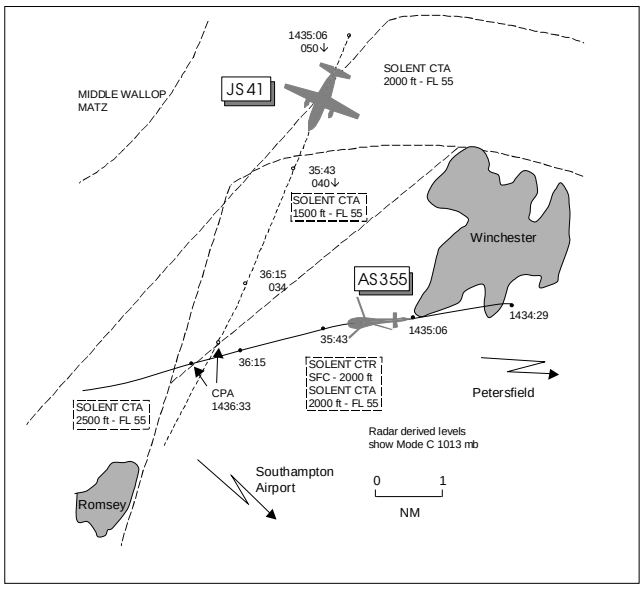
Date/Time: 2 May 1437

Position: 5102 N 0126 W (6 NM NW Southampton Airport - elev. 44 ft)

Airspace: CTA (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	JS41	AS355
Operator:	CAT	Civ Pte
Alt/FL:	↓ 3500 ft (QNH 1017 mb)	2500 ft (QNH NK mb)
Weather Visibility:	VMC CLBC >10 km	VMC CBLC >10 km
Reported Separation:	0 V 300 m H	not seen

Recorded Separation: NK V 0·5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JS41 PILOT reports flying inbound to Southampton at 210 kt descending to 3500 ft QNH on a radar vector to position downwind LH RW 02; the ac was not TCAS equipped. Having broken cloud at 4500 ft and shortly before levelling off he requested a visual approach. The controller agreed to the request and advised him of helicopter traffic in his 12 o'clock at 2500 ft QNH which he saw immediately. It was in his 11 o'clock, crossing L to R, but above his level and descending; it levelled at his altitude and passed 200-300 m ahead. He monitored its movement and he considered that there was no need to take any avoiding action. He informed ATC who, from subsequent communications with the subject helicopter pilot, appeared slightly confused over what level the helicopter was maintaining. He assessed the risk of collision as high.

THE AS355 PILOT reports heading 290° at 120 kt in a transit of the Solent CTA. He was operating single crew with an observer occupying the other pilot's seat. The visibility was >10 km 1000 ft below cloud in VMC and the helicopter was coloured red/white with strobe lights switched on. Having thought he was at the edge of Solent CAS he decided to carry out 2 engine condition checks owing to suspect high exhaust gas temperatures. During the check on No 2 engine, which proved to be difficult owing to a throttle problem, he said he must have climbed from his assigned altitude of 2500 ft to 3500 ft QNH. He did not see the other ac which passed behind.

UKAB Note (1): During a subsequent telephone conversation, the AS355 pilot stated that he had descended to 2500 ft but did then climb inadvertently to about 3500 ft during the engine checks.

ATSI reports the Solent Radar Controller, combining both the Southampton and Solent APP/APR functions, described the workload and traffic loading as "light" and the relevant ATC equipment was serviceable.

The AS355 pilot established communication with the Solent controller at 1427 and reported approaching Petersfield, en route to Bristol, at 3500 ft *"victor mike"*, requesting to route *".... north of your zone routeing er past Salisbury"*. The controller placed the flight under a FIS. The pilot went on to advise that he did not think his transponder was working. The controller responded by saying: *"... I'll advise you of that if I don't get anything"* and, recognising that the helicopter's route and level would require a transit of CAS, asked whether an IFR or VFR clearance would be required. The pilot requested a VFR clearance and, at 1428, reported at Petersfield. The controller issued the clearance: *"... transit controlled airspace level three thousand five hundred feet VFR report if you do need to leave that level to maintain VMC."* The pilot replied: *"... wilco ... what have you got as your cloud base then at the moment."* When the controller reported the cloud as scattered at two thousand six hundred, the pilot responded: *"Okay well we're go down to twenty five hundred then if that's okay with you just to make sure."* The controller re-cleared the flight *" ... to transit descending to two thousand five hundred VFR report when level."* The pilot did not provide a full readback but advised: "*I'll call you er level twenty five hundred feet...".* No further reference was made to the AS355's lack of a transponder and the flight continued as an unidentified, primary only radar return. At interview, the Solent controller confirmed that, under normal circumstances, he would have issued a squawk to the AS355 but, because of the pilot's earlier statement and the fact that no SSR return was showing on radar, he did not on this occasion.

The JS41 established communication with the Solent controller just over half a minute later, at 1429:30. The flight was maintaining FL 80, southbound towards the 'SAM', and told to expect radar vectors for a LH circuit and VOR DME approach to RW 02. The JS41 was cleared for initial descent to FL 70 and, at 1431:30, assigned radar heading 205°. Once the controller had received an acknowledgement of this instruction, he asked the AS355 to report passing Winchester. He explained that this had just been to get an update on its position because it was not radar identified and he was, therefore, unable to confirm its position on radar. In order for the controller to fulfil his responsibilities for ac operating in Class D airspace, in the case of an ac without a transponder, he would normally be expected to obtain a report entering CAS and this should have been requested. Winchester is situated well within the Southampton CTR, to the W of the extended RW C/L. Although

the pilot of the AS355 had neither reported vacating 3500 ft nor reaching 2500 ft, the controller did not request a level check.

At 14.33:30, the Solent controller instructed the JS41 to descend to 3500 ft QNH, despite the fps on the AS355 not indicating that the flight had vacated 3500 ft. At that stage the JS41 was approximately 9·5 NM N of the AS355 on a converging track. When this was discussed at interview, the controller explained that, although fully aware that the AS355 was a VFR flight, his plan was to provide vertical separation until either the JS41 sighted the helicopter or it could be established that the flights had passed, rather than simply providing both flights with TI, which, strictly speaking, was all that he was required to do. He fully accepted that, with this plan in mind, he should have confirmed the AS355 had vacated 3500 ft before clearing the JS41 to that altitude. However, he had reasoned that, under normal circumstances, having issued the revised transit clearance descending to 2500 ft some 7-8 minutes earlier, the helicopter would have had more than adequate time to descend 1000 ft. Although not formally identified, the Solent controller had noted a primary return which he believed to be the AS355 and this was supported by the pilot reporting S abeam Winchester at 14.34.

Approximately one and a half minutes later, the pilot of the JS41 reported *"visual".* Appreciating that the AS355 was likely to affect the JS41's visual approach, the Solent controller advised: *" ...the traffic just going approaching your twelve o'clock now left to right range one and a half miles Twin Squirrel helicopter two thousand five hundred feet VFR report when you have him in sight."* The pilot of the JS41 responded: *"... just confirm his altitude 'cos we're at three thousand five hundred and he's just descending through our level now at twelve o'clock".* The Controller asked the AS355 to confirm its level and the pilot replied*: "... we were at thirty five hundred I'm sorry...".* The pilot of the JS41 said that he would be submitting an Airprox report, adding his estimate that the helicopter was only about three hundred metres in front of him. Once clear of the AS355, the JS41 continued with its visual approach and, at 14.37:30, was transferred to Southampton Tower. A minute later, the AS355 was transferred to Boscombe Radar when leaving CAS to the NW of Romsey.

On the LATCC radar recording, a clear primary radar return can be seen which entirely conforms with the AS355's reported positions and routeing. Unfortunately, due to lack of Mode C information, its vertical profile cannot be determined and, therefore, it is not possible to assess the vertical separation between the subject ac with certainty. In his written report, the pilot of the AS355 states that while carrying out 'engine condition checks' he must have climbed from 2500 ft, which he acknowledges was his assigned altitude, to 3500 ft. This does not accord with the report from the commander of the JS41 which states that, as he reached 3500 ft, he saw the helicopter *"... above our altitude and descending."* The radar recording shows the subject ac converging, with the AS355 in the JS41's eleven o'clock position. When the pilot of the JS41 reported sighting the helicopter, lateral separation was less than 2 NM. Lateral separation continued to reduce until the JS41 subsequently passed 0·5 NM behind the AS355 and, thereafter, the separation rapidly increased as the ac diverged.

UKAB Note (2): Met Office archive data shows the Southampton METAR EGHI 1420UTC 03010KT 360V060 9999 SCT026 11/08 Q1017.

UKAB Note (3): Replay of the Pease Pottage radar shows the Mode C as Flight Levels based on 1013 mb therefore when referenced to the Southampton QNH 1017 mb FL 034 is 3500 ft altitude.

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 addressed the ATC aspects of the incident. From the point of initial contact by the AS355, members wondered why the Solent controller had not issued a squawk. In not doing so, he had effectively lost the ability to check the serviceability of the transponder and then subsequently to identify the helicopter and track its progress if the equipment had been or become serviceable during its transit of the Solent CTA. The

ATCO then embarked on a plan which hinged on providing vertical separation between the subject ac and passing TI until they could see one another. However, the controller had omitted to check that the AS355 had levelled at 2500 ft. Members understood his logic but his assumption that the AS355 would be level, 7-8 minutes after issuing the clearance, was no more than an assumption. Moreover, although the Jetstream pilot was warned about the helicopter, TI on the JS41 was never passed to the AS355 pilot; this would have alerted the AS355 pilot to the presence of the conflicting Jetstream. ATCO members thought one explanation for this was that events had overtaken the controller before he had an opportunity to tell the helicopter about the Jetstream. These three elements all contributed to the Airprox.

Turning to the flying aspects, pilot members were dismayed that the AS355 pilot had elected to carry out engine checks, whilst flying within Class D airspace. Helicopter members explained that these routine power checks, which take about 1·5-2 minutes per engine to complete, require a reasonably high proportion of 'heads-in' time to monitor and then note performance data. This could certainly distract pilots from flying their ac and, in this instance, the pilot should have considered carrying out these checks when flying in a more appropriate Class of airspace. Alternatively, if it had been essential to perform these checks, the pilot should have informed ATC about their significance before commencement. Members felt therefore that poor airmanship had contributed to the Airprox. An additional point was that the helicopter pilot had not reported level at 2500 ft, as requested, nor read back the ATC clearance fully. Members felt that this poor RT discipline had added to the incident. However, at the end of the day, the AS355 pilot had realised his assigned altitude had been 2500 ft, when his level was queried by ATC but he had not maintained that level in accordance with the ATC clearance. The Board were unanimous in agreeing that this had caused the Airprox.

Looking at risk, the Solent controller had planned safe vertical separation for both ac but the AS355 pilot had flown above his assigned altitude without being aware of the transition. The JS41 pilot had become VMC on passing 4500 ft in the descent and, after receiving erroneous TI from ATC, had seen the AS355 crossing L to R 1·5 NM ahead. He had watched the helicopter pass but considered that there had been no need to take avoiding action. However, the AS355 pilot had not seen the JS41 and had seemed unaware of his ac's flight path; it had been entirely fortuitous that the subject acs' tracks had some lateral displacement between them. With due regard to what did take place, these elements persuaded the Board that safety standards had been less than assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The AS355 pilot did not maintain his cleared altitude.

Degree of Risk: B

Contributory factors: The Solent Radar Controller:

Did not pass TI on the Jetstream to the AS355 pilot

Did not issue a squawk to the AS355 pilot

Did not check that the AS355 was level at 2500 ft

Poor R/T discipline by the AS355 pilot

Poor airmanship by the AS355 pilot

inappropriate airspace to conduct engine checks

AIRPROX REPORT No 61/01

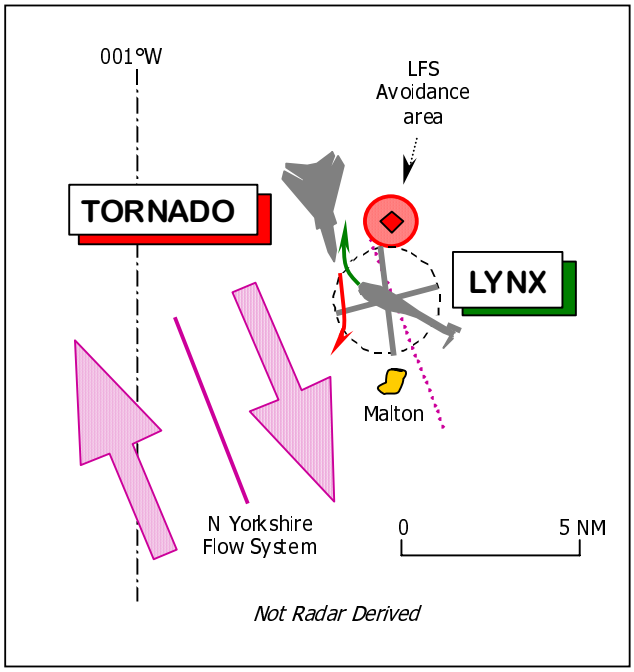
Date/Time: 2 May 1546

Position: 5410N N 0049 W (3 NM N of Malton)

Airspace: UKDLFS - LFA 11 (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Lynx AH7	Tornado GR4
Operator:	HQ JHC	HQ STC
Alt/FL:	200 ft↓ (Rad Alt)	250-350 ft (Rad Alt)
Weather Visibility:	VMC CAVOK 30 km	VMC CLBC 30 km
Reported Separation:	100 ft H, nil V	400 m H, nil V

Recorded Separation: Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LYNX AH7 PILOT reports by signal that his ac has a camouflaged colour scheme, but HISLs were on whilst in a low-level transit at 100 kt in 'CAVOK' weather. About 3 NM NE of Malton, heading 290°(T) descending through 200 ft Rad Alt, a Tornado was spotted southbound about 1000 m away. The Tornado pilot gave no indication that his helicopter had been spotted nor any track adjustment, so he turned hard R to avoid the jet and continued his descent. The Tornado passed down the port side about 100 ft away and rolled to the R revealing the undersurface whilst its engines could be heard. He added that the avoiding action resulted in a main rotor rpm overspeed and CAT 1 damage which necessitated a landing as soon as practicable. Both Lynx crewmembers were *"adamant that a collision had been imminent"*.

UKAB Note (1): Despite repeated requests, the Form 765A Airprox report was not submitted to the UKAB until 30 Aug 2001, some 4 months after the event.

THE TORNADO GR4 PILOT reports his ac has a camouflage grey colour scheme, but HISLs were on whilst in level cruise at 250-350 ft Rad Alt, at 450 kt and squawking 3/A 7001 with Mode C. He was flying in good VMC, 4000 ft below cloud with an in-flight visibility of 30 km. About 3 NM N of Malton on an IP to target run, he first spotted the Lynx helicopter at the same height in his 11 o'clock about ½ NM away. He turned R (as did the helicopter pilot) to avoid the helicopter which passed about 400 m down the port side. He did not assess the risk.

UKAB Note (2): The UK Mil AIP Vol III at Part 1-2-11-3 para 4, requires FW aircrew to comply with the N Yorkshire Flow System, which covers this part of LFA11 where the Airprox occurred. This takes the form of a north and southbound flowed area, extending 6 NM either side of a dividing line between Pocklington and 54° 10'N 000° 58'W. The Tornado crew complied with the southbound flow.

Crews wishing to cross the flows are to do so at right angles to the line dividing the 2 flows and preferably at 500 ft or above to improve conspicuity. However, The UK Mil AIP Vol III at Part 1-1-4 para 15, states that in general although *"compliance with flow arrows is mandatory for all military ac operating below 2000 ft msd"*, an exception is granted to *"helicopters flying below 200 ft msd outside of Tactical Training Areas"*.

UKAB Note (3): This Airprox occurred outwith the coverage of recorded radar.

MIL ATC OPS reports that the Lynx pilot established contact with Linton ZONE on 129·15MHz at 1505:07, after departing from Dishforth on a prenotified low-level VFR departure. ZONE passed the Barnsley RPS (1014 mb) and placed the flight under a FIS. After passing below the MATZ stub, radar contact was lost and the helicopter operated below radar cover within the Vale of Pickering without any further RT contact. This area is regularly used by Dishforth based helicopters and Linton's lack of good radar cover there is well publicised.

However at 1552:36, the Lynx pilot called ZONE and queried *"…do you have a Tornado working in the area? We've just had an Airprox with it."* ZONE advised the pilot that his helicopter could not be seen or radar and asked for his position. The pilot confirmed his position as being about 3 NM NE of MALTON, to which ZONE confirmed *"....I have no traffic showing in the area below Flight Level one seven zero"* to which the pilot replied *"..he's certainly below that.....OK we'll deal with it on the ground."*

There are no ATC causal factors in this Airprox.

THE LYNX PILOT'S UNIT comments that the UKDLFS – particularly in the Vale of York – is a very demanding environment. For this reason there are well published operating procedures that enable military ac to negotiate these areas in relative safety. On this occasion the Lynx captain began his descent on the eastern edge of the N Yorkshire Flow System and it should, therefore, come as no surprise when he encountered a fast-jet operating in accordance with the flow. The structure of this particular flow system has been reinforced to all Unit aircrew.

THE TORNADO PILOT'S UNIT comments that the reported pilot was occupying the front seat in a dual control trainer ac with an instructor pilot, who was the ac captain, in the rear seat, whilst conducting a practice 'IP to Target' run as part of his training. He reports first seeing the Lynx at a late stage (about 0·5 NM range), probably at about the same time that the Lynx pilot spotted the Tornado. At this range, the ac were about 3 sec from potential impact. He turned away from the Lynx, having noted that the helicopter was also manoeuvring. The Tornado pilot estimates a minimum of 400 m, whilst the Lynx pilot describes having to perform a violent manoeuvre and passing only 100 ft from the Tornado. After consulting the Tornado captain, it is possible that the distance was about 200 m. It is unlikely to have been much less, since he was able to keep the helicopter in sight throughout, despite the R turn away from it. He also commented that the camouflage of the Lynx blended effectively with the background. This was a late sighting by both pilots, fortunately resolved by the actions of both; the Lynx pilot was probably the first to react and it may have been this manoeuvre that caught the Tornado pilot's attention.

HQ JHC comments that it would appear that there was a risk of collision in this instance due to the late sighting by both ac in the UKDLFS, but resolved by the avoiding action taken by both crews.

The UKDLFS can be extremely busy, especially at choke points formed where aircrew aim to avoid built up areas, low flying avoidance areas etc. In this instance, the ac involved were constrained by the town of Malton and the LFS avoidance area to the N, while the Tornado crew were forced to follow the N Yorkshire flow system. Both crews were operating in accordance with the appropriate regulations; the Tornado crew following the southerly flow arrow and the Lynx crew operating under the flow arrow whilst flying below 200ft MSD outside of a TTA.

Despite there appearing to have been vertical separation of at least 50 ft, in reality both crews were flying by Rad Alt, so there could have been little or no vertical separation. Additionally, even with 50ft vertical separation a helicopter overflown by a Tornado at 450 kt would be extremely lucky to escape without some damage. Whilst the Lynx crew believe the horizontal distance to have been only 100 ft the Tornado crew contend it was not more than 400 m, we accept that a figure somewhere between the 2 is the probable distance.

This incident serves as a reminder to all crews of the importance of maintaining a thorough lookout within the UKDLFS, particularly at choke points and when crossing flow arrows. We will use this incident to highlight to all JHC crews the need for constant

vigilance within the LFS. This incident could well have had more disastrous outcome had the crews not taken the evasive action they did.

HQ STC comments that without doubt, the low conspicuity of the helicopter was a major factor in this incident and it is probable that the Tornado pilot only became visual when the Lynx pilot initiated avoiding action. The late visual acquisition of a converging fast-moving ac understandably alarmed the Lynx pilot and the incident clearly highlights the requirement for extra vigilance when operating close to choke points in the UKDLFS.

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.

A military pilot member thought that this was an unusual Airprox as this was a conflict within the LFS between two military ac, whose pilots should have been intimately aware of the structure of the flow system. Military pilot members believed that descending in the immediate vicinity of flow arrows was not a good idea if an alternative was available; sooner or later a conflict will ensue as graphically illustrated by this encounter. It seemed to some members that the promulgated procedures for flight in the vicinity of flows (as outlined at Note 3) did not provide much separation between FW and RW traffic – theoretically 50 ft. This view was not widely supported amongst the members who thought that though the procedures imparted only a small amount of separation it was acceptable. The IFS advisor emphasised that these flows were choke points and it was unwise to fly in their vicinity at 200 ft msd, where FW traffic was, in effect, being funnelled and these areas should generally be avoided if practicable. Moreover, some members suggested that this Airprox could have occurred anywhere within the UKDLFS, where a fast jet can be encountered at 250 ft. The prevailing view was that the flow system was not intrinsic to this encounter. Here, as within the remainder of the FIR, the golden rule for the maintenance of separation when flying VFR was 'see and avoid' and this was deemed by the majority of the members to be the crux of this Airprox – did both pilots see each other's ac in sufficient time to maintain safe separation? The Lynx pilot reported he had to exceed the ac's flight envelope to avoid a collision, because the Tornado was not seen until it had closed to a range of about 1000 m. With closing speeds in the order of 550 kt, and only some crossing motion to attract attention to it, the Lynx pilot had about 3 sec available to him to avoid the jet. Equally, the Tornado pilot saw the helicopter at about the same time or marginally later and the relative position of the descending Lynx could have impaired visual detection. This led members to conclude that this Airprox resulted from a late sighting by the crews of both ac.

Turning to risk, the Lynx pilot reported he had taken robust avoiding action, induced, some pilot members thought, by a significant element of surprise, but nevertheless his quick reaction after sighting the rapidly closing fast jet and avoiding it resulted in damage to his ac. Conversely, from the Tornado pilot's perspective the STC member believed that if he was able to keep the helicopter in view throughout his R turn, this indicated he had not needed to over-bank – certainly less than the 60° AoB required to effect a significant displacement of the jet – during his avoiding action. Without recorded radar information the Board was unable to resolve the anomaly between the reported minimum horizontal separation. Even taking account of the Tornado unit's assertion that it may have been as close as 200 m, this was still double that of the Lynx pilot. Differences such as these were not uncommon however, when ac were in sight for a matter of seconds only. It had certainly been a close quarter's situation near the ground, that had demanded prompt action to resolve. Weighing all these points carefully for relevance, the Board concluded that the safety of the two ac had been compromised.

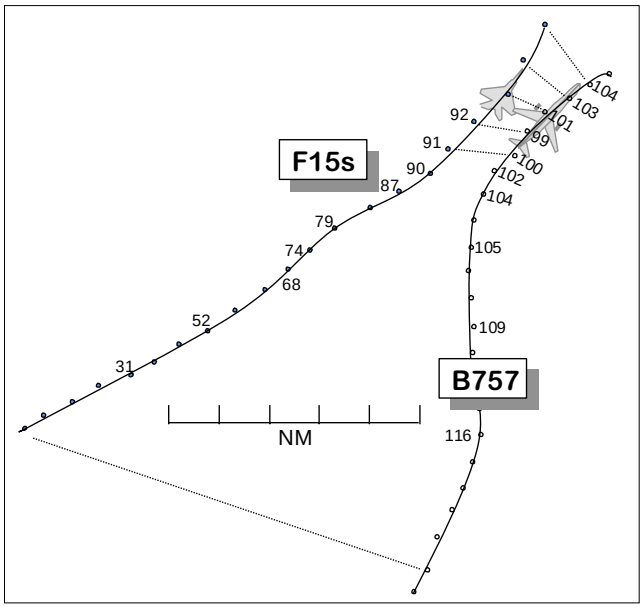
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by both crews.

Degree of Risk: B.

AIRPROX REPORT No 62/01

Date/Time:	3 May 1014	
Position:	5232 N 0052 E (7 NM NE of Thetford)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	B757	F15 x 2
Operator:	CAT	Foreign Mil
Alt/FL:	FL 100 ↓	FL 100
Weather Visibility:	VMC CLBC 30 km	VMC CLBL
Reported Separation:	700 ft, < 1 NM	/NK
Recorded Separation:	0.75 NM, 700 ft	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B757 PILOT reports heading 360° at 250 kt, descending into Norwich under a RAS from Norwich Approach after transfer from London Mil, cleared to descend to FL 100. When approaching that level, traffic appeared on TCAS closing from 8 o'clock 4 NM and 4200 ft below. A TA followed and 15 seconds later a climb RA was issued which he followed, also following the controller's avoiding action right turn onto 060°. He did not see the other traffic which TCAS showed passing 700 ft below and less than 1 NM away in his 10 o'clock. He considered there had been an imminent risk of collision.

THE F15 PILOT reports departing Lakenheath leading a pair in close formation on a Brandon 1 SID (tracking NE) under a RIS while climbing through thin layers of cloud at 400 kt. Departures turned them onto 360° and levelled them at FL 100 (he thought) for other traffic which he did not see. They then turned further left for the Daventry RVC.

MIL ATC OPS reports that the B757 pilot was in receipt of a RAS from London Radar Controller 12 (CON12) and was descending to FL 100, having left CAS in the Stansted area, whilst inbound to Norwich. At 1011:05, CON12 initiated a radar handover to Norwich, during which the Norwich controller (APR) instructed CON12 to *...turn him left heading three six zero please.."* The handover was completed at 1012:20 and the ac left the frequency at 1012:35 having been on CON12's frequency for just under 3 min in total. At the time of the handover, there was no apparent confliction.

The F15s established communications with Lakenheath Departures (DEPS) as they were rolling at 1011:07 and, once airborne, requested a RIS having been prenoted to climb to FL 100 to transit the Daventry RC. At 1012:57 DEPS passed traffic information to the F15 pilots, *".... traffic, uh, one o'clock and uh four miles"* which referred to the B757; the pilots responded that they were *"..searching."* At 1013:09, DEPS transmitted *"C/S maintain Flight Level nine zero, traffic one o'clock two miles, northbound, descending into one zero zero."* The F15 pilot acknowledged the level stop off adding *"..on course two seven zero when able"* which was approved shortly afterwards by DEPS. At the same time, the DEPS Assistant (a controller) opened the landline to Coltishall (for Norwich Approach) and requested to speak to the Norwich controller, who said *"..standby."* At 1013:43, whilst waiting on the landline the Norwich controller was heard transmitting to one of his ac *"...continue heading zero nine zero, traffic will pass one mile to the west of you as you turn",* and answering Lakenheath's call. As this was happening, the F15 pilot transmitted *"...C/S's looking for ten...Flight*

Level one hundred when able." DEPS asked the pilot to stand by and shortly afterwards requested the pilot to confirm that the ac were in a left turn onto 270°. The pilot confirmed this and, at 1014:16, DEPS recleared the F15s to FL 100. Having established that the ac were turning away, the DEPS Assistant told Norwich to disregard the landline call.

The LATCC radar recording shows the B757, initially squawking 6122 (LRAD), tracking about 030º, whilst passing overhead Honington in a descent through FL 123. The F15s first appear at 1012:14, 1·5 NM NE Lakenheath heading about 050º and are 9 NM WNW of the B757. By the time that the handover was completed, a few seconds later, the ac are still separated by 8 NM and 10000 ft. The B757 turns N at 1012:45 as it passes FL 114, with the F15s passing FL 50. The ac maintain their respective headings, which are converging, until 1013:28, when the B757 commences a R turn. At this point, the F15s are 2 NM W of the B757 and indicating FL 84 (climbing), while the B757 indicates FL 105 (descending). The F15s level off at FL 90 at 1013:41, with the B757 in their 1 o'clock position, range 1 NM in a R turn passing about 040º and indicating 1200 ft above. The ac then follow almost parallel tracks, separation briefly reducing to 0·75 NM, while the F15s reach and maintain FL 92. The B757 descends to FL 99 for 1 radar sweep before climbing through FL 105; it then turns further R whilst the F15s start a gentle turn L and the ac diverge.

Following the handover from CON12 to Norwich the confliction developed rapidly as the B757 turned onto N. The confliction however, was not apparent to CON12 prior to him releasing the B757 to Norwich. Although at first examination, DEPS' first traffic information call at 4 NM range would appear to be rather late, the B757 had only just turned onto its northerly heading and until this point, the ac were only converging very slowly. The information given during this traffic information call however, was rather sparse, with no information provided on the conflicting ac's track or level. It was fortunate that, although only providing RIS, DEPS elected to stop the climb of the F15s at FL 90 when he passed the traffic update (which was much more comprehensive). This separation was, however, achieved without any external co-ordination taking place.

NORWICH ATC reports, with RT transcript, that during the B757's handover from London Mil, APR asked for the ac to be turned onto 360° for an approach to RW 09. While waiting for the ac to call, he saw a Lakenheath departure from RW 06; he replied to the B757 pilot's first call with avoiding action, right onto 060°, and traffic information was passed on the fast climbing traffic. The pilot advised of a TCAS response and he approved the TCAS climb and turned the ac further onto 090°, advising that the traffic would pass 1 NM W of him as he turned. The LKH traffic passed behind and to the left of the B757; once clear he vectored it for a visual approach to RW 09.

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 confliction arose because the F15s had not appeared on radar when APR asked CON12 to turn the B757 onto N before transferring it. Fortuitously DEPS sensibly stopped the F15s' climb at FL 90 (without ascertaining that the B757 had been stopped at FL 100); this plus the B757's response to APR's avoiding action and TCAS prevented a hazardous situation developing. Members agreed that the incident was a confliction of flightpaths resolved by both controllers and the B757's TCAS, which had removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths resolved by both controllers and the B757's TCAS.

Degree of Risk: C

AIRPROX REPORT No 63/01

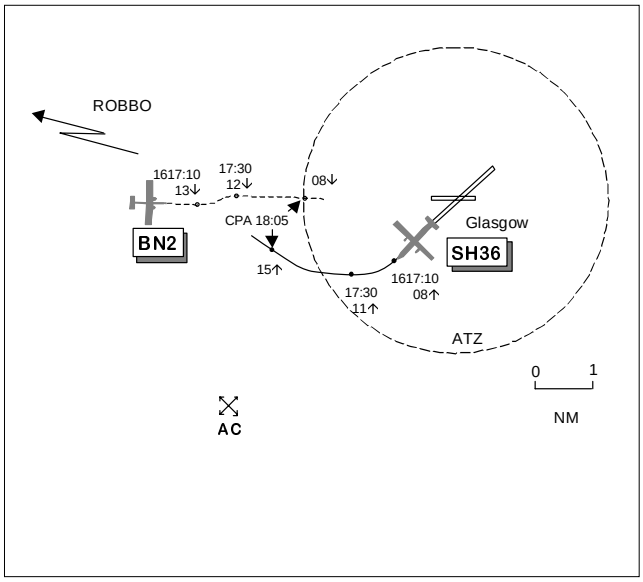
Date/Time: 23 Apr 1618

Position: 5547 N 0431 W (3 NM WSW of Glasgow Airport - elev. 26 ft)

Airspace: CTR (*Class:* D)

	Reporting Aircraft	*Reported Aircraft*
Type:	SH36	BN2
Operator:	CAT	Civ Comm
Alt/FL:	↑ 6000 ft (QNH 1001 mb)	800 ft ↓ (QNH 1001 mb)
Weather Visibility:	VMC CLBC 20 km	VMC CLBC 20 km
Reported Separation:	100 ft V 0.5 NM H	NK

Recorded Separation: 700 ft V 0.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SH36 PILOT reports departing Glasgow RW 23 climbing straight ahead to 6000 ft at 140 kt. On passing 500 ft he was given a R turn direct ROBBO so he turned R onto heading 290° to intercept the 281 RAD. He received a TCAS TA on traffic which indicated 100 ft below which he then saw, an Islander, 45° to the R of his nose approx. 0·5-1 NM away on an approach to RW 10. ATC had mentioned the BN2 when he had been given the R turn, he thought, but he believed that in being released on his own navigation to ROBBO, he could have turned further R and increased the risk of confliction. He assessed the risk of collision as medium.

THE BN2 PILOT reports flying inbound to Glasgow on an ambulance flight but he did not recall any incident during his duty period and had been completely unaware of being involved in an Airprox.

ATSI reports that the Glasgow Aerodrome Controller (ADC) at the time of the incident, said that he was operating with a trainee who was on a six week detachment to the unit for RT familiarisation, as part of his Student Cadet Course. The ADC commented that his memory of the event was somewhat vague as he did not hear until some two weeks after it had occurred that the pilot of the SH36 had filed an Airprox report. As far as he was concerned, he had no recollection of anything untoward occurring which would have warranted the filing of an Airprox.

The weather conditions at the time were reported as a surface wind of 180°/4 kt; visibility 20 km with scattered cloud at 1600 ft.

The BN2 was operating an air ambulance flight into Glasgow Airport. The Glasgow MATS Part 2, Page 1-41, describes the local procedures for handling ambulance flights and states: 'Ambulance flights operated by the local company will use the c/s prefix "Ambulance" and will be afforded priority consistent with prevailing traffic conditions (e.g. landing/ departing other than on RW in use). When the condition of the patient warrants, the pilot may declare Cat A priority status (MATS Part 1) in which the ac will be given priority over all ac other than those in emergency".

In accordance with the procedures, the pilot of the BN2 had declared that the flight was Cat A. Accordingly, the ac was offered a Surveillance Radar Approach (SRA) to RW 10, in order to expedite its arrival as it was inbound from the W; the promulgated RW in use was 23. The ADC was informed by the Approach Radar Controller (APR) of the BN2's status and its use of the non-duty RW.

The ADC commented that the ac is based at Glasgow and operates ambulance flights into the airport regularly and he was not surprised that it would be using RW 10 on this occasion.

The SH36 established communication with the ADC at 1612, whilst taxying to the holding point for RW 23, having been cleared on a ROBBO SID. The SID routeing is to climb ahead to the AC NDB, turning R onto track 300° to ROBBO, the position of which is 281°/16 NM from GOW VOR, to cross GOW DME 10 above 3000 ft, climbing to 6000 ft. The GOW VOR is situated on the airfield. The SH36 was, subsequently, given clearance to line up after a landing ac. The ADC said that because of the presence of the BN2 approaching for RW 10, he instructed his trainee to pass a revised clearance to the SH36 i.e. to *"climb straight ahead to maintain altitude six thousand feet",* to ensure that the two flights did not conflict. The SH36 was cleared for take off at 1615.

The ADC passed the SH36's ATD to the APR by intercom and informed him that he could see the Ambulance ac and requested a R turn to ROBBO for the SH36. This was approved with the proviso that the ADC separated the two ac. The ADC confirmed that he could see both ac at the time and considered that the SH36 could turn direct to ROBBO without conflicting with the BN2. Accordingly, he took over the RT from his trainee and informed the SH36 that a R turn direct to ROBBO was approved and asked the pilot to report turning. The pilot acknowledged the clearance and shortly afterwards reported turning R. The radar recording 1617:30 shows the SH36, climbing through an altitude of 1100 ft, having just made a R turn onto a W track. It is 2·5 NM SE of the BN2, which is descending through 1200 ft, on an E track.

The pilot of the SH36 stated in his report that ATC mentioned the traffic when clearing him to turn. The RT transcript reveals that no such message was passed. The only reference, on the frequency, to a RW 10 arrival is made to the pilot of another ac waiting to depart.

The APR Director, who was controlling the BN2, passed its pilot traffic information (TI) on the departing ac. The ADC was then informed, via intercom, that the BN2 had the departing ac in sight and would be transferring to his frequency. The APR advised the ADC that once the SH36 had passed 3000 ft it could be transferred to Scottish Control.

The BN2 contacted the Tower frequency at 1618 and was subsequently cleared to land on RW 10. The SH36 reported passing 3000 ft at 1620 and was transferred to Scottish. No comments were made on the frequency by either pilot about any proximity hazard concerning their respective ac.

The ADC said that he was separating the subject ac, both of which were operating on IFR flight plans, by the use of reduced separation in the vicinity of aerodromes, 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: adequate separation can be provided by the aerodrome controller when each ac is continuously visible to this controller". From his recollection, he did not believe that the subject ac had come significantly close to each other, either vertically or horizontally, although he was rather surprised, on viewing the radar photographs of the incident, to discover that the SH36 had turned further R than he would have expected. It appears that the ac turned R to pick up a radial rather than routeing direct to ROBBO and this is confirmed by the pilot concerned, who later reported that he had turned onto a heading of 290° to intercept the 281° radial. The ADC stressed that, had he believed that the SH36 was turning close to the BN2, he would have instructed it to turn away to the L. He admitted that it would have been prudent to have passed TI to the pilot of the SH36 on the BN2. The MATS Part 1, Page 2-1, states that: "Aerodrome control is responsible for issuing information and instructions to ac under its control to achieve a safe, orderly and expeditious flow of air traffic and to assist pilots in preventing collisions between ac flying in, and in the vicinity of, the aerodrome traffic zone". Arguably, had he been informed of the other traffic, the pilot of the SH36 could have delayed his turn if he had considered it necessary. The radar recording reveals that, having made its initial R turn, the SH36 continued on a W track until it was 1 NM S of the BN2, when it made another R turn to the NW. By this time it was 500 ft above the BN2. The closest point of approach was 0·9 NM, by which time the SH36 was 700 ft above the BN2.

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 agreed that the situation as described occurred at airports on a daily basis. The ADC had responsibility to provide reduced IFR separation in the vicinity of the aerodrome, between the inbound BN2 and the outbound SH36. In applying the criteria, he had kept both ac in sight and believed the separation between them had been adequate. He knew the full picture, had monitored the situation and felt the ac had passed well clear of each other. However, ATCO members were in no doubt that ultimately the onus was on the ADC to pass TI so that both crews were also aware of the situation. The SH36 pilot had received a TCAS TA alert on the crossing BN2 passing ahead (he had estimated 0·5- 1 NM and 100 ft below) and had been concerned that, on the clearance given, he might have turned further R and into closer conflict, but he did not. Pilot members thought that the turn onto 290° after departure would have been a 'best estimate' track to make good for ROBBO and so was perfectly reasonable in the circumstances. It was the absence of information on the inbound BN2 that had caused the confliction in their opinion and colleagues agreed.

Turning to the risk element, the ADC had both ac in sight and was always in the position to provide instructions to both crews should one of the ac have turned onto a collision course. The BN2 pilot had been passed TI by APR Director and had seen the SH36 whilst the SH36 pilot had seen the BN2 on TCAS and had then acquired it visually, passing below and to the R. These elements persuaded the Board to conclude that there had been no risk of collision.

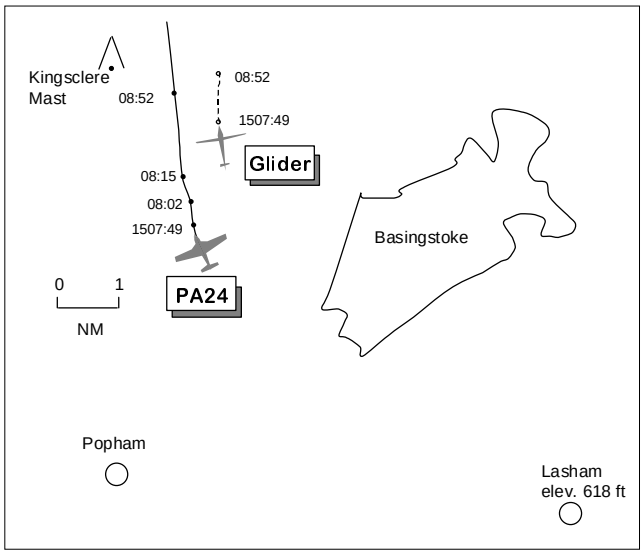
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Whilst applying reduced separation in the vicinity of the aerodrome, the Glasgow ADC did not pass TI on the BN2 to the SH36 pilot.

Degree of Risk: C

AIRPROX REPORT No 64/01

Date/Time:	7 May 1509	
Position:	5118 N 0112 W (2 NM SE Kingsclere Mast)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Ventus 2B Glider	PA24
Operator:	Civ Gliding	Civ Pte
Alt/FL:	3600 ft (QFE)	FL 40
Weather Visibility:	VMC CLBC >20 km	VMC CBLC 10 km
Reported Separation:	20 m V 50 m H/100 ft V 500 ft H	
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VENTUS 2B GLIDER PILOT reports flying on a local sortie from Lasham heading 290-300° at 70 kt cruising between Basingstoke and the Kingsclere Mast at 3600 ft Lasham QFE, he thought. The visibility was >20 km 1500 ft below cloud in VMC. The glider was coloured white overall and was not fitted with a radio. When approx. 2 NM SE of the Mast, he noticed an ac on a converging course very close to his L and beneath his port wing. As he started to bank to the R to avoid, the other ac passed 20 m vertically and 50 m or less horizontally to his L without making any change of heading. The conflicting ac had a single engine, low wing with retractable u/c, coloured white with red detail and he could clearly see the registration marks, which he noted. He assessed the risk of collision as high.

THE PA24 PILOT reports heading 360° at 130 kt en route from France to Gamston VFR at FL 40. The visibility was 10 km 1000 ft below cloud in VMC and the ac was coloured white and red. He was not receiving an ATC service at the time of the incident and the transponder was unserviceable. When approx. 2·5 NM S of Lasham, he saw 3 gliders circling, the nearest about 1 NM away in a L turn; he turned onto a W track to avoid. The closest glider then passed in the opposite direction through his 2-3 o'clock position 100 ft above and 500 ft clear horizontally.

UKAB Note (1): Analysis of the Pease Pottage and Heathrow radar recordings at 1507:49 shows a primary only response, the PA24, 3 NM SSE of Kingsclere Mast tracking 350° with an intermittent primary contact, believed to be a glider, tracking 360° in its 1 o'clock range 1·8 NM. At 1508:02 the PA24 is seen to turn L about 10° for about 12 seconds before resuming its original track whilst the glider continues on a steady N track. Both ac fade from radar at 1508:52, still on roughly parallel tracks 0·75 NM apart. The PA24 reappears 10 seconds later still steady on a track of 350°; the incident as described by both pilots is not observed on radar nor depicted on the diagram.

UKAB Note (2): Met Office archive data shows the Farnborough and Southampton 1450Z QNHs as 1027 mb. Therefore 3600 ft Lasham QFE would equate to approx. FL 39.

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 wondered whether the PA24 pilot had seen the subject glider owing to the disparity of the pilots' reports. He had reported seeing 3 gliders when just 2 NM S of Lasham and had turned W to avoid them, which resulted in the closest glider passing in the opposite direction down his RHS, 500 ft clear horizontally and slightly above. However, the Ventus glider pilot reported the incident 2 NM SE of Kingsclere Mast, approx. 10 NM NW of Lasham. He had been steady on a WNW heading when he saw the PA24 converging from his L and had turned R to avoid it with the PA24 passing just below and to his L without altering course; he had identified the other ac clearly from its registration marks. Regretfully, the incident was not observed on recorded radar; only one primary return showed in the position stated and this matched the flight profile of a glider. Moreover, this primary return appeared for just under 1 minute before fading completely at 1508:52 near Kingsclere Mast; it may not have been the subject Ventus glider. Other gliders were observed intermittently adjacent to Lasham airfield at the same time. There was no doubt, however, about the identity of the PA24 from the glider's sighting report and the radar trace through AIS Mil. After much debate, particularly with respect to the target aspect and geometry of this encounter, members agreed that on the balance of probability it seemed unlikely that the PA24 pilot had seen the subject glider and this had caused the Airprox. Pilot members were all too familiar with the inherent difficulties of seeing a white glider against a cloudy background owing to its thin profile but some questioned the wisdom of planning to navigate through an area marked on topographical charts with intense glider activity. However, other pilot members pointed out that this area had many other airspace restrictions, including MATZs, CTAs and DAs, to complicate en-route navigation and that the PA24 pilot had routed above and around the busiest gliding area close to Lasham airfield's overhead, whilst also underflying the LTMA.

Addressing the risk element of the incident, members worked on the basis that the PA24 pilot had probably not seen the glider, whilst the Ventus pilot, on seeing the PA24 very late, had started avoiding action which effectively had little chance of changing the glider's flight profile in the time available. These factors led the Board to conclude that the safety of both ac had been compromised to the extent that it had resulted in an actual risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non-sighting by the PA24 pilot.

Degree of Risk: A

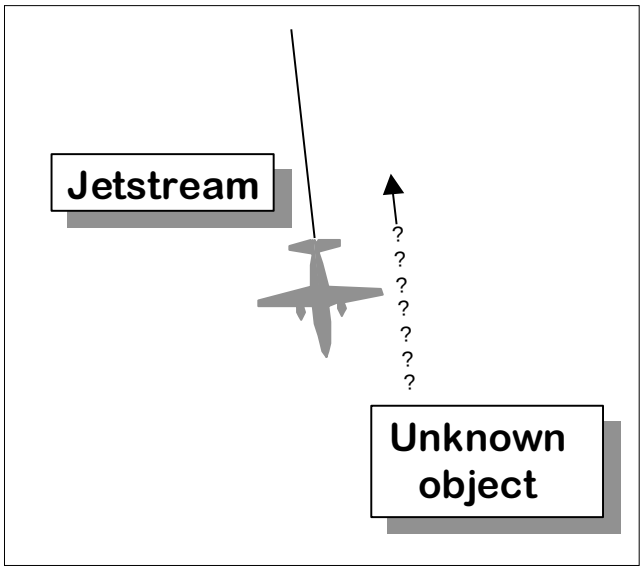
AIRPROX REPORT No 65/01

Date/Time: 7 May 0954

Position: 5111 N 0116 W (6 NM SW of Basingstoke)

Airspace: Airway R41 (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	Jetstream 41	Unknown
Operator:	CAT	
Alt/FL:	FL 75↓	
Weather Visibility:	VMC CLOC 30 km	
Reported Separation:	10 M H, 50 ft V	
Recorded Separation:		NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JETSTREAM 41 PILOT reports flying a radar heading of 175° at 240 kt having stopped his descent at FL 70, under radar control from Solent Approach. The Captain (handling) saw reciprocal traffic passing at extremely high speed slightly below (50 ft) and to the left (10 m) and heard it pass with a 'whoosh'. There was no time for avoiding action. His FO, who was head-down copying the weather, heard it (but did not see it) and asked what was that. Its passage had not been noticed by anyone in the cabin, and when he asked the controller if he had seen anything, was told there was nothing visible near him on radar. He described the object as about 6 times longer than its width and more like a missile than an ac, with nothing noticeable in the way of wings.

UKAB Note: Ascertaining precisely where the incident occurred was not possible since the object was not seen on radar by the controller at the time and did not appear on any radar recordings. It was assumed that it occurred a few seconds before the pilot commented on it on RT; this was shortly after 0954:00. Assuming that LATCC radar and Southampton RT recordings were synchronised, the radar showed the ac within a mile or 2 of where its track crossed the A303 road. The pilots gave a position some miles down track, but the radar and RT timings indicated that they had reported the incident some minutes before they reached this reported position, and at that position, had

descended from the FL 70 given in their report. In discussion with the Captain, he agreed that the northerly position was likely to be the more accurate as the navaid used to derive the position could sometimes be a few miles in error. Despite the assistance over several months of the MOD and their research organisations, the police (including the Special Branch), amateur rocketry organisations and people living in the area, it has not been possible to identify what it was the pilots saw/heard pass their ac. The object left no smoke trail and its reported shape suggested it might have been a breakaway advertising balloon; such a stationary object passing very close could have given the impression of passing at speed in the opposite direction. While the pilot who saw it reported hearing it, this sound could have been an impression he gained on assuming it was a powered object, but the FO, who did not see it, also heard a sound and asked his Captain what it was. The FO was asked if the sound could have emanated from their own ac, perhaps resonance from cabin fittings or air from the pressurisation system. He did not think so and had not previously, or since, heard any such noise from within the Jetstream 41. The nature of the object therefore remains unknown.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Jetstream pilots, transcripts of the relevant RT frequencies, radar video recordings, and a report from the air traffic controller involved.

Members agreed that endless speculation as to the nature of the object seen was possible, but like the other 11 unidentified objects reported by airliner pilots in Airprox in the last 15 years, this one did not appear to be malevolent. In the absence of any further information, the Board could do no more than conclude that the incident was a conflict with an unknown object in Class A airspace, and that the risk of collision was unassessable.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict with an unknown object in Class A airspace.

Degree of Risk: D

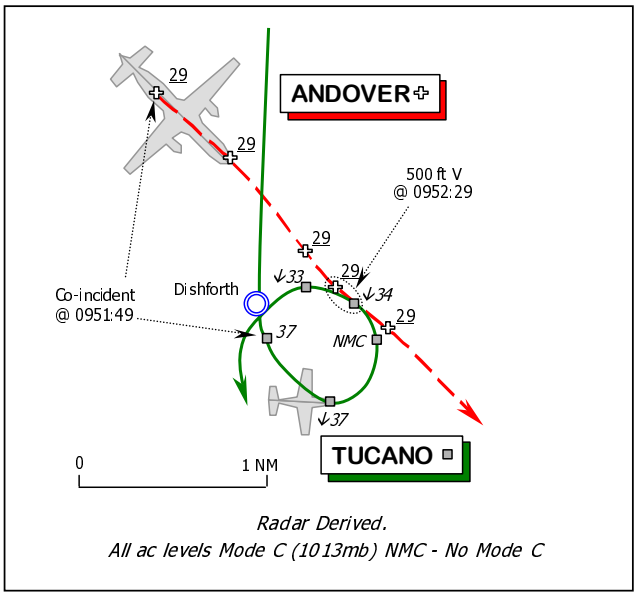
AIRPROX REPORT No 66/01

Date/Time: 11 May 0952

Position: 5408 N 0125 W (Dishforth - elev 117 ft)

Airspace: Vale of York AIAA (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Tucano	Andover
Operator:	HQ PTC	DPA
Alt/FL:	3500 ft ↓ (QFE 1019 mb)	3000 ft (RPS 1018 mb)
Weather Visibility:	VMC NR	VMC Haze 25 km
Reported Separation:	4-500 ft V	500 ft V
Recorded Separation:	500 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUCANO PILOT, a QFI, reports his ac has a black high-conspicuity colour scheme and HISLs were on whilst conducting a dual instructional sortie. Following a simulated emergency, his student pilot elected to carry out a PFL at Topcliffe, but their circuit was full, so he opted for Dishforth instead. "Their intentions were transmitted to Topcliffe APPROACH" who passed them the Dishforth duty RW and QFE. Shortly after being cleared for a PFL by Dishforth TOWER, they arrived in the airfield overhead at about 4300 ft QFE, whereupon his student commenced a descending L turn to position at HIGH KEY. As they turned L at 30° AoB through a heading of about 270° at 115 kt, descending through 3500 ft QFE and whilst both he and his student were looking for the 2 ac reported by TOWER to be in the circuit, he noticed an Andover type ac appear very large in his rear view mirror. It appeared to be moving away several hundred ft below them. A second or two later he acquired visual contact with the Andover, whose flight path suggested to him that it had flown about 4-500 ft directly beneath his Tucano. Since he was not aware of the Andover until it had already passed close beneath (from behind his Tucano's raised starboard wing) he was unable to take avoiding action and therefore considered the risk of collision to be "reasonably high".

UKAB Note (1): HIGH KEY is a defined cct position for PFLs, on the cct deadside, generally abeam the duty runway threshold at a specified height according to ac type. For a Tucano, this is usually between 2500 – 3500 ft.

THE ANDOVER PILOT reports his ac has a grey and white livery but HISLs are not fitted. He was conducting an 'open skies' flight promulgated under ACN 01-05-0213 on 10 May, he thought with non-deviating status (NDS), under a RIS from Linton-on-Ouse on 129·15 MHz and squawking 3/A 7007 with Mode C.

Heading 135° (T) at 185 kt, flying straight and level at 3000 ft, he thought on QFE [actually BARNSLEY RPS (1018 mb)], he first sighted the Tucano at 1 o'clock about 2 NM away and 1000 ft above them. The Tucano was turning L across their track from R - L initially and descending slowly, through to their 11 o'clock turning L – R directly above them. When their paths crossed both he and his co-pilot independently assessed the Tucano to be 500 ft above their Andover. No avoiding action was taken as there was no perceived threat of a collision, but as a precaution the autopilot was disengaged and the Andover flown manually. ATC was subsequently advised about the Tucano passing overhead by 500 ft, but no Airprox was reported. He added that there was "nil risk of danger or a collision" and the crew workload was low.

UKAB Note (2): NDS cannot be afforded to flights in Class G airspace where this Airprox occurred – albeit just above the non-standard Dishforth MATZ. The ACN promulgated that the flight was "… approved to operate under Civil …Category B flight status" within CAS (classifications A – E), "Outside CAS the flight is to be afforded maximum priority over all controlled flights, except those in emergency". Controlled flights are deemed by AUS to include flights under the control of the ADC in a visual circuit within a MATZ and OAT under a 'radar service', either IFR or VFR. Furthermore, JSP 318A article 5003 states that "The nature of the FIR outside CAS in not consonant (compatible) with the application of NDS". In practical terms - "When the flight profile takes an ac outside CAS, it will be necessary for the controller to revoke the NDS…nevertheless, other (military) controllers ….are to continue to afford that ac precedence and do everything possible and reasonable to minimise deviation from the requested flight profile".

MIL ATC OPS reports that the RT recordings from the Topcliffe APPROACH position were completely unreadable and hence a transcript was not available. Moreover, there was a significant discrepancy between the timings of the recordings from the control positions concerned at Dishforth, Linton and Leeming and the corresponding events as seen on the radar recording. Thus all timings in this report have been adjusted to UTC, to give the most accurate picture of events.

The Andover crew was under a RIS from Leeming ZONE (LEEM) whilst conducting an open skies flight in accordance with the ACN and the flight had just turned SSE to overfly Dishforth at 3000 ft BARNSLEY RPS (1018 mb). At 0949:31, LEEM

contacted the Dishforth TOWER Aerodrome Controller (ADC) to advise that the Andover would be flying *"..through your overhead at 3000 ft…Barnsley."* ADC advised that one ac was climbing to HIGH KEY, but LEEM reinforced the fact that the Andover was a 'non-deviating' flight, to which the ADC responded *"I'll stop them from climbing to High Key."* ADC then transmitted to this other ac climbing to HIGH KEY *"...make this… a normal circuit there is an Open Skies aircraft transiting north to south through the overhead at 3000 ft…at present…a non-deviating aircraft."* At 0950:40, LEEM advised the Andover pilot *"...traffic left eleven o'clock at two miles…three miles..crossing left to right, no height."* This referred to the subject Tucano (although LEEM was not aware of its identity at the time); the Andover pilot's reply was garbled but appeared to refer to a helicopter - "C/S *helicopter about"* – (UKAB Note (3): which was not queried nor responded to by LEEM). LEEM then contacted Linton ZONE (LINT) by landline to commence a handover of the Andover advising that he had *"..called the traffic in the Dishforth area and he's cleared to route through their overhead at 3000 ft"* . With the handover complete the Andover pilot left the LEEM frequency at about 0951:25.

The Tucano crew was under a FIS from Topcliffe APPROACH (TOP APP), situated at Leeming; although originally intending to join for a PFL at Topcliffe, when told that the circuit was full TOP APP believed the Tucano pilot requested a VFR recovery to Dishforth. (UKAB Note (4): Without a transcript it is not clear whether TOP APP was told that the Tucano was conducting a PFL at Dishforth. If he had, it had not registered in the controller's mind). The Tucano was one of several ac in the area squawking the Vale of York conspicuity code 3/A4576, which had not been identified by TOP APP. At 0950:33, TOP APP contacted Dishforth to advise that the Tucano was inbound. The landline was answered by the Dishforth Tower Assistant, but a delay ensued because the ADC was busy. At 0950:54, while still waiting to speak to the ADC, TOP APP transmitted to the Tucano pilot *"C/S roger, believed to be two in the visual circuit, squawk four five...."* (the remainder of the transmission on the Dishforth recording then becomes unintelligible). TOP APP believed that while he was still waiting to obtain an accurate circuit state, the Tucano pilot reported '..visual, changing to Dishforth Tower frequency' so he informed the pilot that he believed there to be '2 in'; he also believed that the Tucano was about 3 NM NE of Dishforth at the time. As the ADC was busy, the relief who was acting as Dishforth GROUND (GND), took the call at 0951:02. TOP APP informed GND that the Tucano was *"Inbound visual from the north,* C/S*…"* to which GND responded at 0951:08,*"...roger, have you had a MATZ crosser that's inbound from the north non-deviating?* (unintelligible words - possibly *confirm he will*) *remain well clear of him?"*. Part of APP's reply was unintelligible but continued "*....I think the MATZ crosser is north of him by about 3 miles"* following which GND replied *"OK… it's the non-deviating that I'm worried about,..OK,…"* after adding "…*copy that, two in"* the landline was closed. From this conversation, GND formed the erroneous opinion that the 'non-deviating' Andover was clear of the Dishforth area and so he relayed this erroneous information to the ADC along with the details of the subject Tucano joining - whose pilot called at about the same time - *"Dishforth TOWER,* C/S*, join PFL"* who was asked to *"standby"*. At 0951:57, the ADC responded *"…join* (RW) *three four,* (QFE) *one zero one nine…2 in".* The Tucano crew acknowledged immediately, "*join 34…orbiting in the overhead for HIGH KEY."* Another Tucano pilot then transmitted *"...am I cleared to…climb to HIGH KEY visual with the transiting aircraft?".* To which the ADC replied, at 0952:25 *"…affirm, with one orbiting for HIGH KEY."* At 0952:33, ADC can be heard to state *"So this is clear?"* on the landline recording to (it is thought) GND.

The Andover pilot reported to LINT at 0952:43, *"…for your information a Tucano passed overhead about 500 ft above us."* At 0953:00, the Tucano pilot reported, *"Dishforth TOWER* C/S*, are you aware of an Andover in the overhead?"* Who immediately responded *"*C/S *that was prenoted in by Leeming as MATZ crossing traffic and was… informed that* (it) *was actually clear."* The Tucano pilot then replied, *"*C/S *roger, we're going to have to file an Airmiss on that one."*

UKAB Note (5): The LATCC radar recording illustrates the encounter broadly as described by both pilots. The Andover is shown squawking 3/A 7007, tracking about 140º towards Dishforth at 3100 ft Mode C (1013mb) initially. The Tucano

can be seen, initially to the E of Topcliffe, squawking the Vale of York conspicuity code - indicating the pilot's intention to descend and operate below 3500 ft - tracking WNW and descending through 3800 ft Mode C. The Tucano passes overhead Topcliffe at 0950:04, directly toward Dishforth. At 0950:36, about the time that LEEM passed traffic information to the Andover pilot about the then unknown Tucano, it was 40ºL of the Andover's track, crossing L – R. However, the Andover's contact merged with a slow moving helicopter that the Andover pilot commented about in his response. The Tucano fades then reappears overhead Dishforth and at 0951:49, is shown at 3700 ft, when the Andover is to the NW maintaining 2900 ft Mode C. The Tucano turned L at 0952:05, about 0·6 NM SE of the airfield, with the Andover to the N of Dishforth. The Andover passes <0·5 NM NE abeam the airfield at 0952:20, with the Tucano 12 o'clock >0·5 NM in a L turn through N. At 0952:29, the CPA occurs with the Tucano still in a L turn descending through 3400 ft Mode C (about 3580 Dishforth QFE (1019 mb), 500 ft above and just L of 12 o'clock from the Andover, that is maintaining 2900 ft Mode C (about 3080 ft QFE) - with a horizontal separation of about 0·1 NM at that point. The Tucano emerges from the Andover's 5:30 position 400 ft above it, turning L through W after the merge. The Tucano descended through the Andover's level at about 0953:10, when horizontal separation had increased to 1 NM. The Dishforth MATZ is a non-standard radius of 3 NM from the ARP – sfc to 3000 ft above the elevation of the controlling aerodrome of the combined MATZ – Leeming at 132 ft. Considering the elevation of Dishforth at 117 ft, the difference in elevations reveals that the Dishforth MATZ extends to 3015 ft aal, illustrating that the encounter was above the Dishforth MATZ.

The LINT controller was only the recipient of the Andover pilot's comments about the Tucano's overflight. The crew had only recently checked in following the handover, during which the controller had been informed that the ac was *"cleared"* through the Dishforth airfield overhead and that the traffic in the area had been called. Similarly, under the RIS, LEEM passed traffic information to the Andover pilot who appears to have misinterpreted the call referring to the Tucano as being about a helicopter flying beneath him, but nonetheless spotted the Tucano.

The absence of the TOP APP recording had a significant impact on the investigation as elements could only be reconstructed of the Dishforth TOWER RT recording, which itself had significant unreadable portions. The controller was reasonably busy at the time and events appear to have happened fairly quickly after the Tucano freecalled to join the Topcliffe circuit for a PFL and thence opting to go to Dishforth. Before the Dishforth landline was answered by GND, the Tucano pilot advised that he was visual with Dishforth and changing to TOWER, at which point the ac was about half way between the two airfields that are only 4 NM apart. Although TOP APP had surmised the Tucano's position, the ac had not been identified under the FIS, there was no obvious risk of collision at the time in what were considered to be very good weather conditions and the controller felt that the pilot was keen to get onto the Dishforth frequency. Therefore, no information was passed to the Tucano crew about the Andover. The Leeming Supervisor assessed that, given the traffic situation at the time, TOP APP had prioritised his actions appropriately. Despite this, as the Open Skies Flight was being controlled by another controller at the same ATSU – Leeming ZONE, TOP APP should have been aware of the Andover's flightpath and it is therefore unfortunate that even a general warning of its existence was not passed to the Tucano pilot.

The Tucano pilot reported that "..our intentions were transmitted to Topcliffe Approach..", whereas the controller merely stated that the Tucano had requested a "VFR visual recovery to Dishforth" and his initial message to GND only mentioned an "..inbound visual join.." By the time TOP APP was speaking with GND to obtain the actual circuit state, however, it appears that the Tucano crew had switched frequency and the controller had been unable to contact Dishforth in time. Had it been made clear to GND that the Tucano pilot had already switched frequency, GND may have been tempted to ask if the Tucano crew been told about the MATZ crosser, nonetheless GND was clearly aware that the prenotified Andover transit had priority over other traffic and had noted that the Tucano could possibly be affected. After the incident, the GND controller was convinced that he had been informed that the MATZ crossing

Andover was, by then, well clear of Dishforth. However, the intelligible portions of the Topcliffe Tower landline transcript do not support this. What is thought to have been GND's question - *"..confirm he will remain well clear of him?"* could easily be interpreted in different ways. However, it is difficult to conclude that a N to S MATZ crosser, which was thought to be 3 NM N of a Tucano also joining from the N, could ever be considered 'well clear' of the airfield that it was crossing. Moreover, this conversation took place only 2 min after the initial call from LEEM about the Andover. Although the facts are not conclusive, it is probable that GND misunderstood the information that had been passed to him and perceived that the Andover was clear.

Given the Andover's priority task, ADC's actions in curtailing PFLs during its transit were entirely sensible. Once the ADC had been informed erroneously by GND that the Andover was clear, however, there appeared to be no further requirement to restrict PFLs. When the Tucano pilot initially called to join for the PFL, ADC advised the pilot to *'standby'.* She believed that she had done this because she was waiting for GND to complete the landline conversation with TOP APP and, once the landline call had ended (and GND had incorrectly confirmed that the Andover was clear), she then cleared the Tucano to join for the PFL. The GND position recording however - which recorded landline and RT simultaneously - indicates that the landline conversation was completed at least 20 sec before the Tucano pilot called ADC. It can only be assumed therefore, that ADC was either double checking with GND that the Andover was clear, or concentrating on another evolution on the aerodrome. With hindsight, the ADC was offered a clue that the Andover may not have been clear when one of the other pilots in the circuit asked whether he could climb to HIGH KEY - *"...visual with the transiting aircraft".* Although this transmission only occurred about 10 sec before the merge, it would have taken some very quick reactions to have realised the significance and then communicated any warning of a 'possible' confliction, to the subject Tucano pilot.

The Andover pilot was provided with reasonably accurate positional information on the Tucano, but appears to have visually acquired a helicopter instead, only sighting the Tucano at a much later stage. The Tucano pilot was not informed of the Andover's presence by any controller and only sighted it after their flightpaths had already crossed. The fact that the Andover had not cleared the vicinity of Dishforth aerodrome was not adequately established.

Nevertheless, the Andover's flight details were known to ATC and other pilots operating in its vicinity should have been made aware of its presence. Henceforth, the ADCs at Dishforth, Topcliffe and Church Fenton have been instructed to ensure that a positive statement that MATZ crossers or overflights are clear of their area is obtained from radar controllers. Dishforth and Topcliffe aerodromes are so situated that where a radar controller at one ATSU might initiate a MATZ crossing procedure, after a handover, the radar controller at the other ATSU would be better placed to cancel the MATZ crossing when the traffic is clear. Therefore, it has been recommended that both Leeming ATC and Linton-on-Ouse ATC jointly review their MATZ crossing procedures, to ensure that both radar and aerodrome controllers are left in no doubt about which ATSU has the responsibility for cancelling a crossing of Dishforth or Topcliffe aerodromes.

HQ PTC comments that even with Mil ATC Ops painstaking analysis, it is difficult to reach a hard conclusion about the precise sequence of events in this incident because of their rapid pace and the uncertainty of the timings. However, it seems that the Tucano crew's decision to change destination and its speed of execution exceeded the ability of the controllers involved to recognise the proximity of the Andover and take appropriate measures to prevent the confliction. That the ac were not going to collide was purely fortuitous and only apparent in retrospect.

However, bearing in mind that the Andover was a Cat B flight of some diplomatic significance for which the routeing, levels and detailed timings had been notified, such an encounter could have been avoided by the imposition of a limited embargo on local flying. Notwithstanding the necessarily late notice of these flights, their notification is duplicated both by NOTAM and by ACN and should be foolproof. However, it would appear that the

information regarding this flight was not adequately disseminated within the unit, so that its significance was not recognised at the time.

The unit has subsequently reviewed its procedures for the handling and dissemination of NOTAMs, and for the handling of ac crossing the various MATZ.

MOD (DPA) comments that there is little to add to the unit's report, which suggests that there was a low risk of a collision because of the good lookout discipline of the Andover crew. However, as the Tucano crew had not seen the Andover until it had passed beneath them, a change in the Tucano's flight path coupled with the Andover crew's limited capability to take avoiding action could easily have led to a significantly increased risk of a collision. Concern was also expressed that the Tucano crew did not see the Andover, when it was on the inside of their turn and only slightly below them; this incident did not result because of the limitations of the human eye but from inadequate lookout discipline.

Of note is the Andover crew's comment that they were conducting their flight with NDS, which does not apply when operating in the Open FIR and generally affords no higher level of service/ protection to the flight. This important flight safety message will be reiterated to crews through flight safety publications.

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.

The number of ATSUs involved in this Airprox and the totally inadequate RT recordings available to the Mil ATC Ops investigation had understandably led to a fairly lengthy explanation about their individual involvement, albeit to a greater or lesser degree. In the end, for whatever reason, Dishforth GND formed the impression in his mind that the Andover was clear of the Dishforth area removing any potential for confliction with a PFL and relayed this to the ADC. Consequently, when the Tucano pilot called and requested to join via a PFL there was nothing known to the ADC to prevent her from acceding to the Tucano crew's request. Members agreed that the other pilot's transmission of visual acquisition of the transiting Andover did not leave sufficient time for action. Hence the lack of any forewarning from the ADC. Members also concurred with Mil ATC Ops' analysis that, insofar as time allowed, TOP APP could have provided some form of information or reminder to the Tucano crew about the Andover flight. Far better to pass that, than endeavour to obtain a circuit state that would be revealed in the first transmissions from the Dishforth ADC anyway. Here then was the crux of the matter. The Tucano crew flying under VFR on a PFL to Dishforth was unaware of the presence of the Andover. In the weather conditions that prevailed the Board was unanimous that the Tucano pilots should have been able to see the Andover beforehand as they cleared the airspace they were descending into. For whatever reason, however, this was an effective non-sighting on their part. From the Andover crew's perspective they had seen the Tucano in good time, monitored its turn throughout and wisely disengaged the auto-pilot so that the PF could take appropriate avoiding action if needed – which it was not. This led to discussion as to whether this was merely a sighting report – or more accurately a non-sighting report on the part of the Tucano crew, rather than a confliction. However, this did not engender widespread support. The Tucano pilot's report had revealed some points of ATC procedure which needed addressing and the Board was encouraged that a review had taken place regarding the co-ordination of crossing traffic. However, the second element of this Airprox was not so much a lack of co-ordination, but more a mistaken impression of the Andover's position relative to Dishforth by GND following the conversation with TOP APP. The PTC member added that insufficient emphasis had been placed on the importance of the Andover's transit through this intensively used airspace by the units involved, which had led to a review of the dissemination of aeronautical information. Although a local embargo on flying would undoubtedly have resulted in a reduction in local traffic during the Andover's flight this was thought a little excessive by some, especially with the density of ATSUs in the area capable of providing forewarning. In the end, the members agreed that effectively a non-sighting of the Andover by the

Tucano crew, compounded by a breakdown in the flow of information within Dishforth Tower caused this Airprox.

Although the Tucano crew had not seen the Andover, the latter crew's sighting and readiness to take action should it be needed reduced the potential of the encounter being any closer than it actually was - 500 ft before they merged and 400 ft after the Tucano had cleared astern of the Andover. Although the Andover might not be as manoeuvrable an ac as the Tucano, there was unanimous agreement that no risk of a collision had existed in the circumstances that pertained.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively a non-sighting of the Andover by the Tucano crew, compounded by a breakdown in the flow of information within Dishforth Tower.

Degree of Risk: C.

AIRPROX REPORT No 67/01

Date/Time: 5 May 1253 (Saturday)

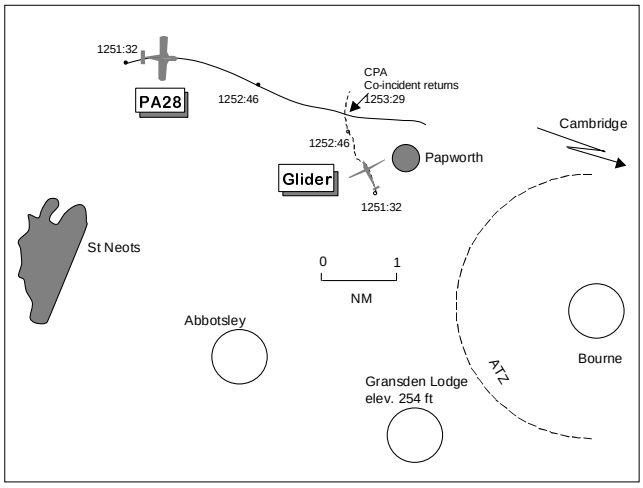
Position: 5215 N 0008 W (1 NM W of Papworth)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Libelle Glider	PA28
Operator:	Civ Pte	Civ Trg
Alt/FL:	2700 ft (QFE NK mb)	3000 ft (QNH NK mb)
Weather Visibility:	VMC CBLC >10 km	VMC CBLC >10 km

Reported Separation: 50-100 ft V, 0 H/300 ft V, 0 H

Recorded Separation: NK V, Nil H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LIBELLE GLIDER PILOT reports heading 005° at 56 kt level at 2700 ft QFE on a solo local flight from Gransden Lodge; his glider is white, with a red fin. The visibility was >10 km 300 ft below a broken ill-defined cloudbase in VMC and he was listening out on a glider common frequency of 130.4 MHz. He had been steady for several minutes in a line of convection when he saw a white low winged monoplane, possibly an Piper Arrow or similar, as it passed directly overhead by 50-100 ft. The flight path of the conflicting ac was from slightly behind his left wing at almost a 90° crossing angle and owing to its relative speed through his field of view he was unable to note its registration; he took no avoiding action as the other ac was diverging. He surmised that after his period of straight and level flight, his view would have been blocked by his wing whose root starts at shoulder height but has a pronounced dihedral. He assessed the risk of collision as high.

UKAB Note (1): Although the pilot could not recall the QFE setting, 2700 ft QFE would equate to 2954 ft QNH.

THE PA28 PILOT reports flying on a dual IMC training sortie from Sywell routeing to Cambridge

for a practice approach at 3000 ft Cambridge QNH 1022 mb at 100-110 kt. The visibility was >10 km 1000 ft below cloud in VMC and he was receiving a FIS from Cambridge Approach on 123·6 MHz. The ac was coloured white with red/blue stripes and although the ac was fitted with a transponder he was unable to recall if it was in use. Whilst tracking the HON VOR 100° radial in the vicinity of St Neots and having just been cleared to join the CAM hold at 3000 ft, he saw a white glider passing 300 ft or more below R to L. He took no avoiding action as this had been a late sighting owing to the glider being below the horizon and its fine outline. He added that he had been busy taking down the Cambridge ATC clearance and reviewing the joining procedure with his student immediately prior to the incident.

UKAB Note (2): Met Office archive data shows the Cambridge METAR 1250Z 02018G28KT 360V060 9999 FEW030 SCT035 ///// Q1022.

UKAB Note (3): Analysis of the Debden radar recording at 1251:32 shows a primary only return 3 NM NNE of St Neots, believed to be the PA28 tracking ESE with a slow moving primary only return, believed to be the Libelle glider, 1 NM SW of Papworth in his 1 o'clock range 4 NM crossing R to L tracking 350°. Apart from slight meanderings ±10° either side of a nominal track, the PA28 continues ESE bound; the glider deviates L then R 20° before tracking NNW on a line of constant bearing until CPA occurs at 1253:29 when the returns merge.

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.

Pilot members were clear that this conflict, which occurred in the London FIR, had been a 'see and avoid' encounter within Class G airspace. The PA28 had been on a simulated IMC instructional training flight where the student, seated on the LHS, would have his lookout restricted and the instructor would therefore assume responsibility for that role during IF simulation. However, it was pointed out that the glider had approached from the PA28's RHS forward quadrant. The PA28 had been tracking towards the CAM NDB at 3000 ft and the glider had been seen very late, as it passed an estimated 300 ft below. From his honest report, the instructor had been pre-occupied copying down the Cambridge ATC clearance and reviewing the joining procedure with his student, which seemed to have degraded his lookout immediately prior to the encounter. There was also the well known difficulty of seeing a predominately white glider against an ill-defined cloud overcast, compounded also in this case by the glider's constant relative bearing within the instructor's field of view to his R. Members appreciated these difficulties but thought they were all the more reason to emphasise CRM. The tasks should have been split so that the instructor was not 'heads-in' for longer than necessary, while still allowing him to monitor his student. It was also pointed out that it had been unfortunate to have become distracted from looking out when transiting the area of St Neots, where intense gliding activity could be expected from Gransden Lodge, with cable launches up to 3000ft.

Glider pilot members who were familiar with the Libelle glider and its dihedral wing configuration felt this characteristic was no more pronounced than on many other glider types. Known ac blindspots, when viewed from the cockpit, should be taken into account during a lookout scan to eliminate any possibility of traffic being obscured from view. From the description by the Libelle pilot of the PA28's flight path (crossing overhead by 50-100 ft and then diverging to his R) members agreed that this had been a close encounter where the glider pilot, like the PA28 pilot, had no time to react. The incident had been caused effectively by non-sightings by either pilot. Radar replay had shown the ac returns merging and the pilots' reports indicate similar cruising altitudes although estimated sighting distances were different. This difference was thought to be a matter of perception which members knew from experience was easy to mis-judge whenever a late sighting was involved. Taking all these factors into account, the Board concluded that the safety of both ac had been compromised and that there had been an actual risk of collision, avoided more by chance than anything else.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effective non-sighting by both pilots.

Degree of Risk: A

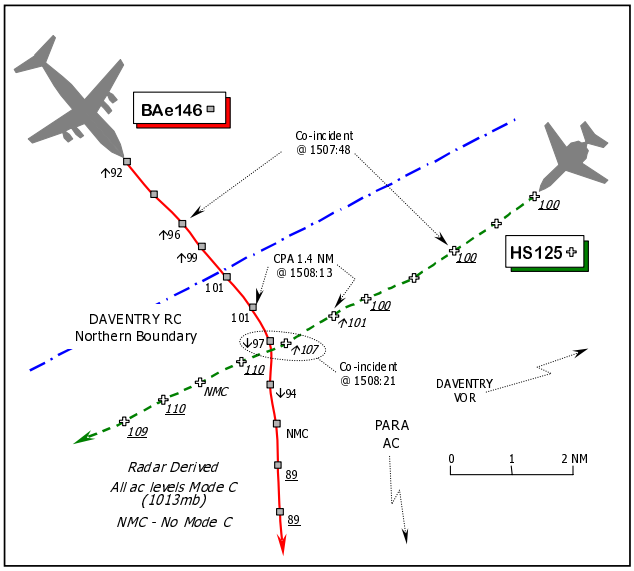
AIRPROX REPORT No 68/01

Date/Time: 11 May 1508

Position: 5209 N 0124 W (10 NM W of DAVENTRY)

Airspace: DAVENTRY CTA (*Class:* A)

	Reporting Ac	*Reported Ac*
Type:	HS125	BAe146
Operator:	HQ STC	CAT
Alt/FL:	FL 100	↑ FL 190
Weather Visibility:	VMC CLOC 20 NM	VMC CLOC 20 km
Reported Separation:	6-800 ft V	< 800 ft V
Recorded Separation:	1·4 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HS125 PILOT reports his ac has a red and white livery and HISLs were on whilst flying between Waddington and Brize Norton under a RCS from London MILITARY. A squawk of 3742 was selected with Mode C, but TCAS is not fitted. Whilst in transit through the DAVENTRY Radar Corridor (RC) heading 246° at 360 kt, flying straight and level at FL 100, London MILITARY suddenly instructed him to climb immediately to FL 110. Simultaneously, he saw a BAe146 at 2 o'clock, 3-4 NM away, slightly below his ac but climbing. He maintained his heading and as he initiated the climb he saw the BAe146 begin a descending R turn and pass 6-800 ft directly below his ac; he saw it next at 9 o'clock flying straight and level heading about 180°. He assessed the risk of collision as *"high"*, if avoiding action had not been taken.

THE BAE146 PILOT reports he departed Birmingham on a COWLY 1E SID, flying a radar vector of 150°, climbing to their assigned level of FL 100, outbound for Brussels at 250 kt under a RCS from LATCC. Suddenly TCAS enunciated a 'Traffic' alert on another ac – the HS125 - at 10 o'clock 400 ft above his ac, which was in conflict with their climbing *"trajectory"* and seen heading about 240°. ATC then instructed him to descend to FL 90 on a heading of 180°, so he immediately disconnected the autopilot and the autothrottle to execute a 30° aob avoiding action R turn. TCAS then enunciated contradictory RA 'advice to climb at >1000 ft/min but he did not comply with the RA as he had the HS125 in sight and they were still in the turn when it passed less than 800 ft above them. He reported that he had seen the traffic to LATCC, who apologised saying it was their mistake. He assessed the risk of collision as *"high"*.

MIL ATC OPS reports that the HS125 was westbound via the DAVENTRY RC, level at FL 100 and under the control of the LJAO CENTRAL (CEN) controller. At 1501, shortly before the HS125 entered the RC, the TC COWLY Sector Controller (SC) called CEN on the TC MIDLANDS direct landline, asking CEN to use the northern side of the RC because of parachuting activity at Hinton-in-the-Hedges. CEN agreed, informed the HS125 pilot and then placed the ac under RCS as it entered the RC, subsequently issuing a radar heading of 250º. By this time, the HS125 was one of a number of ac that had been prenoted to use the DAVENTRY RC. Later, at 1507, TC COWLY called CEN again, asking if the controller was happy for the Hinton-in-the-Hedges parachuting ac to do *"...his para dropping in that Hinton area in that circle?"* CEN however, advised TC COWLY that she was unaware of the precise location of the site, which is not marked on the LJAO video map, and a discussion followed regarding its position relative

to the ac transiting the RC and the position of the parachuting ac. CEN then heard over the land-line the TC COWLY SC instruct an ac - the BAe146 - to stop its climb immediately and descend to FL 90, followed very shortly afterwards by the TC COWLY SC issuing an avoiding action turn. On hearing this, CEN observed a radar contact, displaying the callsign used by COWLY, indicating FL 94 and entering the RC from the N in confliction with the HS125. Moments before 1508:00, CEN transmitted to the HS125 crew *"…avoiding action..climb climb rapidly."* As no response was received, CEN repeated the instruction *"C/S avoiding action, climb immediately, traffic right one o'clock, three miles crossing right left…Flight Level one hundred."* CEN made a third call to the HS125 pilot before receiving an acknowledgement that her calls had been copied and that the HS125 was at FL 110. With the confliction now resolved, the ac was cleared to descend back to FL 100, whereupon the pilot reported the Airprox.

CEN had been routeing the HS125 through Class A CAS in accordance with standard procedures and so would not have expected GAT to enter the DAVENTRY RC. Therefore, it is unlikely that CEN could have detected the confliction any sooner than she did. It was fortuitous that co-ordination was actually taking place at the time, which enabled both controllers to resolve the confliction in a co-ordinated manner.

Unlike Weston-on-the-Green (EGD129), there is no specific airspace reservation around the site at Hinton-in-the-Hedges and as this parachuting site is not frequently used at levels which affect LJAO operations it is not marked on the LATCC Area Control Room radar video maps. However action has been taken to ensure that LJAO controllers are briefed on less regularly used parachuting areas, such as this.

UKAB Note (1): The UK AIP at ENR 5-5-4-2, promulgates Hinton-in-the Hedges as a free-fall parachute drop zone of 1·5 NM radius, centred on 52° 01' 13·6"N 001° 1'2' 16" W; active during daylight hours up to FL 150 with the permission of LATCC.

ATSI comments that although the traffic levels were light, the LATCC TC COWLY SC's overall workload was described as 'moderate to high' due to a number of thunderstorm cells to the S of the sector resulting in ac deviating from their normal routeing. Furthermore, parachuting was taking place at Hinton-in-the-Hedges (marked on the TC COWLY SC video map) up to FL 150, with LATCC TC's approval and a pink strip was displayed on the COWLY Sector detailing the Hinton-in-the-Hedges parachute dropping ac's (PARA ac) details. Weston-on-the-Green was also active up to FL 120. Following the Sector handover, the TC COWLY SC had been in position for some 4 min before the Airprox occurred, although he had been working on the sector previously during his watch. Thunderstorm development during the middle of the afternoon prompted many flights to ask for weather avoidance turns. Such deviations often required co-ordination with adjacent sectors and the SC was busy making such telephone calls.

CEN telephoned the COWLY Sector at 1456:10, about 12 min before the Airprox, to request a CAS crossing clearance for the HS125, E - W at FL 100 through the DAVENTRY RC squawking 3/A 6402. This co-ordination was agreed by the previous handing-over controller. LATCC MATS Part 2 (TC) requires that, when an individual co-ordination has been agreed for an airways crossing using the DAVENTRY RC, a pink 'crossing strip' is displayed under the COWLY designator on the TC COWLY W fps display. This was done.

The Hinton-in-the-Hedges PARA ac, called the COWLY SC at 1456:40, requesting clearance to climb for a drop. Following co-ordination with TC NORTH, at 1459:20 it was cleared to climb to FL 120. The RT transcript indicates that it was the handing-over controller that issued the clearance. At 1504:40, the BAe146 crew checked in on the TC COWLY SC's frequency following a COWLY 1E SID climbing to FL 60. Meanwhile the HS125 had already entered the DAVENTRY RC, maintaining FL 100, and the COWLY SC had formulated a plan to climb the BAe146 to FL 90, underneath the HS125 in the RC and the PARA ac until lateral separation had been established between them. The PARA ac pilot requested clearance to commence the drop at 1505:00, but was advised to wait because of the military crossing traffic in the DAVENTRY RC – the HS125. This confirms that the COWLY SC had not overlooked the HS125. Some 30 sec later, the BAe146 crew reported approaching FL 60. Cognisant of the requirement to climb the ac to FL 190 as soon as possible for transfer to the next sector under the

standing agreement, at 1505:40, the SC instructed the crew to fly a *"…radar heading 140 climb flight level 190"* to be level by COWLY. This instruction was clearly and accurately readback by the crew of the BAe146 and the SC wrote *"FL 190"* on the fps. The HS125 at that stage was 20 NM E of the BAe146 and tracking about 250°. Immediately before issuing the climb instruction to the BAe146 crew, the SC had been engaged in telephone co-ordination about another ac avoiding weather. It is possible that this distracted the SC enough to 'forget' about his initial plan to restrict the BAe146's climb to FL 90. He then made another telephone call to co-ordinate further traffic avoiding weather. At 1507:00, the SC called CEN to request that the HS125 be vectored along the northern edge of the DAVENTRY RC, which would then permit the PARA ac to commence its drop at Hinton-in-the-Hedges. Learning that this area was not shown on CEN's radar video map, the COWLY SC started to explain the location when he noticed that STCA had activated, turning immediately to red, with the Mode C of the BAe146 indicating FL 94. At 1507:50, he instructed the BAe146 crew *"…will you stop…your climb immediately please stop your climb descend 90 descend 90 please"*. The term "avoiding action" was not used initially and there was no response from the BAe146 crew. Next, the SC reaffirmed *"C/S its avoiding action turn R heading 180 descend FL 90",* which was acknowledged. The CPA occurred at 1508:13, thereafter the BAe146 descended in compliance with the COWLY SC's instructions and the HS125 climbed in response to an instruction from CEN, who was still on the telephone line to the COWLY SC. There had been insufficient time to agree a course of action with CEN. Four transmissions containing avoiding action instructions were issued by the COWLY SC and although the BAe146 crew did not respond to two of them they did react and comply. The BAe146 pilot informed the SC that the traffic had passed above and that he had received a TCAS alert. Response to the avoiding action heading of 180° took the BAe146 to the W of the PARA ac and once clear of the HS125, it was given clearance to FL 190 and transferred to the next sector.

The COWLY SC expressed reservations about the use of CAS for parachute dropping operations, which then had to be avoided by GAT under the control of LATCC. The complexity of the traffic situation, added to the presence of thunderstorms, was complicated further by the two parachuting operations taking place. These combined factors significantly increased the workload of the controller during the period preceding the Airprox. Nonetheless, the COWLY SC, having initially planned to climb the BAe146 to 1000 ft below the co-ordinated crossing traffic – the HS125 - subsequently climbed the BAe146 straight to FL 190.

HQ STC comments that Mil ATC Ops have provided an objective analysis of this Airprox and there is nothing more to add from the STC perspective.

UKAB Note (2): The LATCC Clee Hill radar recording clearly illustrates this Airprox. The HS125 is shown in transit through the lateral confines of the DAVENTRY RC level at FL 100 Mode C. The BAe146 is shown climbing steadily through FL 92 at 1507:15 and penetrates the RC 50 sec later, after ascending to FL 101. The CPA of 1·4 NM is shown on the next sweep at 1508:13, when both ac indicate the same level – FL 101, just as the HS125 commences the avoiding action climb. Thereafter, the BAe146 is also shown in the avoiding action descent in compliance with the instructions issued by the TC COWLY SC. Standard vertical separation is restored at 1508:30, when the HS125 is shown level at FL 110.

UKAB Note (3): NATS Ltd conducted a TCAS and STCA *simulation* of this occurrence based on the Heathrow SSR data. It was determined that the BAe146 TCAS performed as envisaged when it detected the HS125, which was not fitted with TCAS. The TA should have been enunciated when the BAe146 climbed through FL 95, and a 'Climb' RA generated at FL 101. Following the BAe146 pilot's visual assessment and compliance with the avoiding action descent issued by the TC COWLY SC, coupled with the HS125 pilot's compliance with the avoiding climb instruction, TCAS subsequently enunciated a 'Descend Now' RA at 1508:10. 'Clear of Conflict' was enunciated as the BAe146 passed FL 92 in descent. Similarly, the STCA functioned in accordance with its designed parameters.

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.

From the HS125 pilot's perspective he had been conforming with the instructions correctly issued by LJAO CEN for flight through the RC. Suddenly he had been called upon to climb to avoid the climbing BAe146, whose crew erroneously had been instructed to climb to FL 190. It was evident from the radar recording that the HS125 pilot's very quick reaction to the instruction issued by CEN, both of which drew praise from the Board, was sufficiently robust to climb successfully above the BAe146. Indeed, with both ac at the same level – FL 101 – just 1·4 NM apart at the CPA, the HS125 pilot managed to achieve FL 110 with commendable speed. Similarly, the BAe146 pilot had assessed the situation swiftly and, having realised from the visual sighting that the HS125 was climbing, had disregarded the TCAS climb RA and descended to avoid the other ac. Some members were concerned about the apparent contradiction of the reported TCAS 'climb RA', but as the HS125 was not equipped with this extremely impressive equipment, the RA was predicated (at that moment) on the HS125 remaining level at FL 100 a situation that CEN was not going to allow. The NATS simulation had confirmed that the RA at that juncture was within the designed parameters since the TCAS was 'unaware' that the HS125 was about to climb quickly at this point. LJAO CEN had reacted promptly and expeditiously when her attention was drawn to the situation, but some members were concerned that the discussion about Hinton-in-the-Hedges might have distracted both CEN and the TC COWLY SC unduly. Both the Mil ATC Ops advisor and the military area ATC member emphasised that this parachuting activity rarely effected LJAO and members were reassured by the Unit's positive reaction in ensuring all LJAO controllers were briefed on this DZ. A further point was that the imminent activation of Swanwick ACC predicated against further updates to the LATCC ACR equipment fit.

It was readily apparent to the Board from the very comprehensive analysis conducted by Mil ATC Ops and ATSI that this Airprox stemmed from an error by the TC COWLY SC. The SC's plan had been to separate the BAe146 from the HS125 in the RC, by restricting its climb to FL 90 and then ensuring separation from the PARA ac, before issuing a clearance to climb to the standing agreement level of FL 190. Members did not miss the significance of the two similar levels – FL 90 and FL 190. Some then postulated that the plan had been interrupted by other events, specifically, the co-ordination required by weather avoidance which had led the SC to clear the BAe146 crew to the wrong level (FL 190) a mistake that was revealed when the STCA activated. If the SC's original plan had been adhered to, without interruption it was probable that the Airprox would not have occurred. ATCO members familiar with the TCR environment agreed that the additional distractions introduced by weather avoidance and the two parachuting activities could have affected the outcome. Nevertheless, once he observed the STCA and realised his error he had acted promptly to restore the situation and issued appropriate descent instructions followed by an avoiding action turn. These actions, combined with those of LJAO CEN, enabled standard separation to be restored promptly. The absence of a co-ordinator was noted; some controller members queried that if one had been in position fulfilling this important task it might have relieved the workload on the SC sufficiently to prevent the Airprox. However, one controller member pointed out that the SC himself had not asked for the co-ordinator position to be opened, suggesting perhaps that the workload he encountered was not excessive. This was, to a certain extent, merely conjecture and could not be resolved by the Board. Nevertheless, the NATS advisor briefed the Board that guidelines for the manning of the co-ordinator position had recently been issued to TC staff at LATCC [SI 119/01 (TC)], which included consideration of the weather conditions and allayed some members concerns over this issue. Consideration was also given to several 'Human Factors' (HF) theories put forward by the NATS HF advisor. In the end, members concluded that the SC had a sound plan, but for various reasons, had not followed it through. The Board agreed unanimously that this Airprox occurred because the TC COWLY SC climbed the BAe146 into conflict with the HS125.

With regard to risk, all the safety nets played their part – the STCA alerted the SC to his mistake enabling him to take corrective action and warn the BAe146 pilot. In turn the BAe146 pilot was alerted to the situation by TCAS and had sighted the HS125 whose pilot was also taking avoiding

action initiated by CEN. Nevertheless, this was all at relatively close quarters. Horizontal separation had been reduced to only 1·4 NM, against the 5 NM required in CAS, just as the BAe146 started to descend from FL 101 and the HS125 pilot began his avoiding action climb through FL 101. Both pilots had sighted each other's ac and while the prompt avoiding action had successfully removed the possibility of a collision the Board judged that, the safety of both ac had not been assured during the incident.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The TC COWLY SC climbed the BAe146 into conflict with the HS125.

Degree of Risk: B.

Contributory factors: Attention to other activities (parachute dropping and weather avoidance) led to increased workload, which interrupted the SC's intended plan of action.

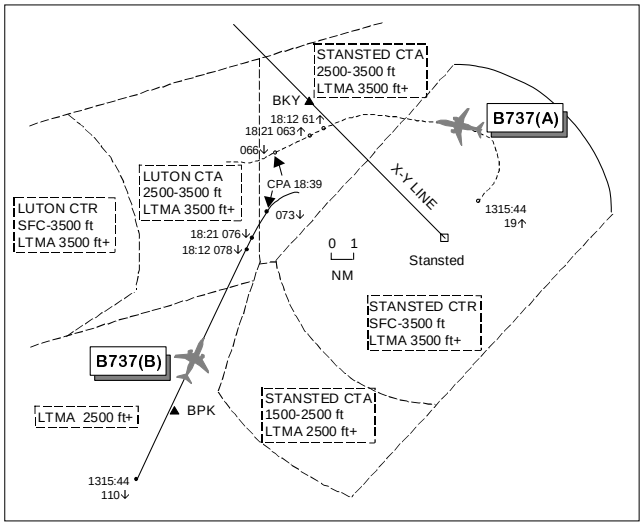
AIRPROX REPORT No 69/01

Date/Time: 12 May 1319 (Saturday)

Position: 5156 N 0001 E (4 NM SSW of BKY VOR)

Airspace: LTMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	B737-300 (A)	B737-300 (B)
Operator:	CAT	CAT
Alt/FL:	↑ FL 70	↓ FL 70
Weather	VMC CLNC	VMC CLOC
Visibility:	30 km	NK
Reported Separation:	0 V 3 NM H/300 ft V 3 NM H	
Recorded Separation:	700 ft V 2.8 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 (A) PILOT reports outbound from Stansted climbing to FL 70 at 290 kt having been released from 'ATC speed control' by Essex Radar, he thought, frequency 126·95 MHz. Whilst passing 4000 ft QNH he was instructed by Essex Radar to stop climb at 5000 ft and turn onto heading 250°; he complied with both. A TCAS TA *"traffic traffic"* was received on an ac passing down his RHS and when he was clear of the traffic he was instructed to climb to FL 70 again. When passing FL 68 ATC urgently requested him to stop climb immediately and issued a heading change onto 350° followed by descent to 6000 ft; simultaneously a TCAS TA alert then an RA *"descend descend"* were received and followed. The Capt disconnected the AP to execute the manoeuvre and the other ac, another B737, was seen in his 10 o'clock at about 3 NM at the same level in a turning RH climb. The RA changed to a *"monitor vertical speed"* and then ATC turned him back onto heading 250° and issued climb instructions to FL 70. He assessed the risk of collision as high.

THE B737 (B) PILOT reports heading 030° at 220 kt inbound to Stansted routeing to BKY VOR descending to FL 70. He had just levelled off, he thought, when Essex Radar on frequency 120.62

MHz issued an avoiding action R turn onto heading 070°; a TCAS TA was received and the other ac, a B737, was seen about 3 NM away passing down his LHS 300 ft below. He believed that as the other B737 had been outbound working Stansted Director, this incident had been a liaison problem between controllers. He assessed the risk of collision as low.

ATSI reports that the Stansted INT DIR (callsign Essex Radar) had taken over approximately thirty minutes prior to the incident. He commented that initially the position had been quiet but, although the traffic loading remained low, his workload had increased to high at the time of the Airprox, due mainly to increased telephone co-ordination and his acceptance of non-airways traffic to overfly Stansted.

The following procedures, which are stated in the LATCC-TC MATS Part 2, Pages STN 5.4 and 7.1, are pertinent to this Airprox. Irrespective of the RW in use *"Any descent to Minimum Stack Level or below west of the X – Y line must be co-ordinated by SS* (Stansted) *INT with SS FIN"*. When RW 05 is in use *"Unless otherwise co-ordinated with Stansted INT, Stansted FIN* (responsible for controlling the following outbounds initially) *will not climb any BUZAD or CPT departure above 5000 ft until passed the X – Y line westbound"*. The X – Y line is described as *"a line from Stansted airport, to BKY, extending to the edge of regulated airspace"*. It is marked on the Stansted radar video map.

B737 (B) was the second of two inbound ac reportedly following the LOREL 2Q STAR i.e. routeing Brookmans Park (BPK) - BKY - BUSTA. The INT DIR explained that, initially, both ac had been the subject of full releases. In accordance with agreed procedures, the minimum level which could be allocated by TC was 1000 ft above the Minimum Stack Level (MSL); at the time of the incident MSL was FL 70. Following further co-ordination initiated by TC N, the two ac were released descending to 4000 ft, to facilitate a shorter routeing to final. B737 (B)'s release was then changed again by TC, this time to FL 80 (MSL+1000 ft). As well as carrying out this telephone co-ordination with TC N, the INT DIR said that he received a telephone call from London Military requesting co-ordination on a civil executive jet, which was routeing outside Controlled Airspace (CAS) to the N of Stansted, inbound to Biggin Hill. The INT DIR said that he considered accepting the ac at low level e.g. 2400 ft, but as he could see a number of unknown ac displaying the SSR conspicuity code operating to the N, probably at low level, and in view of the light traffic loading, he decided to accept the flight into his airspace at 6000 ft. He did not identify the ac at the time but allocated it a local Stansted squawk. Because the overflight was joining at 6000 ft, i.e. 1000 ft above the initial altitude of the outbound ac, he did not consider it necessary to inform the FIN DIR of its presence at that time.

B737 (B) established communication with Essex Radar at 1315, reporting passing FL 107 on the descent to FL 80. The flight was instructed to continue on its present heading as a radar heading and was cleared to descend to FL 70; its fps was annotated accordingly. The INT DIR stated that his plan was to shorten the ac's routeing by turning it early onto a LH downwind leg for RW 05, ensuring, in the process, that it remained W of the X – Y line and, thereby, clear of westbound departures. He added that, due to airspace restrictions, he could not give it descent to an altitude until it passed W of Stansted Airport, so his intention was to monitor the ac's progress, issuing further descent when appropriate. The INT DIR admitted that, in accordance with MATS Part 2, he should have co-ordinated this descent to MSL with the FIN DIR. He said, as far as he could recollect, he had looked towards the FIN DIR, but, because he was busy, he decided to take the action first, intending to carry out the requisite co-ordination later. The INT DIR added that, at the time B737 (B) contacted him, he had not noticed on his radar display that B737 (A) was airborne. Had he done so, he would not have cleared B737 (B) to descend prior to co-ordination taking place. However, the radar data taken from the 'slave' recording of the Stansted INT position i.e. the picture that the controller would have seen, shows B737 (A) 2 NM NE of Stansted Airport passing 1900 ft at the time B737 (B) made its initial call. The INT DIR could not explain why he had not noticed B737 (A).

B737 (A) had been cleared on a Compton 2S SID from Stansted's RW 05. The routeing for this SID is: "Straight ahead to I-SED d2 (BKY VOR 119°), then turn L onto BKY VOR R104 by BKY d7 to BKY VOR, then turn L onto BKY VOR R262 to

WCO NDB then to CPT VOR". The initial cleared altitude is 5000 ft, with a stipulation to cross BKY d5 at 3000 ft or above.

The INT DIR said that, soon after clearing B737 (B) to descend, the executive jet referred to earlier, made its initial call on the frequency descending to 6000 ft. He stated that he had not seen this ac previously on his radar display and was surprised, not only to find that it was already in Stansted's airspace before he had noticed it, but also that it was travelling faster than he expected. He instructed it to turn L heading 130° to position behind B737 (A), which he could now see and informed the FIN DIR of its details. The FIN DIR was controlling B737 (A), having received a call from the pilot at the same time as B737 (B) had called Essex Radar. He had instructed B737 (A) to squawk ident and climb to FL 70. The INT DIR had no recollection of receiving any co-ordination from the FIN DIR of this climb above 5000 ft as required in the MATS Part 2. Shortly afterwards, the FIN DIR instructed B737 (A) to stop its climb at 5000 ft, presumably as a result of receiving notification of the overflight at 6000 ft. The FIN DIR received authorisation from TC N to climb B737 (A) to FL120. (This would have been given subject to Stansted traffic.) He reported that, as no co-ordination had taken place between him and the INT DIR regarding B737 (B)'s descent, he assumed that it was only descending to FL 80. Consequently, when it was clear of the overflight, he asked the INT DIR if he could have FL 70 for B737 (A).

The INT DIR said that he agreed to B737 (A) climbing to FL 70 because, for an inexplicable reason, he had forgotten that he had instructed B737 (B) to descend to FL 70. As he had been occupied with the overflying traffic, he had decided to change his plan regarding the shortened routeing for B737 (B). He was now planning to vector it to the NW of the airport and once clear of the departure and the overflight, to position it downwind LH. As far as he was concerned the situation was resolved, with the overflight at 6000 ft, B737 (A) at FL 70 and B737 (B) at FL 80.

In accordance with his revised plan, the INT DIR returned his attention to B737 (B) at 1318:10, when he instructed it to continue on its radar heading. He still did not realise the potential confliction between the subject ac even though the radar recording timed at 1318:12, shows B737 (B) passing FL 78, with B737 (A), at an altitude of 6100 ft (QNH 1020 mb), in its one o'clock at a range of 7 NM. Almost immediately, the FIN DIR, having observed that B737 (B) had descended through FL 80, asked the INT DIR what he was doing with it. The latter controller said that he realised straight away that he had made an error. He issued B737 (B) with an avoiding action R turn heading 070°. Before he could pass TI, the pilot reported sighting the other traffic. Meanwhile, the FIN DIR had instructed B737 (A) to turn R "*now"* heading 350° and to stop its climb *"as soon as possible".* The term avoiding action was not used, nor was TI passed. The pilot reported levelling at *"six thousand seven hundred"* and receiving a *"TCAS descend".* The FIN DIR replied *"Yeah descend now to altitude six thousand feet"*. The MATS Part 1, Supplementary Instruction 2/99, states that on receiving notification of a TCAS descent, 'The controller should acknowledge the report'. There is no requirement to specify a cleared level as the controller ceases to be responsible for providing standard separation as a direct consequence of an RA manoeuvre. The pilot of B737 (A), subsequently, reported at *"five seven climbing to six thousand"* and announced his intention of filing an Airprox report as he had sighted the other traffic. The radar recording, timed at 1318:21, when turns are issued to both ac, shows them 5·6 NM apart, B737 (B) is passing FL 76, with B737 (A) approaching its twelve o'clock at FL 63. The radar confirms that both controllers took avoiding action appropriate to the circumstances. The minimum separation occurs at 1318:39, by which time the horizontal distance is 2·8 NM with 700 ft vertical separation. B737 (A) has passed through B737 (B)'s twelve o'clock and levelled at FL 68 before, subsequently, descending. By 1318:49, the horizontal distance had decreased to 2·2 NM but vertical separation had now increased to 900 ft. The STCA did not activate throughout the encounter.

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 agreed that this incident highlighted the danger of controllers basing future action on an intention to monitor and/or co-ordinate rather than adopting a fail-safe plan. The ATSI advisor re-iterated that at least one of the controllers involved in this incident did not carry out the required co-ordination before climbing/descending ac from their agreed levels prior to crossing the X-Y line. ATCO members, familiar with the LATCC TC procedures, added that ac inbound to Stansted and Luton following the LOREL STAR could be expedited by obtaining full releases, thereby avoiding holding at LOREL, the shared holding fix. However, reducing the track distance of the inbound traffic invariably increased the ATCO's workload owing to the additional co-ordination required to facilitate the non-standard arrival. Nevertheless, it was apparent to members that had the existing procedures between the Stansted INT DIR and FIN DIR SCs been correctly executed from the outset, the Stansted INT DIR would have had a robust and safe plan in place. Instead, the consequence of descending the inbound B737 (B) to FL 70, prior to the X-Y line and contrary to MATS Pt. 2, without co-ordination and then allowing the FIN DIR to climb B737 (A) to that level, had led to the Airprox. The 'missing' initial co-ordination would have alerted the FIN DIR that FL 70 was occupied when he later requested to climb B737 (A); he had assumed the INT DIR was descending B737 (B) to FL 80, MSL + 1000 ft, who in turn had forgotten that he had cleared B737 (B) to FL 70.

At the end of the day, the INT DIR immediately realised the error when he was prompted by the FIN DIR who had noticed B737 (B) descending below FL 80. From that juncture, things worked reasonably well. The avoiding action given had been timely and appropriate in the circumstances but members noted again an apparent reluctance, on the part of the FIN DIR in this case, to use the correct phraseology. Simultaneously, both B737 crews had received TCAS TA alerts; B737 (A) crew had then executed a descent in response to an RA. These actions led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Stansted INT DIR allowed the FIN DIR to climb B737 (A) to the level that he had cleared B737 (B) to fly at, without co-ordination.

Degree of Risk: C

AIRPROX REPORT No 70/01

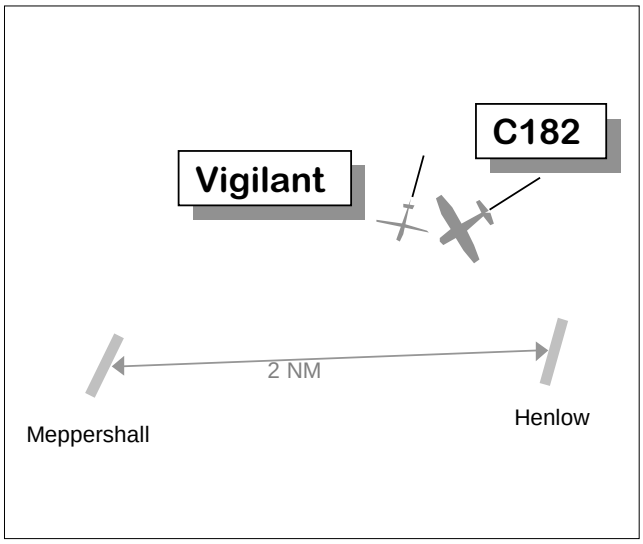
Date/Time: 12 May 1020 (Saturday)

Position: 5202 N 0020 W (1 NM W of Henlow - elev 170 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Vigilant motorglider	Cessna 182
Operator:	HQ PTC	Civ Pte
Alt/FL:	800 ft (QFE 1016 mb)	500 ft ↓ (QFE 1019 mb)
Weather Visibility:	VMC CLNC >20 km	VMC CLNC 10 km
Reported Separation:	15 ft	/50 ft

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VIGILANT PILOT, an instructor, reports heading 193° at 60 kt, starting a downwind leg to RW 02 at Henlow at 800 ft. He had joined via a 360° lookout descending orbit and asked the student to continue to look out. His student called an ac and on looking left it appeared passing his port wing tracking SW; it then flew 15 ft in front of him, turning right towards Meppershall. The risk of collision was high; the Cessna had approached fast from behind, leaving him no time for avoiding action.

THE CESSNA 182 PILOT, solo, reports heading 240° at 120 kt inbound to Meppershall for maintenance. There were many ac in the area; microlights from Sandy, ac over Biggleswade from Old Warden and 3 ac arriving and departing from Meppershall. He had been listening out on 123·05 with Old Warden and changed to 121·1 for Henlow. He had intended to land up the slope but the other traffic was favouring the downhill, N easterly runway; while positioning for this he saw a Grob glider which came out of his blind spot on his right along the wing line. As he increased his rate of descent, it passed about 50 ft away with a medium risk of collision. He attributed the incident to a high workload with very busy skies and the close proximity of Meppershall to Henlow.

UKAB Note: Neither ac shows on radar recordings, although the C182 pilot advised he was squawking 7000 with Mode C.

HQ PTC comments that this was certainly so close as to cause concern. Regardless of any right-of-way considerations, the Vigilant crew had no opportunity to 'see and avoid' with the Cessna approaching from behind as it did. Meppershall is a private strip with no A/G Stn but is strictly PPR for ac inbound to them for their maintenance services. SOPs, with which the Cessna pilot was familiar, already exist to prevent conflictions with traffic at Henlow, but the activity at Old Warden had apparently persuaded the pilot to compromise them. However, there is no readily identifiable published source of information about Meppershall or its procedures, and thus no easy way for visitors to find out about these SOPs. OC 616 VGS has since met the Meppershall operators and the joining procedures have been revised and augmented. A procedure has now been established whereby the 2 sites exchange information on their anticipated activity when opening up, and in future a telephone briefing will be passed to pilots booking in to Meppershall.

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.

GA members agreed that an overhead join at Meppershall would have been a much safer option for the C182 pilot; there was a feeling that haste on his part may have played a part in the incident. Members agreed that the cause of the Airprox was that he had not seen the Vigilant in time to avoid it safely, and had flown into confliction with it in the Henlow circuit. While it was noted that the Vigilant had 'come out of the blind spot' as described by the Cessna pilot, it must have been visible ahead of him somewhat earlier. Distraction caused by trying to locate Meppershall may have played a part in the late sighting. The Board concluded that there had been a risk of collision in the incident, the safe outcome of which appeared to have been largely down to good fortune.

It was not apparent why the Cessna pilot had deviated from the established Meppershall procedures; members suggested that in the absence of a Pooley's entry or information in the UK AIP, a briefing on them should form part of a pilot's PPR requirement. The Chairman agreed to convey this suggestion to the airfield manager.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: While in transit through the Henlow circuit, the C182 pilot flew into conflict with the Vigilant, which he saw late.

Degree of Risk: A

AIRPROX REPORT No 71/01

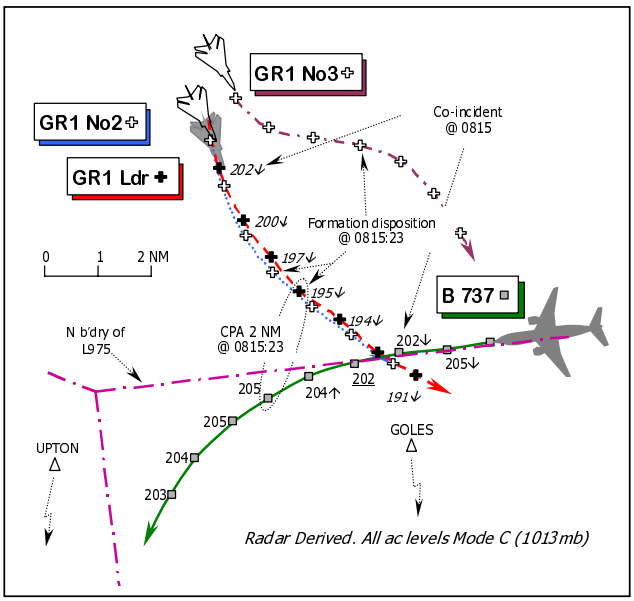
Date/Time: 9 May 0815

Position: 5341N 0111W (6 NM NNW of GOLES)

Airspace: AIRWAY/FIR (*Class:* A/G)

Reporter: MACC RIBEL Sector

	First Aircraft	*Second Aircraft*
Type:	B737	Tornado GR1 x3
Operator:	CAT	HQ STC
Alt/FL:	↓ FL 200	FL 215 ↓
Weather Visibility:	VMC 10 km	VMC CLOC 40 km
Reported Separation:	3 NM H	3-4 NM H
Recorded Separation:	2 NM H, 1000 ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MACC RIBEL SECTOR CONTROLLER (SC) reports that the B737 was inbound to Liverpool from Amsterdam via airway L975. At 0812:40, the B737 crew reported descending to the standing agreement level of FL 200, whilst westbound to the N of the airway centreline approaching GOLES. He observed a formation of military ac – the Tornado GR formation under the control of London MILITARY - descending through FL 215, southbound on a conflicting track about 12 NM N of the B737. The formation seemed to be descending faster than the B737, so he instructed the B737 crew to maintain FL 200 on reaching, assuming that the London MIL were attempting to take 5000 ft uncoordinated Mode C separation and cross the airway below the B737, which they are authorised to do. The B737 levelled off at FL 200, but the formation also indicated FL 200 Mode C. Avoiding action and traffic information was passed to the B737 crew, but horizontal separation was eroded to, he thought, 3 NM.

THE MACC RIBEL CO-ORDINATOR reports that the Tornado GR formation was observed approaching the B737 from the N in descent. As the formation passed FL 210 he telephoned the London MILITARY Console 15 controller (CON15), who advised that he was turning the formation L to go behind the B737, whereupon he advised CON15 that the B737 was being turned L 180° to avoid the formation.

UKAB Note (1): At 0814:38, STCA triggered a high severity alert at a range of 9·6 NM between the subject ac. At 0814:40 the RIBEL SC instructed the B737 to *"…maintain FL 200 on reaching….further descent in 10 miles".* This was acknowledged by the crew, but immediately afterwards at 0814:50, the SC instructed them to *"…turn left now fly heading of 180 degrees this is avoiding action traffic's on your right hand side range of about 5 miles unknown military traffic fast crossing right to left".* The B737 crew reported that they were responding to a TCAS climb at 0815:00, and the SC queried whether the crew had visual contact on the other ac, which they did not. Shortly after 0815:20, the crew reported they were *"..clear on TCAS",* whereupon the SC advised the crew that he would be filing a report.

THE B737 PILOT reports heading 265° at 310 kt, under an ATC service from Manchester on 126·65 MHz. Whilst levelling at their assigned level of FL 200, ATC instructed them to "turn L 180° avoiding action", which they did. Simultaneously, a TCAS TA was enunciated, immediately followed by a 'climb' RA, which was complied with; they climbed

to FL 206 before the conflict was 'resolved'. Whereupon they descended back to their assigned level. The other ac passed about 3 NM down the starboard side at the same level from TCAS, but was not seen; ATC advised that it was military traffic and military ATC had not effected co-ordination.

THE TORNADO GR1 PILOT reports leading a formation of 3 Tornado GR1s as the first of two waves of a 'Storm Trail' from Lossiemouth to Akrotiri, Cyprus. Heading S at 320 kt under, he thought, a RCS from London MILITARY, they were instructed to descend to cross L975. Shortly afterwards, whilst still N of the airway, they were instructed to come hard L to avoid civil traffic - a B737 in their L 10 o'clock. He reported to the controller that they were visual with the airliner but commenced a L turn onto E regardless. The formation passed 3-4 NM behind the B737 before being cleared back onto a southerly heading with a *"low"* risk of a collision – they had acquired the B737 visually at a range of 10 NM and watched it throughout. He thought, however, that the occurrence took place to the N of L975 and that the airway crossing itself was uneventful.

UKAB Note (2): Though an ACN/NOTAM is issued for 'Storm Trail' formation flights of this nature, where in-flight refuelling takes place, such flights are only accorded Non-Deviating Status (NDS) in the UAS.

ATSI reports that analysis of this Airprox revealed no ATS causal factors; the RIBEL SC reacted well on becoming aware of the conflict. Although not related to the cause, the outcome would have been less serious had the RIBEL SC been following the guidance in MATS Pt.1 (page 1-50) which states :-

"Although aircraft operating in controlled airspace are deemed to be separated from unknown aircraft flying in adjoining uncontrolled airspace, the radar controller should aim to keep the aircraft under his control at least two miles within the boundary where possible. Unpredictable manoeuvres by unknown aircraft can easily erode separation."

However, it is appreciated that this is not easy to achieve in a 10 NM wide airway, where 'two way' climb and drop throughs are taking place, in this case between traffic arriving and departing the Manchester TMA.

MIL ATC OPS reports that the Tornado GR formation, was southbound cruising at FL 215 for the Lichfield Radar Corridor entry point at NEWTON and under a RIS from CON15, manned by a trainee and mentor with one other track on frequency. At 0813:05, when the Tornado formation was about 20 NM N of Airway L975, CON15 instructed the Tornado formation *"....for co-ordination, descend report level Flight Level one six zero"* which was acknowledged by the leader. The descent to FL 160 was required for the transit of the Lichfield RC. During the following minute, the controlling team of CON15 became engaged in a protracted hand-over sequence with another ATSU involving an ac in the vicinity of EGD207 - Wainfleet. When the Mentor returned his attention to the Tornados (which were passing FL 205) at about 0814:30, he realised that they had not descended as rapidly as had been expected and were in direct confliction with westbound traffic within the airway - the B737. CON15 then transmitted to the formation leader*"...avoiding action, turn hard left heading zero nine zero against traffic left eleven o'clock ten miles crossing left to right, indicating Flight Level two one zero descending."* The leader replied *"Roger visual that traffic..."* followed by some unintelligible words - possibly happy to continue, but CON15 responded *"C/S negative, hard left zero nine zero"*, which was acknowledged. As they turned, the formation passed behind the B737, which was seen to have levelled at FL 205.

UKAB Note (3): The Claxby radar recording shows the B737 tracking along the extreme northern edge of L975 in a fairly rapid descent, with the Tornado formation tracking S and the lead ac (the only one squawking) indicating FL 215. The formation commenced the descent at 0813:33, at which point the B737 is about 50º L of the formation's track at a range of 19 NM, passing FL 245. The relative geometry is maintained as the B737 tracks marginally N of the airway boundary until 0815:00, when the first indication of a L turn by the Tornados is shown. By now, the B737 is 40º L of the formation at a range of 4·9 NM and standard horizontal separation was eroded when both indicated FL 202. One of the trailing Tornados executes a very sharp L turn onto E and separates from the other two ac, which continue a descent while making a more gentle L turn, steadying on a track of about 120º. Meanwhile, the B737 ascends to FL 205 whilst following the TCAS RA and commences a L turn.

The CPA of 2 NM occurs at 0815:23, as the leading Tornado pair, still in Class G airspace, pass into the B737's 4 o'clock - 1000 ft below it, thereafter passing astern of the airliner.

The B737's 2 letter destination indicator on its SSR label - Liverpool, indicated that a descent from its cruising level was inevitable and hence it was going to conflict with the southbound formation. The Tornados slow descent should not have been particularly surprising as they were at the start of a long transit, but if they had been level at FL 160 before entering CAS, this would still not have avoided an erosion of prescribed separation, as the B737 had been cleared to FL 200. The GOLES/ UPTON area is well recognised within London Radar as being a potentially awkward place to cross L975, and to do so taking radar separation without co-ordination, whilst expecting further traffic (and hence not being able to constantly monitor the situation) was ill considered. The CON15 controlling team became completely distracted by the landline conversation and activity elsewhere whilst not dividing their attention adequately. However, once the confliction was noted, the avoiding action instructions issued were appropriate and clearly delivered. Had all the ac in the formation turned immediately, it is likely that they would have followed a similar track to that of the trailing ac, which remained about 2 NM N of the CAS boundary and almost 4 NM clear of the B737's projected track. This is not a criticism of the aircrew, they were in Class G airspace, receiving a RIS at the time and responded accordingly. Although the slower turn took elements of the formation into CAS and reduced the separation with the B737, the report that the leader was visual with the airliner confirmed that there was no risk of collision.

There is a significant lesson to learn from this Airprox, relating to the conduct of controller training. The trainee was a 'first tourist' controller whose progress had been hindered by a tendency towards under confidence. Mindful of this, the mentor, normally a talkative and 'prompting' screen had adapted his instructional style accordingly, resulting in a more 'laid back' method, allowing the student to control at his own pace. Therefore, it is likely that this relaxed style gave the CON15 team a false sense of security and the mentor was not as alert as he should have been. Moreover, there is no suggestion that the mentor saw the confliction at an earlier stage, and simply allowed the trainee too much leeway before intervening.

HQ STC comments that the Mil ATC Ops analysis requires no embellishment and all the relevant factors have been addressed. The Tornado formation leader's initial response to the avoiding action turn was not inappropriate when under a RIS outside CAS. However, when approaching an airway with the intention of crossing under a RCS as here, crews should react immediately to any avoiding action initiated by the controller, even before the airway boundary is reached. Although the instructions may be seemingly unnecessary as the leader had the B737 in full view throughout, crews should remember that controllers must maintain standard horizontal separation of 5 NM when crossing CAS. Hence, in the interests of flight safety and to reduce the potential for inducing TCAS RAs, crews must comply with any ATC instructions issued.

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 STC member suggested that the Tornado leader's mind would have been focused on fuel conservation for the long transit flight ahead, which could explain his apparent reluctance to turn away from his desired track. Moreover, whilst this reaction was entirely understandable - the B737 had been in view for sometime - when within or that close to the boundary of CAS, the controller's avoiding action instructions should have been complied with promptly. Members noted that the Tornado formation had not been placed under a RCS by CON15 when this turn was given and was still technically under a RIS. A civil controller queried if the Tornados would have maintained their track into CAS if the controller had not changed the ATS to a RCS. Colleagues explained that military pilots would be expected to question entry clearance into CAS if a RCS had not been applied. A discussion then ensued as to whether all

elements of the formation should have been squawking. Although the B737 TCAS detected the squawking lead Tornado and provided the B737 pilot with an RA, he was denied information on the other two ac in the formation. However, the Mil ATC Ops advisor said the formation had been contained within the agreed 1 NM 'box', so non squawking elements were not contributory factors in this Airprox. The NATS advisor briefed the Board that further trials were being conducted to examine TCAS performance in scenarios involving a closely spaced formation in a radar corridor, where all elements were squawking. Moving on, the Board noted that the B737 had been vectored onto the boundary of CAS and indeed marginally over it into the FIR, and sided with ATSI's contention that the outcome could have been less serious if the RIBEL SC had complied with the Mats Pt 1 guidance. Nonetheless, there was nothing more that the B737 crew could have done in this situation apart from follow the RA.

Military controller members were in no doubt that this had been a poorly executed crossing of L975 by the mentor (and trainee) manning CON15, who had become over distracted by other tasks and had not detected the confliction. Nevertheless, it was the mentor's responsibility to ensure that training aspects did not impair safety and that standard separation was maintained, as appropriate, between GAT and OAT under his control. Although the Tornado formation had been instructed to descend to FL 160 prior to crossing L975, this would not have provided the requisite separation against the B737 descending to FL 200 if no co-ordination had been undertaken. A cleared flight path at a suitable level could have been requested, but this might have been difficult to conclude in this particular area of CAS with climbing and descending traffic. However, if the formation had remained at their higher transit level above the B737 inbound to Liverpool, a military controller member observed that 'enhanced' co-ordination might also have been used to advantage. It was evident to the Board that the mentor had become sufficiently distracted, not to detect the developing confliction and consequently had made no attempt to co-ordinate the crossing of CAS. Therefore, the Board agreed that this Airprox had resulted because the CON 15 mentor did not ensure that the prescribed separation was maintained between the Tornado formation and the B737, which he was required to do.

Once the mentor realised that a confliction existed his corrective action was swift, positive and correct; although horizontal separation was still eroded to 2 NM, the lead Tornado was already 500 ft below the B737's level. Three further safety nets also came into play; TCAS played its part, resulting in 1000 ft vertical separation at the CPA, and the RIBEL SC issued an avoiding action turn after the STCA was triggered. Meanwhile, the Tornado pilot who had spotted the B737 from afar, had monitored the situation visually throughout. The Board agreed unanimously, therefore, that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: CON15 did not ensure that the prescribed separation was maintained.

Degree of Risk: C.

Contributory Factors: CON15 mentor became over distracted by other tasks.

AIRPROX REPORT No 72/01

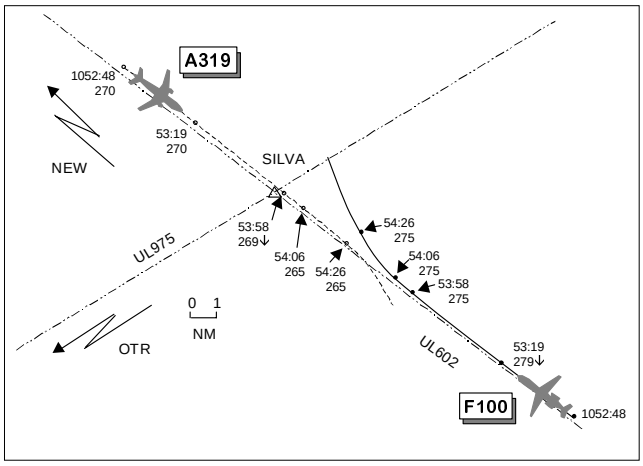
Date/Time: 14 May 1054

Position: 5356 N 0047 E (34 NM NE of OTR)

Airspace: UAR UL 602 (*Class:* B)

Reporter: MACC

	First Aircraft	*Second Aircraft*
Type:	A319	F100
Operator:	CAT	CAT
Alt/FL:	FL 270	↓ FL 260
Weather Visibility:	VMC CLOC >10 km	VMC CLOC Good
Reported Separation:	500 ft V NK H/<1000 ft V NK H	
Recorded Separation:	1000 ft V 0·75 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MACC PENNINE SC reports the sector was quiet when the F100 contacted him descending from FL 280 to FL 260 in accordance with the agreement for Newcastle inbound traffic on UL602. He issued a new squawk and looked at the radar to establish its radar identity. Immediately he noticed conflicting opposite direction traffic 10 NM ahead which the F100 pilot mentioned at about the same time. An avoiding action R turn was given onto heading 360° which was executed by the F100 crew together with a TCAS RA climb manoeuvre.

THE LATCC AC SECTOR 10-NORTH SEA (GOLES) SC reports the sector was busy owing to traffic 'bunching' and non-RVSM ac integration workload. He cleared the F100 to descend to FL 260, to be level 80 NM DME before NEW, which was through the level of the A319 opposite direction; he transferred the F100 to PENNINE sector. Another ac contacted him with a routeing query to an oceanic entry point and whilst he consulted his overhead map, the adjacent BEENO (SECTOR 11) SC made him aware of a traffic confliction at SILVA. Immediately he issued an avoiding action turn with TI and noticed the A319 had commenced a descent; the crew then reported following a TCAS RA.

THE A319 PILOT reports flying on airway UL602 between SILVA and DOGGA at FL 270 and M 0.77 in VMC. He received a TCAS TA alert *"traffic"* followed by an RA *"monitor vertical speed"* then *"descend"* with ROD demanded showing ±2500 ft/min. Descent was initiated, finally levelling-off at FL 265; he then acquired the conflicting traffic visually, but very late. As he passed abeam the other ac on his LHS, which appeared not to be climbing, ATC, who were very busy, issued a radar vector to the R. He assessed the risk of collision as high.

THE F100 PILOT reports flying in the cruise heading 315° maintaining FL 280 routeing towards NEW VOR in VMC. London ATC issued descent clearance to FL 260 to be level 80 NM DME NEW; shortly thereafter a frequency change to PENNINE RADAR was issued and acknowledged. During the frequency change, the Capt, PF, commenced descent using v/s mode and noticed opposite direction traffic on TCAS 25 NM ahead at FL 270. He stopped the descent at FL 279, he thought, whilst the FO, PNF, checked-in with PENNINE RADAR. The FO informed PENNINE RADAR they had been cleared to FL 260, but could see traffic ahead, 1000 ft below; was the SC aware of it? The controller said that he was but was not working it and instructed them to turn R heading 360°. During the turn he received a TCAS RA *"climb"* but then 1-

2 seconds later it changed to "*monitor vertical speed*"- and indicated to him to maintain his present level; he never saw the other ac visually. TCAS had made him aware of the confliction and although the R turn from ATC had meant there had been little risk of collision, he felt TCAS prevented what could have been a very serious incident. ATC said they would be filing a report, but asked if he wished to file also; he thought their report would be sufficient. However, when he was subsequently asked to complete a report for the incident 12 days later he had to do so from memory.

ATSI reports that the North Sea Suite was split at the time of the Airprox. The controller was operating as the GOLES SC and had been in position for about thirty minutes. He described the sector as "quite busy", partly because of a non-Reduced Vertical Separation Minimum (RVSM) compliant ac routeing through his airspace adding to his workload. He explained that he was still not fully experienced in the practical operation of RVSM and commented that, as far as he was concerned, the training he had received, in advance of its introduction into UK airspace (19 April 2001), had not been sufficient. The CAA/SRG Principal Inspector ATS (LATCC), during a subsequent discussion, described the RVSM 'training' carried out at LATCC more in terms of 'familiarisation'. He added that simulator time had been made available by AC Operations to any controller who felt the need for extra familiarisation.

The A319, eastbound on Upper Air Route UL602, established communication with the GOLES Sector at 1041, reporting maintaining FL 270. The pilot was passed a routeing of DOGGA and BLUFA, which he acknowledged. No further transmissions were made to, or received from, this flight until avoiding action instructions were passed nearly thirteen minutes later.

At 1045, the F100, which was routeing westbound at FL 280, via DOGGA to Newcastle on UL602 i.e. on a reciprocal track to the A319, made its initial call on the frequency. The LATCC MATS Part 2, Page NOR 3-25, states that: "LATCC is to descend Newcastle and Teesside inbounds to FL 260 level 80 DME NEW VOR and transfer ac to Pennine Radar, released for further descent, otherwise a radar handover must be given". To comply with this procedure, the GOLES SC, at 1050:30, instructed the F100 to descend, when ready, to FL 260, to be level 80 NM before Newcastle. However, this action did not take into account the potentially conflicting A319 which, by the SC's admission, he had overlooked. The radar at 1050:32, when the descent clearance is issued, shows the subject ac 59.2 NM apart, both tracking the centreline of UL602. When asked why he had overlooked the presence of the F100, the SC said that he could offer no definitive explanation. He surmised that, possibly, he forgot about the flight as it had been on frequency for some time and, because it was exiting the sector at the same level it had entered, there had been no requirement to pass it any executive instructions and, consequently, to monitor its progress closely. Additionally, at the time he issued the descent clearance to the F100, the radar return of the A319 would only just have been showing on his radar display because, he explained, the lower edge of the FPS display board had been in a position where it overhung the top of the radar screen. He confirmed that the confliction should have been apparent from the FPS display. Although he could not recollect their exact positioning, relative to each other, the respective FPS of both ac were displayed, as required, under the SILVA designator.

Unaware that he had created a potential confliction by issuing a descent clearance to the F100, through the level of the A319, the SC transferred the F100 to PENNINE RADAR at 1052:48. At the time the ac were approx. 25 NM apart and still maintaining FL 280 and FL 270 respectively. The SC said that, having transferred the F100, he received a call from an Oceanic flight querying its routeing after Newcastle. In order to answer this query, he had to look at the overhead canopy display, thereby distracting his attention from the radar. Consequently, he did not notice that, at 1053:19, the F100 had commenced its descent into confliction with the A319. He first became aware of the proximity of the two flights when his colleague, on the adjacent BEENO Sector, noticed the activation of the STCA and drew his attention to the situation. The ac were now 5 NM miles apart (1054:06) but vertical separation still existed because both crews had reacted to TCAS alerts; the F100 had levelled at FL 275 and the A319, which had started descending at 1053:58, was maintaining FL 265. At first, the SC thought that the F100 was in a L turn. Consequently, he passed the A319 an 'avoiding action' L turn heading 360°. Although realising that the F100 had been

transferred, his next action was to instruct it to stop its descent, just in case its pilot was still listening out on the frequency. It soon became apparent that the F100 was in a R turn (his initial belief that it was turning L might, with hindsight, have been caused by 'track jitter') and without waiting for a response to either of his transmissions, he instructed the A319 to: *"turn right now heading one eight zero avoiding action traffic in your twelve o'clock range three miles descending"*. The pilot replied that he had received a "*Traffic advisory"* and he reported *"we are turning right now"*.

On establishing communication with PENNINE RADAR, after transfer from the GOLES Sector, the pilot of the F100 reported descending to FL 260. The controller issued a PENNINE squawk in accordance with local procedures. In reply the pilot reported passing FL 275 with traffic 500 ft below at twelve o'clock. The controller said that, at the same time, he noticed the confliction and immediately issued an 'avoiding action' R turn heading 360°. The Pennine Controller was entitled to expect the flight to be 'released for descent' and so would not have been specifically looking for such conflicts. The pilot acknowledged the turn and advised he was climbing in response to a TCAS RA.

Fortuitously, due to pilot actions in response to TCAS alerts, standard separation was maintained throughout the incident. By the time that standard lateral separation was lost, vertical separation had been established, with the F100 maintaining FL 275 and the A319 FL 265 until after the encounter.

UKAB Note (1): Replay of the Claxby radar shows CPA occurring at 1054:26, the two ac passing 0·75 NM horizontally and 1000 ft vertically apart.

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.

ATSI appraised members on the RVSM training that had been programmed for ATCOs at LATCC. Each controller had 4 sessions of familiarisation in the simulator, during which they would be 'in control' for one session and be monitoring/watching for the other three. Additionally, there were extra monitoring days available should an ATCO feel the need, having completed the original 4 sessions. ATCO members agreed that RVSM had complicated the usual day to day operations, particularly when RVSM went live, owing to the mix of compliant/non-compliant traffic that had to be sorted out with different separation criteria (1000 or 2000 ft above FL 290). However, the operation of and training in RVSM procedures were not considered to be factors in this incident. For whatever reason, the GOLES SC had overlooked the A319 when he issued descent clearance to the F100 but could not offer a definitive reason for his action. He had acknowledged the A319 had entered and would be leaving the sector in level flight and because it had not required any control instructions during its transit he had not monitored it closely. Although the position of the fps display may have obscured the radar display when the descent clearance to the F100 was issued, the fpss themselves would have shown the confliction existed. Members agreed that the SC's low level arousal state monitoring the progress of the A319 in this situation was understandable but should not have occurred.

Turning to risk, the F100 crew had seen the A319 in potential confliction on TCAS at range 25 NM. They had commenced descent and then levelled-off at FL 275 whilst they queried the A319's presence with the PENNINE SC who then issued an avoiding action R turn which ensured the ac did not meet head-on. The A319 had received TCAS TA *"traffic"* and RA *"monitor vertical speed"* then *"descend"* warnings which he complied with, finally levelling at FL 265. The GOLES SC passed an avoiding action turn to the A319, after being prompted about the STCA alert by a colleague on an adjacent Sector, but this occurred as the A319 effectively passed abeam the F100, too late to have affected the A319's track. The Board concluded that all these factors combined had removed any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The GOLES SC descended the F100 through the level occupied by the A319.

Degree of Risk: C

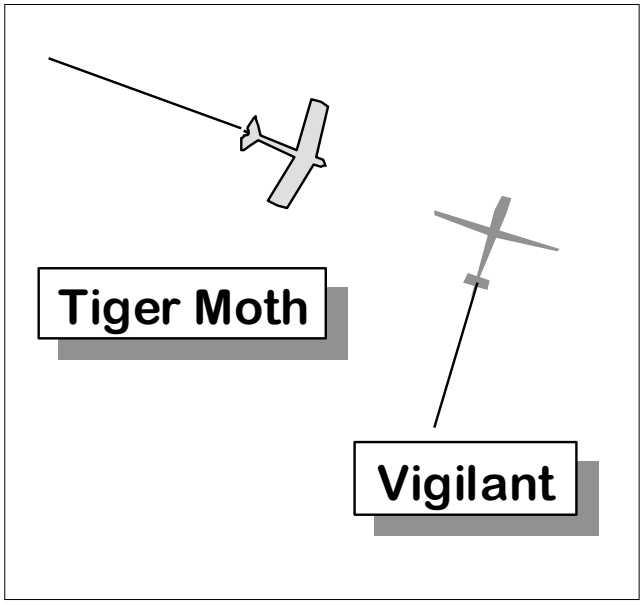
AIRPROX REPORT No 73/01

Date/Time: 19 May 1145 (Saturday)

Position: 5202 N 0217 W (1 NM NE ofHenlow - elev 170 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Vigilant	Tiger Moth
Operator:	HQ PTC	Civ Pte
Alt/FL:	700 ft ↑ (QFE 1019 mb)	1200 ft (QNH)
Weather	VMC CLBC	VMC CLBC
Visibility:	25 km+	15 NM
Reported Separation:	200 ft H /200 ft V, 200 yd	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VIGILANT PILOT, a QFI with student, reports heading 015° at 60 kt, climbing from Henlow after take off. When passing 700 ft he saw a Tiger Moth closing from 200 ft away at the same level on an easterly heading. He pitched down and banked to the left (the risk of collision would have been higher if he had turned right) and the other ac passed 50 ft away with a high risk of collision.

THE TIGER MOTH PILOT reports heading 110° at 70 kt en route to N Weald. He had called Luton to get clearance to enter the zone but could not hear their reply clearly enough due to poor RT reception so he routed clear of the zone to the N of Baldock and Letchworth. This meant routeing round Henlow so he briefed his passenger to keep a lookout for light ac and motor gliders. He saw 2 motor gliders taking off to the NE from right to left and watched them closely. The 2nd one was well out of the way but the first was closer so he kept a careful eye on it all the time, estimating that it would pass ahead of him, which it did by 200 yd and some 200 ft below. As it passed it rocked its wings. He did not consider there was any risk of collision.

UKAB Note: Neither ac shows on radar recordings, although the Vigilant pilot advised he was squawking 7000.

HQ PTC comments that there is a marked discrepancy between the 2 pilots' perceptions of the miss distance in this incident. While the Tiger Moth pilot believes that he had 2 Vigilants in sight at all times, neither dangerously close, there were up to 5 operating from Henlow at the time of the encounter. It is therefore possible that the reporting pilot's ac may have been closer to the Tiger Moth, unseen by its pilot, consistent with the reporting pilot's perception and avoiding action.

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.

It was pointed out that the Tiger Moth pilot, who had responsibly elected to remain clear of the Luton Zone in view of his communication difficulties, had a tricky route to negotiate through the Old Warden/ Henlow area. He might have followed the boundary of the conurbations to the S to remain clear of the Zone and Henlow, some suggested, but it was more important to remain clear of the former. If he had passed S of the airfield he might just as easily have conflicted with arriving traffic at Henlow as with departing traffic to the N. As it was, members accepted that the first ac he saw probably was the

reporting Vigilant; its subsequent manoeuvre lent some weight to this. The differing estimates of separation recollected by the pilots were not uncommon in an Airprox where one pilot had seen the confliction well before the other, and an ac seen late and close often seemed closer than it was. However the Board concluded that having seen the Vigilants in good time the Tiger Moth pilot could have turned well out of their way, and that the cause of the Airprox was that he had flown close to a notified glider site and into confliction with the Vigilant. The Board accepted, on the assumption that the Vigilant he saw was the reporting ac, that there was no risk of the ac actually colliding.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tiger Moth pilot flew close to a notified glider site and into confliction with the Vigilant.

Degree of Risk: C

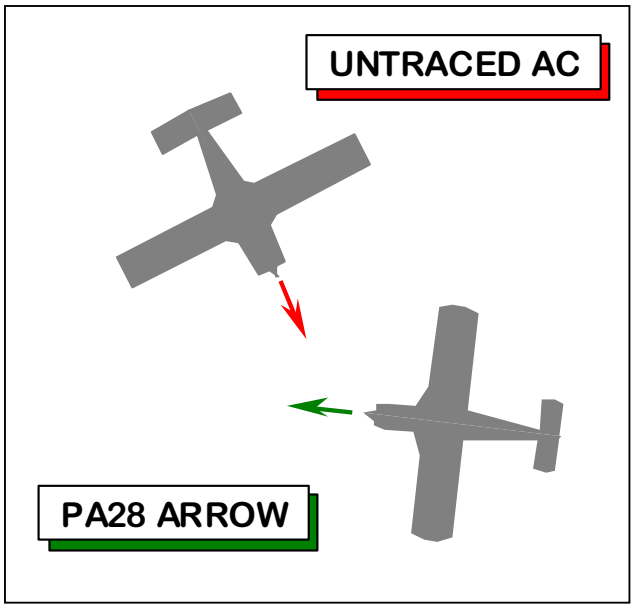
AIRPROX REPORT No 74/01

Date/Time: 19 May 1655 (Saturday)

Position: 5212 N 0027 W (2 NM N of Bedford)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Piper PA28 Turbo Arrow	Untraced
Operator:	Civ Pte	
Alt/FL:	2300 ft (QNH 1025 mb)	
Weather Visibility:	VMC CLBC 20 km	
Reported Separation:	Nil H, 10 ft V	
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PIPER PA28 TURBO ARROW IV PILOT reports his ac has a light brown livery and HISLs were on after departure from Duxford for Coventry Airport at 130 kt; he was flying at 2300 ft QNH (1025 mb), more than 1000 ft clear below cloud with an in-flight visibility of 20 km.

After switching from Duxford to Sywell RADIO on 122·7 MHz, just N of the town of Bedford heading 285°(M) and before he could initiate a call to Sywell, he suddenly spotted another ac at 2 o'clock – about 250 m away. He quickly realised that it was on collision course and reasoned that there was insufficient time to turn away so he dived into a negative 'G' bunt to avoid the other ac; the dive was quickly increased when the bunt seemed insufficient to resolve the conflict. The other ac, a white single engined low-wing monoplane which he thought might have been an AA5, passed about 10 ft above his ac on a steady course with a very high risk of a collision.

AIS (MIL) report that despite extensive tracing action they have been unable to ascertain the identity of the reported ac. None of the recorded LATCC radars illustrate this encounter. Therefore in the absence of radar data, all aerodromes in the vicinity that operate AA5s and ac of a similar description were contacted during procedural

tracing action. This proved fruitless so all AA5 owners were contacted individually, but again without result. Furthermore all of the aerodromes that operate GA ac within a 50 NM radius of the Airprox location were contacted and flight plan routeings checked, but to no avail.

UKAB Note: Tracing action was terminated by the UKAB on 15 Aug 2001, three months after the Airprox. Therefore, the reported ac remains untraced.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB was restricted solely to a report from the PA28 pilot.

Board members appreciated the efforts of AIS (Mil) who had conducted exhaustive tracing action but had been unable to identify the reported ac – an unusual and somewhat unsatisfactory outcome. In the absence of recorded radar data, there was very little information available to the Board to determine the cause and risk, apart from the PA28 pilot's laudably frank and comprehensive report. The geometry of this situation required the PA28 Turbo Arrow pilot to give way to the other ac under the Rules of the Air - if he had seen it in time to do so - but he reports he saw it at a range of only 250 m which was too close to comply. Without any information from the other pilot the members could only conclude that as the unknown ac passed a mere 10 ft above the PA28, its pilot had probably not seen the PA28 in time or at all, otherwise he would have taken avoiding action as well. In the open FIR, 'see and avoid' pertains, and this led the Board to assess that this Airprox resulted from a probable non-sighting by the pilot of the untraced ac and a very late sighting by the PA28 pilot. Turning to risk, in the short time available to him the PA28 pilot was only able to achieve a reported vertical separation of 10 ft, following the avoiding action dive. Therefore, the Board members agreed unanimously that an actual risk of a collision had existed in the circumstances reported.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Probable non-sighting by the pilot of the untraced ac and a very late sighting by the PA28 pilot.

Degree of Risk: A.

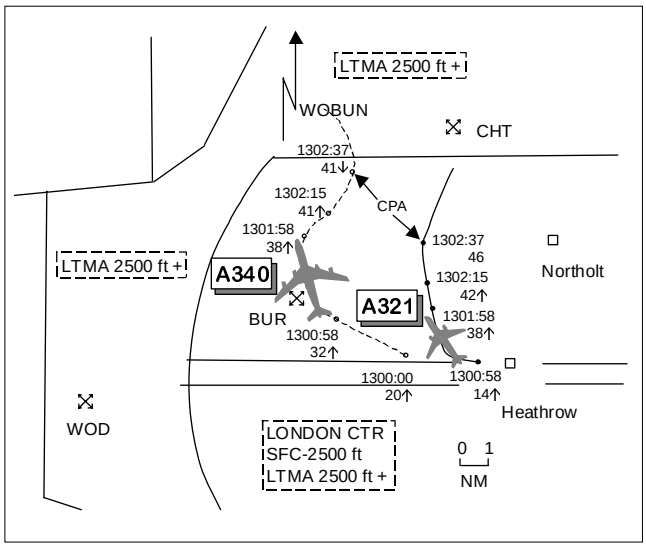
AIRPROX REPORT No 75/01

Date/Time: 16 May 1303

Position: 5134 N 0035 W (7 NM NW Heathrow - elev. 80 ft)

Airspace: TMA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	A340-300	A321
Operator:	CAT	CAT
Alt/FL:	4000 ft (QNH)	↑ 6000 ft (QNH)
Weather Visibility:	IMC KLWD	VMC CLOC 10 km
Reported Separation:	0 ft V 2·5 NM H	/1000 ft V 2-3 NM H
Recorded Separation:	500 ft V 3·7 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A340 PILOT reports flying a BPK 6F SID outbound from Heathrow at 280 kt level 4000 ft. Whilst in a R turn towards CHT NDB in IMC, ATC on frequency 118.82 MHz issued an immediate instruction to turn L and to descend to 3000 ft to avoid traffic. He disengaged the A/P and autothrust and flew the ac manually onto heading 300° and 3000 ft. During the L turn he noticed an ac on TCAS on his RHS about 2·5 NM away climbing through his level. No TCAS alerts were received during the encounter and the conflicting ac was not seen. He did not assess the risk of collision.

THE A321 PILOT reports departing Heathrow RW 27R on a WOBUN 2F SID climbing to 6000 ft at 220 kt. When airborne, he requested an early R turn to avoid weather, from the Heathrow ADC, which was approved. On transferring to LATCC radar frequency 119.77 MHz, he informed them that he was heading 340° to avoid weather; the controller seemed unaware of his deviation from the SID. He was instructed to stop climb at 4000 ft and to turn further R. He saw an A340, visually and on TCAS, ahead and to his L range 2-3 NM at about the same level. No TCAS alerts were received and he assessed that there had been no risk of collision. He opined that communication between the ADC and LATCC radar controller needed to be improved.

ATSI reports that the Heathrow DEPS controller described the traffic loading and workload as "extremely high" and considered that she had been close to being overloaded. She estimated that there had been up to 20 ac on frequency at times, awaiting departure, compared with a normal figure of 8-10.

The main reason for the high workload and traffic loading was the severe weather which was disrupting operations throughout the London TMA. It was while the A321 was in the process of avoiding weather that the Airprox occurred. The relevant ATC equipment was serviceable at the time of the Airprox.

The A340 was cleared for take off from Heathrow RW 27R at 1257:30 on a BPK 6F SID. The next departure was the A321, on a WOB 2F SID, which was cleared for take off at 1259:40. This was in accordance with the minimum specified departure separation of 2 minutes. The BPK and WOB SIDs are similar in that they both initially require ac to track towards the 'BUR' NDB prior to turning R, NE towards the 'CHT' NDB, in the case of the former, and N towards WOBUN, in the case of the latter.

The A340 was transferred to TC NE DEPS a few seconds later and established communication with the TC SC at 1300:00, reporting passing 2000 ft. The flight was instructed to squawk ident and maintain 6000 ft on reaching. The standard 250 kt speed restriction below FL 100 was removed.

Shortly after getting airborne, while still climbing straight ahead and before reaching 1500 ft, the pilot of the A321 requested an early R turn in order to avoid weather. The Heathrow DEPS controller replied *"....roger start your R turn now"*. Rather than following the SID routeing, via the 'BUR' NDB, the A321 then turned onto a heading of 340°, thereby turning inside the A340, which had followed the standard SID routeing without comment. Having acknowledged the instruction to turn R *"now"*, at 1301:00, the pilot of the A321 was instructed to contact the TC NW SC.

Later, the Heathrow DEPS controller was well aware that her handling of the A321's request to avoid weather was inappropriate. She explained that, given more time to consider the full implications of the request, she would have probably reacted differently but, in the heat of the moment, she had assumed, wrongly, that the A321 merely wished to turn early for 'BUR'. Had that been the case, it is unlikely that separation with the A340 would have been compromised, however, there are several constraints placed on Heathrow DEPS controllers which prevent them unilaterally permitting ac to deviate from their assigned SID. In the first place, SIDs reflect Noise Preferential Routeings and, under normal circumstances, ac should not be deviated from their SID routeing until they are at or above an altitude of 4000 ft. Controllers are authorised to permit deviations from the SID routeing on safety grounds, which could include weather avoidance, however, the SIDs are also designed to provide separation from the Northolt Radar Manoeuvring Area (RMA) and, for this reason, there is a requirement for any deviation from WOBUN and BPK SIDs to be co-ordinated with Northolt. In addition, the departure separations

in use at Heathrow, which are based on speed groupings, are predicated on ac initially adhering to SID routeings and any deviations from these routeings must be approved by, or co-ordinated with, TC.

The Heathrow controller also explained that, in most cases, pilots request weather avoidance prior to getting airborne, it being unusual to receive requests from ac just airborne, as in this case. She confirmed that she was fully aware of the requirement to co-ordinate deviations from SID routeings and that, in these particular circumstances, the best option may have been to instruct the A321 to contact TC and make the request for an early R turn with them.

The A321 established communication with the TC NW SC, at 1301:20, and the pilot reported *"....passing three thousand feet heading three four zero to avoid"*. The SC did not pick up the significance of this transmission and the flight's early R turn on to heading 340° was not apparent, at that time, on radar. Consequently, the A321 was merely instructed to squawk 'ident' and the speed restriction lifted. The developing conflict, which had been created as the A321 turned inside the A340, came to the attention of the TC controllers approximately 20 seconds after the A321 had contacted TC NW. The TC NE DEPS SC, at 1301:58, instructed the A340 to turn L *"immediately"* on to heading 360°. At that stage, the A340 had just turned through N, prior to picking up the NE track to the 'CHT' NDB, with the A321 in its 4 o'clock position at a range of 5·5 NM. The TC NE SC went on to pass TI on the A321 and then instructed the A340 to stop its climb at 4000 ft, changed this to an instruction to descend to 3000 ft and finally instructed it to *"continue that L turn to turn away from him"*. At 1302:40, the pilot of the A340 reported descending to 3000 ft and turning L on to heading 300°.

In the meantime, at 1302:15, the TC NW SC had instructed the A321 to descend to 4000 ft, it was passing approximately 4200 ft, and to turn R heading 020°. It soon became obvious to the TC controllers that the A321 had a much higher ROC than the A340 and so, at 1302:45, the A321 was instructed to resume its climb to 6000 ft. Thereafter, lateral separation increased as the flights established on diverging headings and standard vertical separation was quickly restored as the A340 descended and the A321 climbed. The minimum separation occurred at 1302:37, when it was 3·7 NM/500 ft, which meant that, due to the actions taken by the TC controllers, standard separation was not compromised. The radar recording indicates that a low severity STCA activation commenced at 1302:20.

At 1302:00, a TC controller, believed to be a Co-ordinator, telephoned the Heathrow DEPS controller to see whether she was still working the A321 and to point out the conflict with the A340. The Heathrow controller advised that she was no longer working the A321 but called the ac to see whether it was still listening out. Another flight, operated by the same company, took the call initially but then advised that it had done so mistakenly. Nevertheless, the controller, who was still on the telephone to TC, believed that she had re-established communication with the A321 and attempted to issue an 'avoiding action' instruction to turn L onto heading 260°. Fortunately, under the circumstances, there was no response to this instruction.

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.

Discussion of the incident initially concentrated on the scenario from the Heathrow DEPS controller's perspective. ATCO members agreed that it was unusual for weather diversion requests to be made immediately when airborne, as in this case, but it was notable that the preceding ac, the subject A340, had flown the initial part of the SID without making such a request. They went on to make 2 points. First, the DEPS position was busy with ac on frequency awaiting departure, but the situation seemed perfectly manageable since take-off spacing was under her control. If need be she had the option to delay (i.e. slow down) the traffic flow by queuing ac on the ground during peak traffic levels within any given period. Second, she had been fully aware of the implications of allowing ac to deviate from the SID but it was clear that even a minor off-route deviation (e.g. an early turn to BUR)

would still have required prior co-ordination. From this background, members agreed that the Heathrow DEPS Controller had allowed the A321 to depart from the SID without prior co-ordination which then flew into confliction with the A340. It was acknowledged that the ATC system required as much notice as possible (particularly from ac awaiting departure) successfully to effect the required co-ordination. Members sympathised with the DEPS controller's predicament but her best option would have been to turn down the A321 pilot's late weather avoidance request and for the pilot to make the same request on the next (TC Radar) frequency. As it was, the TC NW SC had missed the A321 pilot's heading report, on initial contact, which should have alerted the SC to the deviation from the SID. Members wondered whether the removal of the ATC speed restriction and instruction to squawk ident had become, subconsciously, a habitual/automatic routine response born out of every day use. If so, this was a good learning point for all to note; the importance of listening closely to what was said on the RT cannot be over-emphasised enough.

The TC NE SC had very quickly noticed the developing situation and had started to take avoiding action with the A340 by turning it L and descending it. This was followed swiftly by the TC NW SC turning the A321 R, initially stopping its climb, but then climbing it to 6000 ft out of confliction. These combined prompt actions by the SCs meant that standard separation was never compromised. The A340 crew had seen the A321 on TCAS and the A321 crew had seen the A340 on TCAS and visually; both crews were carrying out ATC avoiding action at the time. All of these elements in combination persuaded the Board that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Heathrow DEPS Controller allowed the A321 to depart from the SID without co-ordination and into conflict with the A340.

Degree of Risk: C

AIRPROX REPORT No 76/01

Date/Time: 21 May 1000

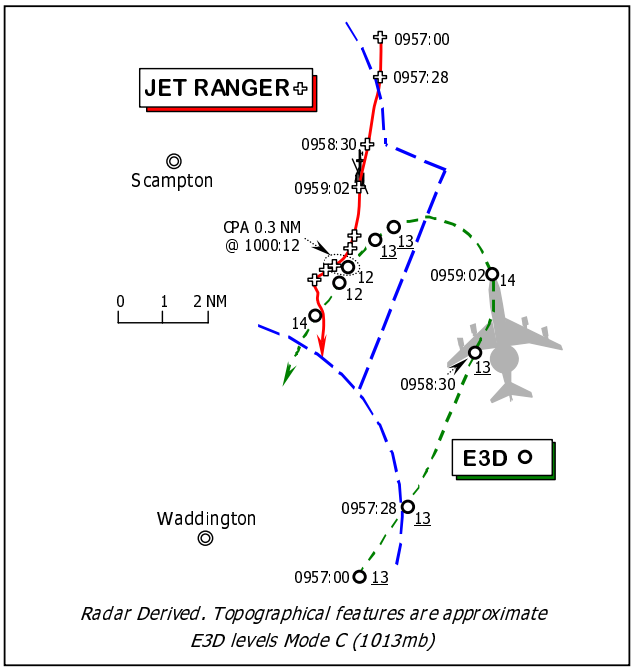
Position: 5316 N 0027 W (7 NM NNE addington - elev 231 ft)

Airspace: MATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	E-3D Sentry	Jet Ranger
Operator:	HQ STC	Civ Pte
Alt/FL:	1500 ft (QFE 30·09 in)	2000 ft (QFE 1019 mb)
Weather Visibility:	VMC HAZE 15 km	VMC NIL SIG >10 km

Reported Separation: 2-300 m H, 200 ft V 0·5 NM H, 300 ft V

Recorded Separation: 0·30 NM H (555 m)



Radar Derived. Topographical features are approximate
E3D levels Mode C (1013mb)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE E-3D SENTRY PILOT reports his ac is camouflage grey with a distinctive black/white radar rotodome and HISLs were on. He was conducting a General Handling (GH) sortie and inbound to

Waddington at 1500 ft QFE under a RIS from Waddington DIRECTOR (DIR) who was vectoring the ac for an ILS approach to RW21 at 210 kt. The assigned squawk was selected with Mode C, but TCAS is not fitted.

DIR had passed traffic information to him about another ac 3 NM to the NW, southbound, at 2000 ft. Whilst in a level turn to intercept the LLZ for RW21, turning L through 250° down-sun, the previously reported ac was spotted L of the nose at a lower height than anticipated. Recognising that this ac was in confliction at a similar height he tightened the turn by increasing to 45° AOB to avoid the other ac, which rapidly became identifiable as a Jet Ranger helicopter with a white/red livery. In addition to horizontal avoidance, with the ground in sight he initiated a slight descent to ensure that they were flying away from the Jet Ranger, which passed down the starboard side about 2-300 m away and no more than 200 ft above his ac. The E3D was descended no lower than 1350 ft QFE to avoid the helicopter, which appeared to be on a southerly heading at about 1600 ft QFE through the RW21 extended centre-line. He added that he was concerned that the helicopter may have been affected by the wake from the E3D; the risk was assessed as *"moderate"* and he reported the Airprox to ATC by telephone after landing.

UKAB Note (1): The height of an E3D Sentry is 41 ft 9 in and it was not 'radiating' at the time of the Airprox.

THE JET RANGER PILOT reports his helicopter is white with a red/blue striped livery; but HISLs are not fitted. He was flying from Humberside to a private HLS at Henley and squawking A3601; neither Mode C nor TCAS is fitted. Whilst crossing the Waddington MATZ at 2000 ft QFE (1019 mb) under a 'MATZ Crossing Service' from Waddington ZONE, heading 185° at 100 kt he was advised by ZONE of another ac 500 ft below them at 1500 ft. The E3D was spotted at 10 o'clock about 3 NM away, heading N he thought, and as he was southbound did not envisage a problem. However, the E3D began to turn towards his helicopter and was now approaching from 8 o'clock – his blind spot - at a similar height; as he was no longer visual with the E3D he relied on information from his passengers. When he believed the other ac was getting too close, he turned to the right. The E3D pilot also took avoiding action at about the same time, he believed, and passed about 0·5 NM to port and 300 ft below his Jet Ranger heading southerly.

He assessed the risk was *"low"* and added that arrangements were in hand to have his helicopter's altimeter calibration checked, although it did not give any cause for concern during pre-flight checks at Humberside.

UKAB Note (2): In a subsequent telephone conversation the Jet Ranger pilot reported that his helicopter's altimeter had been checked and found to be serviceable. His LHS 'passenger' was a qualified commercial helicopter pilot.

UKAB Note (3): The UK AIP at ENR 2-2-4-1, promulgates procedures for the penetration of MATZ by civil ac. "The ATSU providing the MATZ Penetration Service will give traffic information and any instructions necessary to achieve safe separation from known or observed traffic in the zone. The service will, whenever possible, be based on radar observations and either a RAS or RIS will be given. When radar separation cannot be applied, vertical separation of at least 500 ft between known traffic will be applied. When safe lateral or vertical separation cannot be achieved, pilots will be advised to avoid the MATZ."

MIL ATC OPS reports that the co-ordination effected between Waddington ZONE and DIR regarding the subject ac was conducted face-to-face and was, therefore, not recorded on the relevant tape transcripts.

The E3D was turning downwind to RW21 in Waddington's Radar Training Circuit (RTC) at 1500 ft QFE (30·09 in/1019 mb) whilst under a RIS from DIR. After the pilot reported steady heading 035° at 1500 ft, DIR verified the E3D's Mode C response before eliciting the pilot's procedure minima. At 0957:00, whilst the E3D was steady downwind, DIR transmitted *"C/S, roger, traffic left eleven o'clock range ten miles* (slow) *moving southbound two thousand feet QFE"*, which was acknowledged. Shortly afterwards, DIR adjusted the E3D's track left onto 025° before instructing the crew to turn L inbound onto a heading of 230° at 0958:38. Twenty sec later at 0958:58, whilst the E3D was in the L turn, DIR transmitted *"…previous reported traffic north west, three miles, southbound"*; the E3D crew replied *"C/S, looking"*. At 0959:53, the E3D crew was advised to listen out on DIR's frequency for

Waddington TALKDOWN, who identified the ac a few sec later reporting the ac's position as 7·5 NM from touchdown for RW21. The E3D crew confirmed the QFE as 30·09 in and reported the localizer established. At 1000:20, the E3D crew broadcast *"C/S is coming left to avoid rotary traffic at one thousand seven hundred feet our position",* adding that *"he's not at two thousand feet, he's about one thousand five hundred feet"*, which was acknowledged by TALKDOWN. At 1000:49, TALKDOWN endeavoured to reassure the E3D crew but transmitted in error that the Jet Ranger was not above 1500 ft QFE. However, the crew did not hear the whole transmission and asked TALKDOWN to repeat the call whereupon at 1001:22, TALKDOWN corrected his previous transmission and broadcast *"C/S, that traffic is confirmed at two thousand feet on Waddington QFE"*, which was acknowledged. The E3D crew resumed their approach and later filed an Airprox report.

The Jet Ranger Helicopter, was identified by Waddington ZONE, manned by a UT controller and mentor, in the vicinity of Scampton at 1500 ft BARNSLEY RPS (1023 mb) and placed under a FIS whilst en-route to an HLS at Henley. After the Jet Ranger pilot acknowledged the RPS and FIS he added at 0953:10, *"…we'd also like a MATZ crossing if we may…we will remain clear of Scampton…looking to route direct through the Cranwell overhead"* and hence through the Waddington and Cranwell MATZs. Whereupon ZONE instructed the Jet Ranger pilot to *"..set Waddington QFE one zero one nine, climb report level two thousand feet"*. This was readback correctly at 0956:01, *"climb and report level 2000 ft, 1019* C/S*"*, followed at 0956:14, by ZONE transmitting "*C/S, your MATZ crossing is approved at two thousand feet QFE one zero one nine – there is instrument traffic below you"*; the Jet Ranger pilot replied *"C/S that's copied, understood, we will report level"* which he did at 0957:28, "C/S *level 2000 ft"* and acknowledged by ZONE. At 0958:33, ZONE transmitted traffic information to the Jet Ranger pilot *"*C/S*…instrument traffic in the Waddington circuit is now left one o'clock,* (UKAB Note (4): ZONE probably meant to say 11 o'clock!) *five miles, tracking north at one thousand three hundred feet"*. (UKAB Note (5): Probably the observed Mode C indication at the time). This was acknowledged by the Jet Ranger pilot initially reporting *"..copied looking not visual"*. However, at 0958:55, he reported that he had the traffic *"visual"*. At 1000:04, the Jet Ranger pilot transmitted *"*C/S*, we're just taking avoiding action and we're making a right turn for that traffic"*; ZONE responded *"…the traffic is five hundred feet below, co-ordinated"*. The Jet Ranger pilot continued *"Thanks a lot, just felt a little bit too close for comfort really"*. The Mentor reassured him that the size of the E3D probably made it look a lot closer than it actually was and asked the Jet Ranger pilot to confirm that he was still at 2000 ft, who replied at 1000:57, *"Affirm, altitude two thousand feet, one zero one nine millibars"*.

The radar recording shows the E3D in the RTC squawking 3/A 3631 indicating 1200-1400 ft Mode C (1013 mb), which equates to about 1380-1580 ft QFE (1019 mb - 30·09 in), having completed a L turn onto a track of 025° on the downwind leg to RW21. The Jet Ranger is seen NE of Scampton tracking 190° squawking A3601, but with no Mode C as it is not fitted. At 0957:00, the time of DIR's first traffic information call, the E3D is 3·5 NM E of Waddington tracking 030° indicating 1300 ft Mode C (1013 mb) (1480 ft QFE), whilst the Jet Ranger is 5·5 NM NE of Scampton tracking 190° and 10-11 o'clock - 12·5 NM to the E3D. Both ac converge on their respective tracks over the next 2 min. At 0959:00, 5 sec after the Jet Ranger pilot called visual with the E3D, and 2 sec after DIR's second traffic information call to the E3D crew, the Jet Ranger is maintaining track 4·5 NM E of Scampton, whilst the E3D is maintaining track 8·5 NM SE of Scampton indicating 1400 ft Mode C (1580 ft QFE); the Jet Ranger at 9-10 o'clock - 4·5 NM to the E3D. A few sec later, the E3D crew began their inbound L turn onto 230°, towards the Jet Ranger. At 0959:49, the E3D is passing through W indicating 1300 ft Mode C (1480 ft QFE) with the Jet Ranger 1 NM WSW maintaining track. At 1000:00, with the 2 ac about 0·5 NM apart, the Jet Ranger pilot's avoiding action turn is shown as the helicopter appears to alter course by 15-20° to starboard whilst the E3D continues its turn through 250°. The CPA occurs at 1000:12 with both ac on a similar track - their radar contacts almost touching – with the E3D indicating 1200 ft Mode C (1380 ft QFE) reflecting the pilot's reported avoiding action descent. The contacts then begin to diverge as the E3D's greater speed takes it clear of the slower helicopter. As the E3D clears to the SW, its Mode C climbs to 1400 ft (1580 ft QFE), then descends as the ac begins its approach, whilst the Jet Ranger

pilot begins a port turn to resume his original track.

Both the Supervisor and DIR checked the PAR display as soon as they became aware that the E3D crew had reported that the helicopter was apparently lower than 2000 ft QFE; both agreed that the 2 radar returns appeared to be closer than 500 ft vertically, but that the helicopter appeared to be the higher ac. TALKDOWN also stated that there did not appear to be 500 ft separation between the ac in elevation, but this was most likely to have been a conclusion drawn with the benefit of hindsight and was not specifically noted at the time. It should also be noted that the confliction occurred very close to the RW21 extended centreline and as TALKDOWN would have been actively tracking the E3D's approach from the L, the helicopter's radar contact would have only appeared 'in elevation' at a very late stage, once it had entered the narrow elevation beam. It is probable, therefore, that the E3D pilot noticed the confliction before the Jet Ranger was displayed to TALKDOWN.

DIR and ZONE entered into an early dialogue to ensure that both tracks were co-ordinated and vertically separated by 500 ft on a common pressure setting - QFE. The tape transcript also confirms that TALKDOWN, ZONE and DIR verbally and visually verified that the subject ac had been allocated the correct pressure setting and that both ac were transiting at their assigned heights. Thankfully, the traffic information provided by DIR and ZONE was sufficiently accurate for the pilots of both ac to become visual with each other's ac and adjust their tracks accordingly. Under the circumstances, Waddington ATC's actions should have afforded adequate separation between the subject ac without any need for additional manoeuvring.

HQ STC comments that although all indications are that 500 ft vertical separation existed between the ac, both pilots were clearly sufficiently concerned to take avoiding action. However, correct traffic information had been passed to the E3D crew and the Jet Ranger pilot had been warned appropriately. It is feasible, therefore, that the size of the E3D may have led to an impression of loss of vertical separation although its pilot's concern would suggest that, in reality, less than 500 ft vertical separation might have existed.

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 evident to the Board that without Mode C height data from the Jet Ranger – with which it was not fitted – it was not feasible to determine the height of the helicopter during this encounter with any certainty. Some thought the information provided by the Waddington ATC Supervisor and the PAR controller from their interpretation of the PAR display was significant. Conversely, controller members more familiar with the type of PAR equipment in use at Waddington, thought that the size of the E3D's PAR return would have made any accurate determination of the vertical separation from the PAR elevation display problematic. Nevertheless, both pilots had clearly 'read-back' their assigned heights to fly on the correctly acknowledged altimeter pressure setting – QFE - and both had confirmed they were flying level at their respective heights before (and additionally the Jet Ranger pilot after) the event. This gave a theoretical vertical separation between the two ac of 500 ft, which was the normal vertical separation minima employed by military ATC; the latter had evidently done all they could to ensure a safe transit for the helicopter through the Waddington MATZ above the RTC, including appropriate traffic information which had enabled the pilots to sight each other's ac. Even the check of the Jet Ranger's altimeter had not revealed any significant reason for concern as to its accuracy. None of the members doubted that each pilot involved had accurately related his view of the occurrence, but the puzzle was that none of this explained what caused the two pilots each to initiate avoiding action of their own volition when 'standard separation' should have existed.

From the Helicopter pilot's perspective, members could understand his actions if he had suddenly encountered the larger ac without warning in unusual circumstances – but this was not the case here. Whether his helicopter pilot 'passenger' gave the Jet Ranger pilot a misleading impression of the separation that pertained when the latter lost sight of the large E3D could not be determined.

However, the RT clearly revealed that the helicopter pilot thought it was *"…too close for comfort…".* Similarly, the E3D pilots were concerned enough to take avoiding action both in the horizontal and vertical plane to ensure sufficient clearance from the helicopter existed and the E3D's wake did not cause undue disturbance to it. Some members wondered if it might have been better if the E3D had reduced the AOB, allowing it to pass astern of the helicopter thereby enabling the E3D pilots to keep the helicopter in sight for longer, although this would probably have meant abandoning the ILS approach to continue instead displaced on the dead-side. However, this still did not explain the fundamental anomaly and members tried to fathom how it could occur. It was easy enough to suppose why the pilot of a smaller ac might be concerned at a close encounter with another much larger four-engined ac, and here the E3D's rotodome and large wing span in the turn could certainly contribute to a misleading impression of close proximity because of its size. However, the reverse case seemed unlikely unless the E3D pilots were seriously concerned over the effect of their ac's wake on the helicopter. A CAT pilot member postulated that high bank angles - 45° in this case - could give a very deceptive impression of vertical separation to the E3D crew, leading them to believe that the helicopter was closer to their own height than anticipated. However, this was all conjecture and the Board could neither prove nor disprove the actual separation that had pertained. Allied to this a helicopter pilot member asked that as the carriage and operation of Mode C was mandated in CAS should it also be mandated for flight through or in a MATZ? This was an interesting side issue, worthy of further consideration by the appropriate bodies but it did not lead to a UKAB recommendation in this case.

In the end the Board could only conclude that this Airprox resulted from a perceived conflict in the Waddington MATZ resolved by both pilots, who felt that such action was warranted. Both pilots had been well aware of each other's ac from traffic information provided, which had led to their own sightings and subsequent action to remove any possible risk of collision. So, despite the recorded horizontal separation of 0·3 NM, the members agreed that safety had been assured throughout.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Perceived conflict in the Waddington MATZ resolved by both pilots.

Degree of Risk: C.

AIRPROX REPORT No 77/01

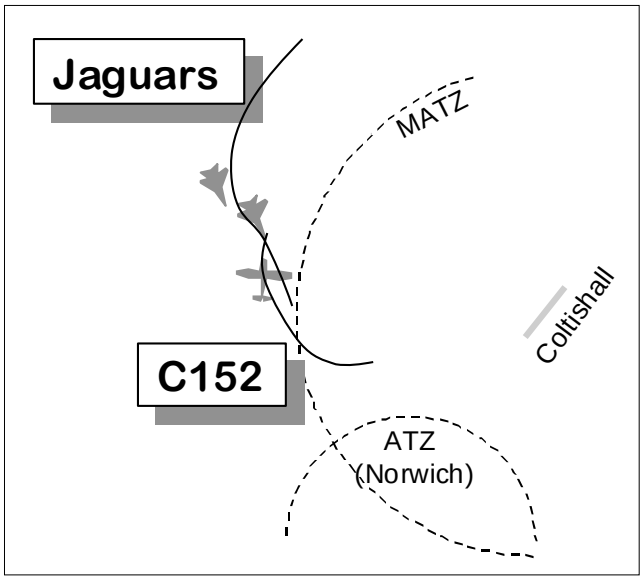
Date/Time: 22 May 1556

Position: 5246 N 0112 E (5 NM W of Coltishall)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Jaguar	C152
Operator:	HQ STC	Civ Trg
Alt/FL:	2600 ft ↓ (QFE 1023 mb)	2500 ft (RPS 1021 mb)
Weather	VMC CAVK	VMC CLOC
Visibility:	7 NM	10 km+
Reporting Separation:	50-100 ft V	/200 ft V

Recorded Separation: NK



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JAGUAR PILOT reports heading 155° at 380 kt on recovery to Coltishall as No 2 of a pair. About 1 minute after changing to tower frequency, and without any traffic information (TI), a white high wing ac passed about 50 ft beneath, on a reciprocal heading, as the Jaguars passed 2600 ft in the descent from 3000 ft to 1200 ft QFE. The light ac was not seen to take avoiding action and none was taken by the Jaguars as the sighting was too late. The risk of collision was extremely high.

THE C152 PILOT reports heading 330° at 90 kt and receiving a RIS from Coltishall Approach on 125·9, squawking 1745 and at 2500 ft RPS as advised to Coltishall. His ac was white with thin red/blue stripes. He was warned of the recovering Jaguars in his 12 o'clock which he saw well ahead; he was told they would pass below but in fact they passed about 200 ft above and slightly to the right. He took no avoiding action as he was uncertain whether the descending Jaguars would pass above or below, and he considered there was a high risk of collision.

MIL ATC OPS reports that liaison between the radar controllers within the Coltishall Approach Room was conducted 'face to face' at adjacent control positions and so is not recorded. At about 1548, the Coltishall Zone (ZONE) controller noticed a radar contact about 5 NM ESE of Coltishall, heading W and asked the Coltishall Approach (APP) controller if he knew what it was. APP did not at the time, but shortly afterwards the Norwich Approach controller (sat next to APP) passed him (APP) details of the ac, a C152, to cross the MATZ at 2500 ft. APP assigned a squawk for the C152 (1745) to Norwich and passed the details to ZONE, who logged them on a FPS. The C152 pilot called ZONE on frequency 125·9, was identified, and instructed to fly at 2500 ft on the Yarmouth RPS (1021 mb) for the MATZ crossing; the ac was not squawking Mode C. The 2500 ft crossing level provided more than 1000 ft separation from the Coltishall circuit height of 1200 ft, hence it was not considered necessary to instruct the pilot to fly on the QFE, which was only 2 mb different (1023).

The formation of 4 Jaguars freecalled APP at 1550:58 on frequency 315.325 to the NE of Coltishall, and requested a visual recovery to RW 04. Because the visual circuit was busy, APP instructed the Jaguars to make a 'wide' approach, remaining clear of the MATZ initially. The Jaguars separated into two pairs, with C/S 3&4 taking up a 10 NM trail behind C/S 1&2. APP transferred C/S 1&2 to the Tower frequency at 1553:48 after the lead pilot had called visual. About 30 sec later, the trailing pair reported *"...wide downwind at three thousand feet"* and APP replied *"C/S 3&4 roger thanks, I should be able to fit you in now if you maintain your current track and positioning."* Just after this, APP observed what he thought was the C152's track about 3 NM SW of the airfield, heading W. APP looked over at ZONE's flight strips and saw a 1745 SSR code logged as a Jaguar operating between FL 140 and FL 160; he therefore disregarded the ac as no confliction. APP then ascertained the intentions of both pilots, checked with the VCR, and transmitted *"C/S 3&4, there's two in the visual circuit, continue visual recovery"* at 1555:20.

Meanwhile, ZONE noticed the recovering Jaguars tracking toward the C152 and, at 1555:24, transmitted *"(C152 C/S) traffic, er, just passing overhead Aylsham* (which is 5 NM NW Coltishall) *this time, southbound indicating similar level, believed to be fast jet"*. The C152 pilot replied *"..looking."* The Jaguar pilots advised *"..visual to Tower, squawking standby"* at the same time, and called Tower (ADC) at 1555:40. ADC responded *"C/S 3&4 Coltishall Tower, join runway zero four, QFE one zero two three, two in."* At 1556:00, ZONE transmitted to the C152 pilot *"...previously called traffic is now north of you, two miles, passing underneath, joining Coltishall descending below you."* The pilot acknowledged, said he was looking and then, at 1556:15, transmitted *"And C/S, got two aircraft high."* At 1556:39, the No 4 Jaguar pilot transmitted to ADC *"Tower C/S 4 reporting an Airprox about thirty seconds ago, more details on the ground."*

The Cromer radar replay shows the C152 (squawking 1745) passing about 1 NM S of Coltishall on a westerly heading. A second 1745 squawk with Mode C (another Jaguar) can be seen about 10 NM NW of Coltishall, tracking N at an indicated FL 150. Jaguars No. 3&4 coast in about 7 NM NNE of the airfield at an indicated 3000 ft. At

1555:24, the time that the Jaguars left APP's frequency and ZONE passes TI to the C152 pilot, the Jaguars are about 6·5 NM NW of the airfield, tracking SW and the C152 is 5 NM W of Coltishall having just commenced a R turn. In relation to the Jaguars, the C152 is 30º L (11 o'clock) range 5·5 NM and moving very slowly. SSR is lost from the Jaguars at 1555:38, as the pilot squawks standby with the last Mode C indication showing 2700 ft. Immediately after this, the Jaguars turn S, with the (now northbound, but almost stationary) C152 3·5 NM to the S of them. The radar contacts merge at 1556:17, as the Jaguars roll out heading about 160º, passing through the C152's contact from 11 o'clock to 5 o'clock.

It had always been APP's intention to advise the recovering Jaguars pilots about the MATZ crosser; indeed, straight after the incident he believed that he had actually done so at an early stage of the recovery. The RT recordings do not support this. In an attempt to pass what he thought would be an update on the MATZ crosser, he glanced at ZONE's flight strip display and saw the 1745 squawk allocated to a Jaguar at medium level. A number of what could be described as 'logical assumptions' now took over APP's train of thought, with the result that he mistook the contact's slow forward speed and lack of Mode C to be a Jaguar manoeuvring rapidly in the vertical plane, whose Mode C response had 'dropped out' briefly. All this occurred despite the fact that he had allocated the same SSR code to the Norwich controller only about 5 min previously. ZONE was aware that the 1745 SSR code was already in use but by the time he had realised, the MATZ crossing information (including SSR code) had already been passed to ADC; at the time, the Jaguar with the same code was well separated from the C152 and ZONE saw no point in changing either squawk as he was entirely happy with the identities of the ac concerned. ZONE was not of course, expecting another controller to use his flight progress strip display as a sole means of obtaining TI. This is one of the major learning points to highlight from this incident, particularly for personnel at ATS Units who possess a relatively small SSR code allocation block.

ZONE acted wisely in highlighting, and updating, the position of the Jaguars to the C152 pilot. His implication in the update that the Jaguars would pass beneath the C152 was an assumption (although understandable) however, based on the fact that the ac were recovering to Coltishall as, by this time, there was no height information available to him. Although visual with the Jaguars, the C152 pilot was clearly poorly placed to attempt any effective avoidance manoeuvre.

The ADC had been aware of the C152's position as it crossed the MATZ. It is normal practice for ADC to reiterate the presence of ac crossing the MATZ to joining ac and this had been done for the ac that had joined in the previous minutes. Before the subject Jaguars called however, the C152 had passed well clear of the circuit area (confirmed from the ATM/DFTI) and ADC no longer considered it to be a problem to his traffic. During this and the preceding period, the visual circuit had been very busy. By the time the Jaguars called him to join, the C152 was virtually clear of the MATZ and so an information call regarding the crossing ac was not made. As things stood, the Jaguars called ADC with only about 30 sec to go before the merge, leaving at the most about 20 sec of useful RT time available to discuss the C152's position. With the benefit of hindsight, an information call from ADC about a MATZ crosser at 2500 ft *may* have been sufficient to prompt the Jaguar pilots to have descended through that height a little quicker than they did, although this would have been their first indication of the C152's presence and so its significance may not have been assimilated in time.

HQ STC comments that although both ac had been receiving TI, and while both pilots were responsible for collision avoidance, a timely warning to the recovering Jaguars, or at least some indication of the MATZ crosser, could have prevented the incident. The controller in question has been debriefed accordingly and the incident has been widely publicised amongst local controlling staff. That aside, the MATZ is Class G airspace and without a radar service, the need for good lookout remains.

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.

The ATC aspects of this incident, members considered, were full of assumptions which could easily have been checked since the controllers concerned were sitting together. It was clear that the assumptions which led APP to misidentify the Cessna for a Jaguar were contributory to the incident. When positioning to enter the MATZ the Jaguar pilots would have expected to be given information about any traffic about to leave it in their direction, and the Board considered this lack of TI was part of the cause of the Airprox. Furthermore, ZONE assumed that the Jaguars would pass beneath the Cessna, and members discussed whether or not his inaccurate TI based on this assumption was also part of the cause. They concluded in the end that because the Cessna pilot had seen the Jaguars some way off he was in a position to take avoiding action if it had appeared there was a risk of the ac actually colliding. However, they well understood how disconcerting the incorrect information must have been for him. Because the incident took place outside the MATZ, and pilots should always be on the lookout for traffic unknown to ATC, the Board also considered the late sighting by the Jaguar pilots to be part of the cause. Pilot members considered this aspect to be the most important factor but controller members, who were disappointed with the standard of ATC demonstrated, considered that the ATC aspects were the main cause.

One Jaguar pilot did not see the Cessna and the other saw it too late to take avoiding action; this and the confusion generated in the Cessna pilot's mind about their intentions led the Board to conclude that there had been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A lack of traffic information on the C152 to the Jaguars, and effectively a non-sighting by the Jaguar pilots.

Degree of Risk: A

Contributory factor: Coltishall APP misidentified the Cessna for a Jaguar.

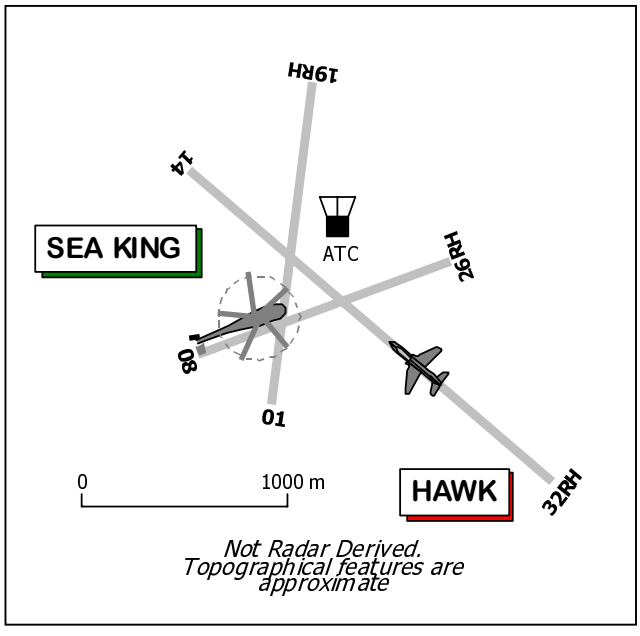
IRPROX REPORT No 78/01

Date/Time: 23 May 1100

Position: 5315N 0432 W (Valley - elev 37 ft)

Airspace: MATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Sea King Mk 3	Hawk T1A
Operator:	HQ STC	HQ PTC
Alt/FL:	100 ft (QFE 1023 mb)	100 ft (QFE 1023 mb)
Weather Visibility:	VMC CAVOK 20 km	VMC CAVOK 30 km
Reported Separation:	200 yd H, nil V	Not seen
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SEA KING MK 3 PILOT reports his helicopter has a bright yellow colour scheme and HISLs were on whilst holding in a 30 ft hover aal abeam RW08 threshold at Valley, awaiting clearance to cross RW32RH to dispersal. He was in communication with Valley TOWER (TWR) on 340·175 MHz who had instructed him to hold at low level by the SAR dispersal to allow a Hawk to carry out a 'RAFAT join'. The Hawk joined, but busy circuit traffic caused a further 2 min delay before he was given clearance by TWR to cross RW32RH. He transitioned his helicopter towards the intersection of RW08/32 at just under 100 ft aal, and with about 200 yd to go to RW32RH at a speed of 30 kt, carried out a final check that the RW approach was clear. He sighted a jet's smoke trail which led his eyes towards a Hawk which was first seen about 900 yd away at the threshold to RW32RH; it was carrying out another 'RAFAT join' along the RW centreline. He rapidly flared his helicopter into a hover to avoid the Hawk, which passed about 200 yd ahead from R - L at approximately the same height. He assessed that there had been a very high risk of collision and added that the TWR frequency was "quite busy" with multiple ac in the aerodrome circuit.

THE HAWK T1A PILOT reports his ac has a distinctive bright red colour scheme and the HISL was on whilst inbound for a visual join at RAF Valley. He was cleared by TWR on 340·175 MHz to join for a "RAFAT Break" to land RW32RH. Following the run-in at 100 ft aal at 360 kt on the RW32RH centreline, he 'broke' R into the circuit. Whilst downwind a Hawk was cleared for take off and another Hawk pilot requested a timed take off. Consequently, he elected to depart the circuit, fly back out to initials and carry out a delaying orbit at initials. A '2 ship' formation then joined the circuit so he requested a further join and "low break" for RW32RH behind this formation, which was approved by TWR and executed at 360 kt and 100 ft QFE (1023 mb). On the break, he was concentrating on the formation ahead and turning downwind behind them, so he did not see the Sea King during the second break at all. Consequently he could not assess either the minimum separation or the 'risk'. He added that during the first RAFAT break, TWR advised of a Sea King hovering over the NW of the aerodrome, which he saw and remained well clear of. However, during the second break the position of the helicopter was not mentioned, so he 'broke' in the same place as before, whilst concentrating on the formation ahead.

MIL ATC OPS reports that the pilot of the Hawk, had called Valley TWR on 340·175 MHz and received a joining clearance for RW32RH. Although the visual circuit was clear, a Sea King was also with TWR, inbound from the W towards the threshold of RW08 and preparing to cross the main RW in order to land at a dispersal adjacent to the threshold of RW 26. The Hawk pilot acknowledged his clearance from TWR *"Join, circuit clear for a RAFAT run-in and break, and I'll probably do one touch-and-go and then land"*. A 'RAFAT run-in and break' is a well known procedure at RAF Valley: the pilot descends to about 100 ft over the RW threshold followed by a flight down the RW centreline at 100 ft/300-350kt with smoke on, before pulling up and turning R downwind. After acknowledging the Hawk pilot's transmission, TWR transmitted to the Sea King pilot *"C/S, we've got one, er, one aircraft for a low, low break, request you remain, er, overhead the SAR dispersal"*, which was acknowledged. The SAR dispersal at Valley is slightly to the N of RW08 threshold and well to the W of RW32. After the Hawk pilot completed his RAFAT break, the Sea King pilot requested permission to cross RW32RH from W - E. However, once the smoke had dispersed, TWR initially gave priority to a pair of Hawks that were already lined-up for departure and instructed the Sea King pilot to hold, whilst clearing the Hawks for take off. The departure of these Hawks prevented the subject Hawk pilot from completing his touch-and-go and so, at 1104:48, he elected to transit back out to the Initial Point (IP) and hold to allow other ac to depart. Over the next 2 minutes, TWR became moderately busy integrating 3 departures with a pair inbound, whilst the subject Hawk orbited at the IP and the Sea King continued to hold N abeam the threshold RW 08. At 1106:43, the Hawk pilot called *"…initials for the low break to land."* TWR replied *"…one upwind departing,*

formation downwind, surface wind 320/5" and the Hawk pilot reported visual with all 3 ac. Immediately after this dialogue, at 1106:56, TWR transmitted to the Sea King pilot *"*C/S *cross runway 14"* which was acknowledged. Shortly after this, TWR observed the Hawk conduct another RAFAT break, which she had neither expected, nor cleared and the Sea King pull up into a hover just before the edge of RW32 as the Hawk passed by ahead of it. At 1107:24, the Sea King pilot transmitted *"*C/S *continuing to cross"*, which was acknowledged. At 1107:40, the Hawk pilot, who was now positioned behind the landing formation, reported downwind and was given a clearance to land at 1108:14. TWR advised the Watch Supervisor (SUP) about what had occurred and 2 hours later ATC was advised that the Sea King pilot was filing an Airprox.

At the time of the Airprox the TWR controller was only recently endorsed, so the SUP was present in the VCR throughout the Hawk pilot's first RAFAT break in order to ensure that the controller had a thorough working knowledge of the procedure. Content with TWR's handling and integration of the 'RAFAT break' with the other traffic, SUP returned to the ACR as the Hawk pilot departed to hold at the IP. TWR's actions had been in accordance with regulations and standard practices and her successful integration of the mixture of departures and arrivals had attracted praise from SUP at the time. When requesting the first run in, the Hawk pilot stated he would be commencing a *"RAFAT run-in and break"* which was clear and unambiguous, and TWR was able to plan accordingly. However, when he commenced his second run, the Hawk pilot stated *"*C/S *Initials for the low break, land"*, which had completely different implications. The RAF Valley Flying Order Book (FOB) stated a minimum break height of 1000 ft QFE for visiting ac, whilst Valley based Hawks were permitted to carry out low level breaks at 500 ft QFE on all RWs other than RW32RH, where the minimum height remained 1000 ft QFE due to noise abatement requirements. The exception to both rules was the 'RAFAT break', which could be flown to any of Valley's 6 RWs. The RAF Valley FOB has now been amended to curtail such breaks whilst rotary wing traffic is operating over the aerodrome or within 3 NM of the aerodrome boundary and now prohibits RAFAT breaks to RW32 in toto. Additionally, a positive request/ATC approval process for RAFAT breaks has been given much greater emphasis.

TWR had not expected the Hawk pilot to conduct a 'RAFAT break' after the second join. Whilst managing a reasonably busy circuit, she permitted the Hawk to continue in the belief that it would not be below 500 ft aal and therefore safely above the Sea King crossing the active RW at 100 ft aal - a height limitation for helicopters which was already laid down in local orders. With hindsight, it would have been prudent for TWR to have confirmed the Hawk pilot's intentions prior to the commencement of the second run, and the fact that low level breaks were not permitted to RW32RH was overlooked, doubtless due to inexperience; had this been noted at the time, it may have acted as sufficient prompt to question the pilot's intentions. Similarly, again with hindsight, had TWR mentioned RW32 rather than 14 when she cleared the Sea King to cross, there is the remote chance that this may have been enough of a prompt to the Hawk pilot for him to consider reiterating his intentions to conduct a RAFAT break on RW32RH. Nonetheless, had the Hawk pilot been consistent with his phraseology, TWR would have almost certainly been able to manage events more effectively.

HQ STC comments that the investigation carried out by the Station has been thorough and has highlighted a significant deficiency in local ATC procedures; it is therefore encouraging to note that the Station has taken a number of steps to prevent a recurrence. This, however, is the second Airprox in recent months involving mixed ac types close to the runway - indication perhaps of the need for a wider review of ATC procedures at those military units where fixed-wing ac operate routinely alongside their rotary counterparts.

HQ PTC comments that they are gratified that the station has thoroughly examined their procedures and issued revised orders to remove the anomalies that contributed to this incident. However, the root cause lies in the confusion between the Hawk pilot and the TWR Controller as to the former's intentions and the clearance issued. Despite changing his terminology, the Hawk pilot assumed that he had been recleared for a RAFAT break. Unfortunately, his call of *"…initials for the low break to land"* was interpreted by the TWR Controller as indicating a 'standard' low level break even though

these were not permitted on RW32RH and consequently clearing the helicopter to cross the runway and into confliction. Had the TWR Controller continued to monitor the 2 ac throughout their manoeuvres, with the excellent view of the visual circuit from Valley Tower, the controller should have been able to see the Hawk descending lower than expected on the run-in, even before he began 'smoking'. This would have provided sufficient warning for her to have cancelled the helo's clearance to cross and to hold it clear of the runway.

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, and reports from the appropriate ATC and operating authorities.

The members commended the Sea King pilot for his 'last-look' check of the runway before he crossed, this clearly enabled him to detect the Hawk and prevented a far worse incident. It was indeed fortunate that the Hawk had been 'making smoke' and that the Sea King pilot was able to stop his helicopter it time. This last check of the runway - apparently an SOP - was a salutary lesson to all pilots to 'look before you cross' any runway, but especially the runway in use. The Mil ATC Ops adviser briefed the Board that the view from the Valley Tower VCR was no better or worse than other aerodromes but the downwind leg for RW32 RHD is actually behind the controller's position when facing the runway, which does not help when controlling a very busy visual Cct. However, everything had appeared normal to the ADC until she spotted the Hawk's smoke at the runway threshold after it had descended to 100 ft. Realising there was a confliction at just about the same time as she saw the Sea King pilot flaring his helicopter into a hover, a warning then seemed superfluous. The Board noted from the RT recording, the Hawk pilot's request for a 'low-break' and his subsequent execution of a RAFAT break. It was understandable, therefore, as to why the ADC had cleared the Sea King pilot to cross RW32 whilst the Hawk pilot was running-in, thinking that 400 ft would separate the two ac. However, the anomalous 'low break' was not permitted on RW32 and some members thought this should have rung the mental 'alarm bells' in her mind sufficient to query the request; the Mil ATC Ops adviser agreed that the ADC should not have fallen into this 'trap' which was part of the cause of the incident. Some controller members voiced concern over some inconsistencies in the phraseology used by the ADC, and wondered if this was a contributory factor, but it was pointed out that her use of the phrase "low, low break" was used to stress the 'lowness' of the RAFAT break to the waiting Sea King pilot. These breaks are not frequently encountered at Valley, but the PTC member explained that the Hawk pilot was new to the RAFAT and still 'working-up'; RAFAT breaks were a normal part of a RAFAT pilot's training. Be that as it may the Hawk pilot had asked for one type of break, but executed another and that was the other part cause of the Airprox. The STC member reminded the Board that this and another recent Airprox at Valley involving helicopters (144/00) had resulted in changes to the FOB and wondered if there was a need for a complete review of all procedures at Valley in light of these anomalies. The PTC member understood the point but explained that a searching review of all FOB procedures had already taken place and the Board noted that once the anomalies in the Valley FOB had been uncovered, prompt corrective action had been taken, which was encouraging. The Board concluded that this Airprox resulted because the Hawk pilot used the wrong terminology to describe his intentions and the ADC accepted his request for a 'low break', which was contrary to instructions within the Valley FOB for that runway.

Turning to risk; one member thought that as the helicopter pilot had looked down the runway, seen the smoke, then the Hawk and had been able to stop his helicopter in time before crossing into the path of the Hawk, this was not a risk-bearing occurrence. Others contended that it was but fortuitous that the Hawk pilot had used smoke during the run-in, which is what had attracted the Sea King pilot's attention to the presence of the jet. A Hawk head-on is a small ac to detect, significantly there was no mention made of the Hawk's 'headlight', which can also be very conspicuous. Nonetheless, the jet was only seen as it passed the threshold a mere 900 yd away according to the helicopter pilot and a little under 5 sec flight time at 360 kt closing speed. This left little time for the helicopter pilot to react to the sighting and he did well to stop his helicopter in

time – not an easy task to slow 10 tons from a speed of 30 kt. Fortunately this prompt action saved the day, but the Hawk pilot had seen nothing and was not able to effect the outcome at all; though not a unanimous decision, the overwhelming majority agreed that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Hawk pilot used the wrong terminology to describe his intentions and the ADC accepted his request for a 'low break', which was contrary to instructions within the Valley FOB for that runway.

Degree of Risk: B.

AIRPROX REPORT No 79/01

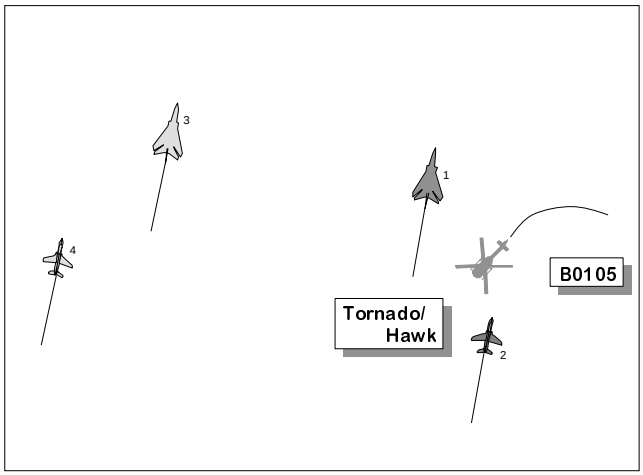
Date/Time: 24 May 1401

Position: 5702 N 0406 W (Lampeter)

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

	Reporting Aircraft	*Reported Aircraft*
Type:	Tornado F3	Bo105
Operator:	HQ STC	Civ Comm
Alt/FL:	350 ft (msd)	500 ft ↑ (agl)
Weather	VMC CLOC	VMC CLBC
Visibility:	25 km	10 km+
Reported Separation:	200 ft V /500 m	

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO F3 PILOT reports heading 010° at 430 kt leading a mixed formation of F3s and Hawks in battle formation with the lead element on the right. A yellow helicopter was seen simultaneously by the 2 crew members in the lead Tornado and by the 2 crewmembers in the No 2 (Hawk); it was in the leader's 4 o'clock slightly above and 1000 yd away, he thought. It was about 200 ft above and passed between the leader and No 2, climbing sharply in a left turn. There was a low to moderate risk of collision; no avoiding action was taken because the ac appeared to be passing clear when seen.

THE BO105 PILOT reports heading 210° at 80 kt on a medevac sortie having taken off from Lampeter. He was aware of military low flying activity in the area and was climbing as steeply as practicable with a patient on board. At about 350 ft he saw 2 Tornados closing very fast in his 11 o'clock which crossed left to right ahead as he turned sharply left. The Tornados passed no closer than 500 m away to his right with a moderate to high risk of collision. TCAS is not fitted to his ac.

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

HQ STC comments that despite the size of the formation and the relative disposition of its elements, the helicopter was not seen in sufficient time to take avoiding action. Crews at the station involved are routinely reminded of the importance of maintaining an effective lookout and this incident serves as a timely reminder to maintain such discipline.

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.

It had been pointed out to the Tornado pilot that if the helicopter had been 1000 yd away when seen, and his No 2 was 300 yd away, the helicopter would have had to have been flying a good deal faster than the jets to have passed between the Nos 1 and 2, or the distance between the Hawk and Tornado must have been much greater. While the leader, when asked about this, confirmed that his formation's recollection was as he reported, the Board agreed that the helicopter must have been a good deal closer when seen. It appeared also that the Bo105 pilot had seen the 2 Tornados to his right and, while watching and avoiding them, had passed close to (but above) the Hawk to his left which he did not appear to have seen. Because of this, and the fact that the Tornado had already passed the helicopter before it was seen, the Board concluded by a majority that there had been a risk of collision.

All concerned were operating in an environment where collision avoidance is based on seeing and avoiding other traffic and the Board assessed that the cause of the Airprox was that neither the formation crews nor the helicopter pilot saw the other party in time to prevent the incident. Some members commented that the helicopter pilot had seen the Tornados in time to turn left and avoid them, but it was pointed out that there was no indication that he had seen the Hawk (which he had turned towards) at all. Members fully understood the difficulty faced by both parties; the helicopter had climbed steeply and was probably well below, against a terrain background, when at the range the fast jet crews would have been scanning for ac to avoid. Similarly, the helicopter pilot would have been concentrating on clearing a built up area safely and had sensibly decided to clear the low-level environment as quickly as possible. Unfortunately this gave the fast jet crews little time to acquire him. Members had heard from helicopter pilots flying powerline inspections that they remain at very low level after takeoff or after completing an inspection run, and turn to scan all round the horizon for skylined fast jets before climbing quickly through and above 500 ft. They report very few incidents as a result. However, the Board accepted that the constraints of flying a medevac out of a built up area may have limited the helicopter pilot's options. Moreover, it was recognised that the odds against climbing straight into the path of a formation had worked harshly in this instance.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively non-sightings by the formation crews and the helicopter pilot.

Degree of Risk: A

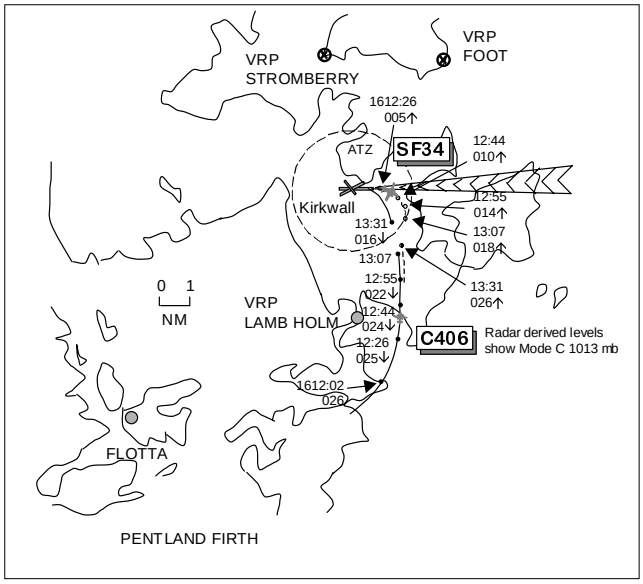
AIRPROX REPORT No 80/01

Date/Time: 24 May 1613

Position: 5856 N 0251 W (2.5 NM SE of Kirkwall - elev. 51 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	SF34	C406
Operator:	CAT	Civ Comm
Alt/FL:	2300 ft ↑ (QNH 1027 mb)	↓ 1000 ft VMC CLOC
Visibility:	30 km	>10 km
Reported Separation:	50-100 ft V 20 m H	/>2000 ft V + H
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SF34 PILOT reports that prior to departure from Kirkwall he was informed of Cessna Twin Caravan traffic which was routeing inbound from the S VFR to pass W of Lamb Holm onto a R base for RW 09. To ensure separation, he climbed straight ahead from RW 09 at 140 kt through 1500 ft before commencing a R turn on track; he entered cloud at 1000 ft and broke out 'on top' at 2200 ft when steady on heading 180°. At this point he received a TCAS TA on traffic ahead, slightly to his R, 300 ft above and descending. He commenced a L turn, the TCAS alert became an RA *'climb'* then *'increase climb'* and the C406 was seen to pass about 50-100 ft below and 20 m horizontally from his R wing. He assessed the risk of collision as high and said that without TCAS he doubted whether he would have seen the other ac as he broke cloud.

THE C406 PILOT reports flying inbound to Kirkwall heading 340° at 195 kt in the descent to 1000 ft QNH 1027 mb. The visibility was >10 km, 1 NM horizontally clear of cloud in VMC and he was receiving a FIS from Kirkwall on 118·3 MHz squawking 7000 with Mode C. The ac was coloured white/red striping and the strobe lights were switched on. He had been told about IFR opposite direction departing traffic, the subject SAAB 340, which he first saw in his 2 o'clock high position in a climbing L turn and which passed >2000 ft horizontally and vertically on his RHS. He took no avoiding action as he was already in a descending L turn to maintain VMC and thought there had been no risk of collision. He queried why, as he was known VFR traffic inbound via Lamb Holm VRP, ATC cleared the IFR departing traffic towards him when he had yet to report W abeam the VRP. The ac did not carry TCAS.

UKAB Note (1): The Kirkwall METARs show EGPA 1550 UTC 120/10 KT 20 KM NIL FEW006 BKN010 13/09 Q1027 and 1620 UTC 130/11 100V160 25 KM NIL FEW006 SCT008 BKN010 13/09 Q1027.

ATSI reports that this analysis was compiled by reference to the appropriate RT and radar recordings, pilot and controller reports and that no field interviews were undertaken.

The incident took place at 1613, approx. 3 NM SE of Kirkwall Airport in Class G airspace. At the time, the two flights involved were in receipt of a combined ADC/APC service from Kirkwall ATSU. The Unit has neither radar nor D/F equipment, though the latter is due to be installed later this year.

The C406 had previously filed an IFR plan from Wick to Kirkwall. However, at 1557, Wick ATC

telephoned Kirkwall to advise that the flight would now be operating VFR and that it would be departing shortly. The Kirkwall controller passed Wick the Kirkwall 1550 weather and sought assurance that the details would be relayed to the C406.

The SF34 had filed an IFR flight plan from Kirkwall to Aberdeen via Advisory routes W3D and W4D. At 1602, the flight was given approval for engine start and issued with the 1550 Kirkwall weather. Five minutes later, at 1607, the SF34 was given taxi instructions to backtrack and line-up on RW 09.

At 1608, the C406 made its first call to Kirkwall, reporting VFR inbound at 3000 ft and estimating the Airport at 1617. The flight was instructed to maintain VFR, issued the Kirkwall QNH and asked to confirm that it had been provided the 1550 Kirkwall weather by Wick. While a little ambiguous, the C406 pilot's reply appeared to indicate that he had done so, he said *"Yes it's er a bit less with you s- er few 600 and broken 1000".* After confirming the cloud report, the controller again instructed the flight to maintain VFR and then requested it to report when passing W abeam the Lamb Holm VRP, adding *".....for a right base join runway 09".* This was correctly readback by the pilot. (Lamb Holm VRP is located 4·5 NM to the S (185°) of Kirkwall Airport.). Additionally, the controller advised the C406 *".....traffic information I have a Saab 340 shortly departing runway 09 climbing through your level on track Wick initially".* The pilot acknowledged the message.

The SF34's clearance to Aberdeen, via W3D and W4D, was to climb to maintain FL 155, together with the allocated SSR code. After this clearance was read back, the controller then notified the pilot *".....traffic information VFR inbound at 3000 ft a twin caravan approaching from the Pentland Firth".* Following an acknowledgement, the flight was then cleared for take-off on RW 09.

At 1612, the C406 reported leaving 3000 ft. It was asked to report its DME range (from the KWL VOR/DME located on the Airport) and the pilot reported 6·3 NM. This was acknowledged and the flight instructed to report on R base leg for RW 09 and advised that the *"Saab"* was just airborne. The radar recording at this point shows the C406 on a NE track, indicating FL 026 (3000 ft altitude QNH 1027 mb), and just crossing through a point due S of Kirkwall. The ac continues on the same track until at a little over 4 NM range from Kirkwall when it appears to turn to the N. It is now to the SSE of Kirkwall, indicating FL 024 (an altitude equivalent of 2800 ft), in the descent. The presented scale of the recorded radar data makes it difficult to assess range accurately, however, at this point the C406 is probably 1-1·5 NM to the E of Lamb Holm VRP. The SF34, meanwhile is in the C406's 12 o'clock position in a R turn, climbing through FL 010 (1400 feet altitude) and at a range of about 3·5 NM. The last intelligible recorded radar picture of the subject ac occurs a few secs later, after which a period of data corruption prevents an assessment being made of relative position. The final picture 1613:07, therefore, shows both ac to the SE of Kirkwall, the C406 is still tracking N, though not now displaying height readout, with the SF34 in its 1 o'clock position and in a R turn passing through FL 018 (2200 ft altitude). Nothing was said on the RT frequency until several sec later when, at 1613:35, the pilot of the SF34 said *"Kirkwall (callsign) er clear of conflict we had er very close encounter with that inbound Caravan which was supposed to be VFR but he's on top of cloud".* The controller acknowledged the call and stated that *".....he can be VFR on the top of the cloud".* The pilot then said *"well ok but he was straight at us we didn't know about him".* The pilot of the C406 then transmitted *"er we are VFR and we had you in sight no problem".*

The Kirkwall ADC/APC reported that *"The departing SF34 was seen to climb on runway heading for a distance before making a right turn and disappearing from sight behind cloud. I was looking for the C406 on right base 09 when the SF34 reported close contact with the C406.....".* Also at this time the controller was expecting other VFR traffic joining from the NE and while looking for this traffic the ADC/APC noticed the C406 to the N of the Airport *"roughly late downwind left for runway 09".* The ac did eventually land on RW 09, though not without some apparent difficulty - at one stage it appeared to be lined up on RW 06 and had to be broken off the approach and repositioned. The controller reports that later, during a telephone conversation, when the pilot was asked why he did not route as requested he replied that he did not know the location of the VRP. The pilot also reiterated that he was VFR and that he had had the other ac in sight at all times.

From the ATC perspective, the Kirkwall ADC/APC did all that could have been expected. Relevant TI was issued to both flights to assist them each in avoiding conflict. However the usefulness of such information to the participants relies heavily on accuracy in navigation and position reporting, factors which on this occasion appear to have been absent. Finally, there is little doubt the contribution that D/F equipment would have made in identifying and helping resolve both this and future potential conflictions; its installation is to be welcomed.

THE MANAGER ATS KIRKWALL reports flying as a passenger immediately behind the C406 crew. The ac, at the time of the Airprox, was VMC on top of solid cloud in a gradual descent and he saw the opposite direction SF34 pass down the RHS; the airline name and tail logo could be clearly seen. He estimated a miss distance of 150–250 m. He confirmed that the C406 crew had cancelled the IFR flight plan from Wick to Kirkwall on start-up at Wick although weather reports indicated that IMC was likely to be encountered en-route. He had noticed that the crew were constantly studying the approach chart for the RW 09 VOR-DME procedure at Kirkwall and a laminated airspace chart of the Wick/Kirkwall area during the cruise phase of flight. The crew appeared to be 'heads-in' for most of the time to the detriment of maintaining a good lookout.

UKAB Note (3): Analysis of the Sumburgh radar recording was hampered owing to the corruption of primary and secondary data. At 1613:07, the SF34 at FL 018 (2200 ft QNH) is 1·2 NM N of the C406 with no Mode C. Position information is unusable for the next 2 radar sweeps but SSR label information for the SF34 shows: 1613:13 FL 019 (2300 ft QNH) and 1613:19 FL 022 (2600 ft QNH). At 1613:25 only SSR data on the C406 shows, Mode C indicating FL 016 (2000 ft QNH). Useable data at 1613:31 shows the ac clearly having passed, the C406 still at FL 016 in a L turn towards Kirkwall 0·9 NM NW of the SF34 tracking S at FL 026 (3000 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 reports from the appropriate ATC and operating authorities.

The ATSI adviser informed members that the installation of D/F equipment at Kirkwall was under way. This equipment would have given the ATCO confirmation of the subject acs' relative positions, particularly when the controller had requested the inbound C406's DME range, and helped the ADC/APC to identify and resolve the confliction. ATCO members agreed that the controller's plan had been sound in issuing the C406 crew with clearance to join R base for RW 09 to keep them clear of the departing SF34. The onus was then on the C406 crew to navigate visually, routeing W abeam the Lamb Holm VRP as instructed, whilst maintaining VMC. For reasons best known to him, the pilot did not say that he was unable to locate the VRP or inform ATC that he could not comply with the issued clearance. The radar recording shows the Caravan Twin in a descent passing 1·5 NM E of the VRP instead of W, heading towards the RW 09 climbout area. TI on the departing IFR Saab 340 had been passed, which the C406 crew had acknowledged, and they saw it, eventually in their 2 o'clock, when it was already carrying out its avoiding action manoeuvre. There was no doubt in the Board's view that the C406 crew had flown into conflict with the SF34 as a consequence of not following the ATC joining instructions and that this had caused the Airprox.

Pilot members questioned the wisdom of the C406 crew's decision to cancel their IFR plan on start-up at Wick, knowing that weather reports indicated IMC conditions en route. It would have been prudent to leave such a decision until after they were airborne and established en route.

Risk wise, the Kirkwall ATCO had forewarned both crews by passing TI to supplement the traffic plan. However, the C406 crew had seen the Saab 340 late as it passed to their R in a climbing L turn above them. The SF34 crew had realised the potential confliction from the outset and had, commendably, climbed straight ahead before turning S to build in additional lateral separation from the inbound Twin Caravan. They were therefore surprised to receive TCAS alerts on the C406 slightly R of their nose, almost head to head, above them and descending. By turning L and following the TCAS RA *'climb'* then *'increase climb'*, the crew avoided the C406's flight

path and saw it pass close to their R and slightly below. Members noted the large discrepancy in separation estimates reported by both crews, but were inclined to give more weight to the Saab pilot's assessment, given the supporting evidence. These factors swayed the Board to conclude that the SF34 had manoeuvred sufficiently to avoid a collision but the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The C406 crew did not follow ATC joining instructions and flew into conflict with the departing Saab 340, which they saw late.

Degree of Risk: B

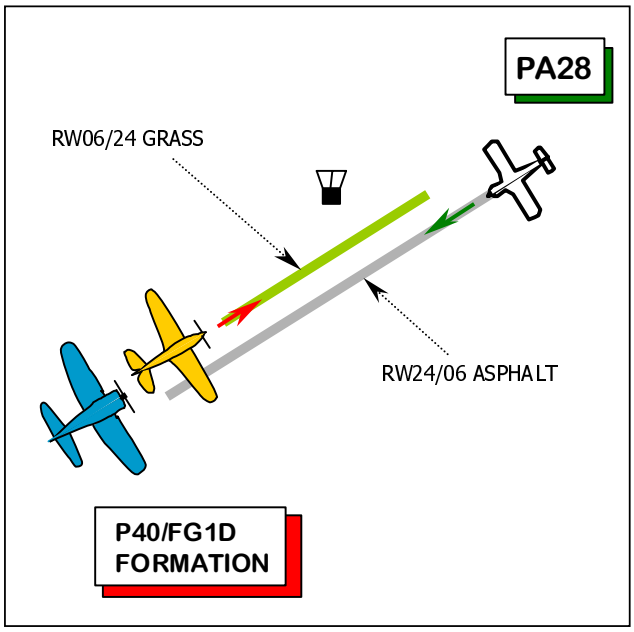
AIRPROX REPORT No 81/01

Date/Time: 30 May 1055

Position: 5205 N 0008 E (Duxford - elev 125 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA28-140	Kittyhawk/Corsair Formation
Operator:	Civ Club	Civ Pte
Alt/FL:	100 ft ↓ (QFE 1014 mb)	↓ 100 ft (QFE 1014 mb)
Weather Visibility:	VMC CLBC >10 km	VMC CLOC >10 km
Reported Separation:	50-100 ft V, 50 ft H	100 ft V, 600 ft H
Recorded Separation:	Not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28-140 PILOT reports his ac has a white/blue/yellow livery and he was conducting a checkout with a PPL holder during a circuit detail at Duxford. There was no cloud below 4000 ft, the visibility >10 km and he was flying out of the sun. He was in communication with Duxford INFORMATION on 122·075MHz, who had asked him to keep the final circuit tight due to an imminent display practice by a formation of two ac, which were about to execute a 'run and break' against the circuit direction. He took control of his ac to expedite landing and called 'finals' for RW24 at about 600 ft Duxford QFE (1014 mb). At about 100 ft aal, heading 240° at 65 kt, he saw both ac of the formation about 300 m away in a descending turn at a high AoB flying directly towards him at the same height. To avoid them he immediately increased his RoD as the formation turned 'just inside' RW24, flying between RW24 grass and the asphalt RW. Just before touchdown as he flared his ac, the formation passed 50 ft away down the starboard side no more than 50-100 ft above him. If he had been required to 'go around' and climb away to the R of RW24, he was in no doubt that a collision would have occurred and he assessed the risk as "very high".

THE KITTYHAWK PILOT reports he was leading the Kittyhawk P40/Corsair FG1D vintage formation during an aerobatics training sortie N of Duxford; both ac have a camouflage colour scheme but are not fitted with HISLs. He was in communication with Duxford INFORMATION on 122·075MHz, and

had requested to return to the aerodrome for their standard practice display routine. Because an ac was conducting circuit training he was asked to hold off, but some 5 – 10 min later he was "cleared" to rejoin. Transmitting 2 min and 1 min RT calls to warn of his arrival, he was visual with the PA28 training ac from 5 NM and throughout the final run in to the aerodrome heading 055° for the practice display at about 100 ft QFE, 300 kt. He assessed the formation passed 200 yd well clear and 100 ft above the PA28 at the CPA with "Nil" risk of a collision. He added that the other pilot was aware of their arrival from Duxford INFORMATION.

THE DUXFORD AERODROME FLIGHT INFORMATION SERVICE OFFICER (FISO) reports that the PA28 instructor called from 'Little Gransden' to 'book-in' his ac for circuits at Duxford. He was informed of various vintage military ac carrying out practice displays and agreed that those pilots would have priority.

During the PA28's circuit detail the Kittyhawk/Corsair formation called for rejoin and a 5 min practice display overhead the aerodrome. The Kittyhawk/Corsair formation leader was passed joining information and traffic information on the circuit ac, who was also informed of the formation leader's intentions. The PA28 pilot elected to land on RW24 asphalt runway and as he did so the Kittyhawk/Corsair formation - who were visual with the PA28 - ran in from the opposite end over the grass RW06 from SW to NE. As he looked down to write the time down, he heard an RT transmission - "that was close", so he looked back up and saw the PA28 taxying on the hard runway, and the Kittyhawk/Corsair formation departing from over the grass RW in tight formation. He added that he did not consider that an Airprox had occurred.

UKAB Note (1): A review of the Duxford AFIS frequency 122·075 MHz, reveals that just after 1042, following a transmission from the Kittyhawk pilot before he departed, Duxford INFORMATION relayed to the PA28 pilot that it would be *"…at least 15 min before the first display commences"*, which the PA28 pilot acknowledged. At 1052:30, the PA28 pilot reported downwind LHD for RW24 and advised the FISO that it would be the last circuit. Moments later, just before 1053:00, the formation leader reported *"Kittyhawk/Corsair 2 minutes"*, which was acknowledged by the FISO who advised *"…PA28 late downwind to land"*. The FISO informed the PA28 pilot that *"…I would appreciate it if you could keep it a bit tighter"*, which was acknowledged. Just after 1054:00, the PA28 pilot reported finals to land and just after 1054:30, the formation leader reported *"Kittyhawk/Corsair 1 minute"*, to which the FISO advised *"…my landing traffic is short finals"*, which was acknowledged by the formation leader. Just before 1055:30, the PA28 pilot transmitted *"that was a little close for comfort"*, followed by a transmission - possibly a reply from the formation leader – that was unreadable. The PA28 pilot's comment was reiterated shortly afterwards to the FISO when he said, *"…vacating R little bit close for comfort there"*.

UKAB Note (2): This Airprox was not shown on the LATCC Debden radar recording.

UKAB Note (3): The RW24 cct is LHD, but the UK AIP at AD 2-EGSU –1-3, promulgates that there is no deadside. The distance between the Grass and asphalt RW centre-lines is approximately 130 m.

ATSI comments that both the PA28 pilot and the Kittyhawk/Corsair formation leader were in receipt of a FIS provided by the Duxford FISO. The Manual of Flight Information Services, Part B, Aerodrome, Introduction, (CAP410) states that *"A Flight Information Service provided at an aerodrome is a service provided to give information useful for the safe and efficient conduct of flights in the ATZ. From the information received, pilots decide the appropriate course of action to be taken to ensure the safety of flight whilst taking off or landing or flying in the aerodrome ATZ."* One specific responsibility of a FISO is *"issuing information to aircraft flying in the ATZ to assist the pilots in preventing collisions".* In addition it states that *".....with the exception of issuing instructions to aircraft on the ground* (under specific conditions)*.....FISOs must not issue instructions of their own volition or exercise any form of control over aircraft."*

It is apparent from an examination of the RTF recording that the FISO concerned on this occasion fulfilled his responsibilities in respect of the service being provided. Both pilots were kept informed of the other's details and intentions by the FISO and it is clear from their responses that this information had been assimilated by both.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, a recording of the relevant RT frequency, a report from the FISO involved and the appropriate ATC authority.

The Board retraced events that led to this incident. The visiting PA28 pilot understood that while he was at Duxford other pilots involved in display practices had priority, subject to the normal primacy of the Rules of the Air. From the timing information relayed to him by Duxford INFORMATION he calculated that he needed to be on the ground before 1057 and at 1052:30 he had reported downwind on his last circuit. At that stage, with the PA28 in sight, the formation had just started to 'run-in' against the circuit flow direction, slightly earlier than expected. By the time the PA28 pilot reached 'finals', unlike the Kittyhawk pilot's advantage, he was still unsighted on the formation ac as they approached from the opposite direction. Eventually both ac were seen - at about 300 m - and the PA28 pilot had then tried to complete his landing more quickly, but not before the formation crossed, at low altitude, offset to his right.

Members highlighted 2 points from all of this. First, the formation leader was mistaken in his understanding that he had been "cleared" to rejoin; a FISO is not empowered to do so and there was nothing on the RT recording to suggest that he had. Second, throughout the whole encounter, the PA28 had right of way. All agreed that the FISO had done his job correctly by giving the pilots involved sufficient information to enable them to integrate safely in the circuit. This made some wonder if an element of impatience might have contributed to what appeared to be a wholly avoidable situation. A little more consideration on timing would have produced a different outcome. As it was, while trying to co-operate, the PA28 pilot felt concerned at the way the formation had flown and this was the cause of the incident.

With regard to risk, only the pilots concerned know what the separation was; nobody else saw them cross. However, members took note of the FISO's description of events, acknowledging his familiarity with the airfield's layout. From this limited information available, the Board could only surmise that the most likely separation figure was somewhere between the 2 pilots' widely differing estimates. If the precise horizontal separation was uncertain, other points were clear: none of the acs' flight paths had crossed in the later stages as events developed; the formation leader had kept visual contact throughout; finally, once the PA28 pilot became sighted, he always had a free escape route straight ahead if he had needed to go-around. These factors led members to conclude that no risk of collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Kittyhawk formation leader flew his formation close enough to the landing PA28 to cause its pilot concern.

Degree of Risk: C.

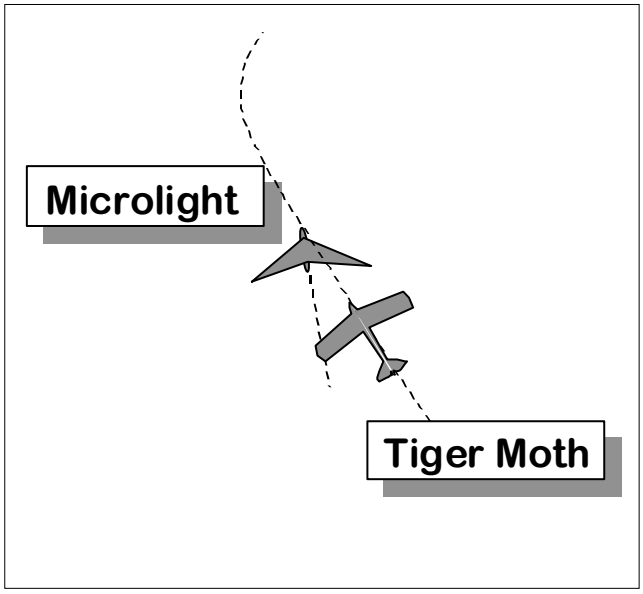
AIRPROX REPORT No 82/01

Date/Time: 3 Jun 1438 (Sunday)

Position: 5140 N 0055 W (Stokenchurch)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Microlight(flexwing)	Tiger Moth
Operator:	Civ Pte	Civ Comm
Alt/FL:	2000 ft (QFE ? mb)	2000 ft (QFE ? mb)
Weather Visibility:	VMC CLBC >10 NM	VMC CAVK 40 km
Reported Separation:	2 ft V /50-100 ft V	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MICROLIGHT PILOT reports heading 350° at 50 kt and flying at about 2000 ft above Oakley (elev – 249 ft). His passenger urgently drew his attention to an ac approaching from behind and to starboard; he turned and saw a yellow Tiger Moth in his 4 o'clock at the same level no more than 50 ft away and closing in a straight line. He dived and in the 3-4 seconds before it passed overhead, managed to create about 2 ft of clearance. He heard its engine despite his headset and the noise of his own Rotax engine at cruise power. The Tiger Moth continued straight for 2-300 m and then turned right to recross his path towards Chinnor where it performed some aerobatics. His machine is white with the wing leading edge red on top and black underneath.

THE TIGER MOTH PILOT reports heading 330° at 55 kt in a climb when he saw the microlight in his 11 o'clock and above. He initially could not assess its range and direction of travel due to its white colour and its shape; it did not appear to be closing. About 15-20 seconds later it became apparent that it was closing but by then he was above its level and it passed 50 to 100 ft below, appearing to descend. He was then passing 2000 ft above Booker (elev 520 ft). There was little risk of collision as he was continually climbing and had been watching it. He emphasised that he would not have flown that close to it if he had been able to work out earlier which way it was going, and that its white colour, when vewed from astern, made it hard to acquire and assess.

UKAB Note: Primary returns believed to be the ac concerned can be seen intermittently on LATCC radar recordings but not in sufficient detail to add anything to the pilots' reports.

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 were aware that an aircraft seen in surprise can often seem closer than it actually is and accepted that the miss distance in this case was probably closer to the Tiger Moth pilot's estimate. Nevertheless by his own admission he had misjudged the geometry of the encounter and had consequently flown closer to the microlight than he would have wished or intended. The Board agreed that this was the cause of the Airprox; some members observed that he was the only one in a position to affect the situation and that he would

have been better advised to turn away early from the microlight and then assess which way it was going. However, with the small overtake involved, the separation distance cannot have been much when the microlight was first seen and a turn might well have made matters worse had it been going in the wrong direction. Further attention was drawn to the relative speeds involved in this encounter. High closing speeds are normally associated with late sightings between 2 ac but this was not reflected in this situation. Indeed the opposite held true and this surprised some members. In any event, the late resolution of the incident and the close passage led to the conclusion that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tiger Moth pilot misjudged the geometry of the encounter and flew into confliction with the microlight.

Degree of Risk: B

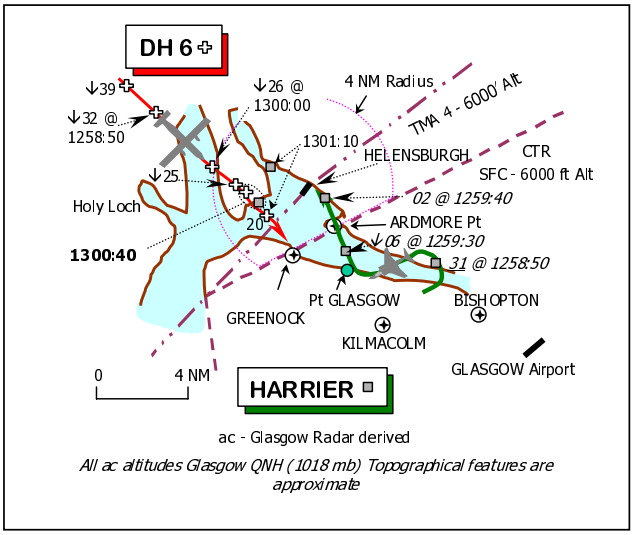
AIRPROX REPORT No 83/01

Date/Time: 2 Jun 1303 (Saturday)

Position: 5559 N 0443 W (Helensburgh)

Airspace: Scottish FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Harrier	DH6 Twin Otter
Operator:	HQ STC	CAT
Alt/FL:	↑ 3000 ft (QNH 1018mb)	2500 ft↓ (QNH 1018 mb)
Weather	VMC Nil Sig	VMC Nil Sig
Visibility:	20 km	40 km
Reported Separation:	Nil V	<1 NM H, Nil V
Recorded Separation:	0·6 NM H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HARRIER PILOT who had taken off from Aldergrove reports his ac has a camouflage grey colour scheme but HISLs were on whilst performing a Harrier role demonstration for the Faslane Fair situated at Helensburgh. AUS had issued an ACN and NOTAM for the event with the crowd centre situated at Helensburgh Pier, north of the entry to the mouth of the River Clyde. Both he and the organiser had fully briefed Glasgow ATC with regard to timings and display details etc. He was under a FIS he thought from Glasgow APPROACH on 119·1 MHz, both during the display, and whilst holding at 3000 ft Glasgow QNH (1018 mb) for his display slot time of 1300 – 1310 UTC over Port Glasgow on the River Clyde.

He started the display at 1300 UTC with a flat 360° turn and then pitched at 6g to 30° nose up for a wingover. Just as he 'unloaded' to 1g at 30° nose up, he spotted a civilian twin engined ac immediately above him "right in the piece of sky of his intended flight path". He manoeuvred his ac and "turned aggressively away" to avoid a "collision/ very close aboard" encounter. The display was terminated and he called Glasgow ATC who then passed traffic information on a Twin Otter 2 NM to the S. He estimated that the Twin Otter was between 2000 – 2500 ft agl during the encounter and there would have been a high risk of a collision

if he had not seen the other ac and completed the manoeuvre as intended.

UKAB Note (1): Airspace Utilisation Section issued ACN No 01-06-0110 on 17 May 01, which had been agreed to accommodate the Harrier pilot's air display within Exercise PURPLE PLAID, part of the Faslane Fair. Glasgow RADAR were nominated as the controlling agency during the display, which was to be conducted within a 4 NM radius centred on Helensburgh Pier at 56° 00" N 004° 44" W, extending to 4000 ft amsl.

The sponsor of the exercise was required to brief the participating ac captains, who themselves were required to contact the Glasgow Watch Manager on the day of the display to confirm their display profiles. It was stated that "Glasgow RADAR will, if possible, provide a radar service or traffic information on request. In addition Glasgow RADAR will co-ordinate ac movements, as required, with the appropriate TCA Sector controller". It was noted that the display area "*..abuts the edge of the Scottish TCA (base level 4000 ft amsl). Display aircraft are not cleared to penetrate CAS without prior clearance. Such clearance, to enter the TCA, is to be obtained from Glasgow Radar. Aircraft are to remain clear of the Glasgow CTR (SFC to 6000 ft amsl), which lies 2·5 NM to the South East of Helensburgh, throughout the display.*

THE DH6 TWIN OTTER PILOT, the captain of the ac and PF, reports she was descending inbound to Glasgow at 140 kt. They had cancelled their IFR FPL and had been "cleared" to enter the Glasgow CTR VFR not above 2000 ft Glasgow QNH (1018 mb) direct to BISHOPTON VRP; ATC had advised them of a Harrier holding at 3000 ft, between Greenock and Ardmore Point.

Tracking 130°, in the descent passing 2500 ft QNH the first Officer PNF first spotted the Harrier, which appeared to be just above sea level, in a tight L turn through a full 360°. The Harrier then pulled up almost vertically, crossing <1 NM ahead from L – R in a steep nose-up climbing attitude as seen through their forward windscreen - though not at a distance to feel sufficiently threatened – before it then disappeared over the top and astern. They informed ATC who said they had only had an intermittent radar contact with the Harrier and were unsure of its pilot's intentions, so they asked us to turn S to avoid the area. She reported that it was a good "VFR flying day", with lots of light ac on navigational exercises resulting in a very high workload for Glasgow APPROACH and added that the Harrier was not where they expected to see it, which was inside the CTR holding above them at 3000 ft as per the traffic information from ATC.

Note (2): In a subseqeunt telephone conversation she added that they were cognisant of both the NOTAM and that they were flying through the area associated with the Air display as they flew down the Clyde. As Glasgow ATC had cleared them to fly that route they presumed that the display had not commenced, but did not consider it necessary to query it.

Note (3): Both GREENOCK and ARDMORE POINT are VRPs situated on the boundary of the Glasgow CTR, on the S and N banks of the River Clyde respectively and bracketing the Glasgow CTR Clyde Entry/Exit lane – 3 NM wide with its centreline aligned on the middle of the Clyde and connecting to Glasgow ATZ. Its use is subject to clearance by Glasgow ATC and flown not above 3000 ft Glasgow QNH.

Note (4): The ScACC Glasgow radar recording does not show the Airprox clearly as the Harrier is only shown intermittently at that time. It is seen holding at 3000 ft QNH, LHD, within the CTR until 1258:50, when it turns through W on the last orbit. At the same time the Twin Otter is shown tracking SE, descending through 3200 ft and approaching the 4 NM radius promulgated display area centred on Helensburgh. At 1259:00, the Harrier is shown at 2800 ft, heading SW and then turns northwest bound for the display area; it passes 600 ft at 1259:30 and leaves the CTR into Class G airspace about 5 sec later. A final Mode C indication of 200 ft is shown at 1259:40, before radar contact is lost about 1 NM ESE of Helensburgh. The Twin Otter enters the promulgated display area at 1300:00, descending through 2600 ft. The Harrier SSR return shows again momentarily without Mode C at 1300:40, 0·6 NM directly ahead of the Twin Otter at the CPA, though no Mode C is displayed by either ac when the Airprox probably occurred. No further returns are shown from the Harrier until about 1301:10, when the Twin Otter at 2000 ft is less than 2 NM S of the jet turning through E onto a parallel SE'ly track and climbing through 2800 ft.

ATSI reports with RT transcript that at Glasgow ATC 4 controllers were involved in this Airprox within the Glasgow Approach Control Room (ACR). Controller A was the APPROACH Controller (APP) before the Airprox occurred and Controller B was his trainee. Controller C took over APP from A and B prior to the Airprox and was in position, together with Controller D who was the APPROACH RADAR Controller (APR), when the Airprox occurred.

Glasgow APP and APR each have their own radar displays but share a common RT frequency and fps display board. The executive role is held by APR and APP assists, as agreed between the two controllers. The Glasgow MATS Part 2 details a list of duties for which the APP Controller may take responsibility, however, it adds:

> "*The extent to which APR delegates responsibilities to APP must be clearly and unambiguously stated and agreed between the individuals concerned. Controllers must detail these agreements when handing over to another controller*".

During the investigation it became apparent that a 'standard' split of duties had evolved, whereby APP deals with VFR flights and phone calls, whilst APR assumes responsibility for IFR traffic. The responsibility for co-ordination is often shared and if one controller is busy, the other will perform the task. It would seem that no reiteration of this split of duties routinely takes place during handovers, as required by the MATS Part 2, because the division of responsibilities is considered to be 'standard'.

The Harrier's display and a free fall parachuting display was programmed to take place at Helensburgh, some 5 NM SSE of Faslane. An ACN and a NOTAM had been issued notifying the air display up to 4000 ft amsl, within 4 NM of Helensburgh Pier some 3 NM outside the Glasgow CTR boundary. Both of these documents were available to the Glasgow controllers within a briefing file, which was situated in the ACR. In compliance with the ACN, the Harrier pilot telephoned Glasgow ATC at about 1050 UTC to confirm his display and receive a briefing. The pilot spoke to Controller A, who was the morning ATC Watch Manager but, unfortunately, this conversation was not on a recorded telephone line nor was any written record made of it. Controller A's recollection of this briefing was that the Harrier pilot wished to discuss his display at Helensburgh at 1300 UTC. The pilot informed him that he wished to arrive a few minutes before 1300 UTC, to hold at Port Glasgow at 1500 ft then perform a low level display, before recovering to Glasgow Airport for fuel. Controller A advised the pilot that due to noise considerations it would be preferable for him to hold at 2500 or 3000 ft, which was agreed. The Harrier pilot informed him that he would make RT contact in plenty of time and that his display would last for 10 min, which Controller A acknowledged and passed details of the cloud base and runway in use. Although the ACN specified a VFR holding point for the use of display participants at the mouth of the Holy Loch outside CAS, the pilot stated that he wished to hold at Port Glasgow, which is within the Glasgow CTR, apparently operating VFR. It is not known whether following the brief, the Harrier pilot gained the impression that he had been cleared to enter CAS, but Controller A definitely did not intend to imply this.

UKAB Note (5): Subsequent enquiries revealed that the Harrier pilot recalled the brief that took place before the display. This was the second year that he had displayed at this Fair, and as a result of previous difficulties he took great care to explain in detail exactly the format and critical timings of the display. The change of holding position was due to unsuitable weather at Holy Loch, hence his request to hold at Port Glasgow. He specified that he needed to depart the hold at 1259 exactly, descending to run in low for the display on top time of 1300. He believed that the Watch Manager understood what he needed to do to achieve his task at the end of the call.

Subsequently, Controller A took over the APP position as mentor to the trainee - Controller B. Shortly after 1252, APP Controller A observed a high speed primary radar contact heading up the Firth of Clyde whereupon the Harrier pilot made initial RT contact, at 1252:50. Note (6): the radar recording reveals that at this point the Harrier's position was 298°(T) Glasgow Airport 9 NM, [between VRP GREENOCK and Port Glasgow] tracking about 120°(T). He reported *"C/S singleton Harrier 1 POB holding in the Clyde at Port Glasgow at 2500 ft and I will be er holding here for the next 8 minutes before displaying at Helensburgh and then I'll be with you at minute…12"*. The reported position led the controller to suspect that the Harrier was within the Class D Glasgow CTR. The initial

action of Controller B, on the instruction of her mentor, was to climb the Harrier to 3000 ft and instruct the pilot to carry out LHD orbits, which was acknowledged *"...climbing to 3000 and a left hand orbit and can you give me a squawk please"*. Although there was no mention made of it on the frequency, Controller B clearly assumed the Harrier pilot was flying under VFR. (The reported weather at the time was a visibility of 40 km and broken cloud at 3,500 ft). This, possibly, was based on the information passed to her by her mentor Controller A, who had carried out the telephone briefing earlier in the morning. A 3/A 1746 squawk was issued to the Harrier pilot and, upon seeing the SSR label appear on the display, Controller B was able to confirm that the Harrier was within the CTR although no 'formal' clearance had been issued to enter CAS; this was not mentioned (or queried) with the Harrier pilot at the time and it is not clear whether the pilot had construed, from his earlier briefing, that he had been 'cleared' to enter CAS.

At 1253:30, the Harrier pilot reported established in the hold at 3000 ft. It would have been reasonable to expect the Harrier pilot to understand that he must remain in a LHD holding orbit at 3000 ft until otherwise cleared. The frequency was quite busy, with a number of VFR ac operating into and out of the CTR. Controller D, who had taken over the APR position at about 1250, advised APP that the DH6 crew, on an IFR flight from Barra to Glasgow, had cancelled their IFR FPL and were now inbound VFR. This was acknowledged by the APP trainee - Controller B, who tried to pass on the known intentions of the Harrier pilot to APR Controller D. However, due to the RT, Controller D did not hear this information. Controller A then unplugged from the APP position to enable the trainee, Controller B, to effect a handover to Controller C before unplugging herself. During the handover, at 1255:00, the DH6 crew made their initial call to the APR on the combined Glasgow APPROACH frequency *"Glasgow RADAR good-afternoon C/S"* and was told by Controller D "*..you can continue towards the zone VFR QNH 1018 expect to join down the river not above 2000 ft*." This was a fairly routine clearance, because the DH6 was heading directly towards the Airport, from the NW, tracking 130°. Such a clearance would also have built in 1000 ft vertical separation, once inside CAS, from the Harrier holding at 3000 ft. However, Controller D did not specify the nature of the ATS that was being provided to the DH6 (nor ask what they required) and neither did the crew request a specific ATS.

Controller A stated that had the handover not taken place when it did, he would have directed his trainee to instruct the Harrier pilot to report when ready to commence his display. However, as the handover had been effected, it was assumed that Controller C would instruct the pilot to report this. The oncoming APP Controller C was informed by the offgoing trainee APP Controller B, that the Harrier would be holding for 8 min before carrying out his display and that was acknowledged by Controller C. However, the time at which this '8 minute hold' started and was due to end was not stated (nor noted on the fps). Controller A, meanwhile asked APR Controller D, to confirm the Harrier pilot's intentions. Traffic information on the Harrier was passed to the DH6 by Controller D at 1259:10, *"…be advised there is a Harrier holding at this time around the Ardmore Greenock area at Port Glasgow at 3000 ft VFR",* which was acknowledged *"understood and looking C/S"*. The DH6 crew was subsequently cleared to route via the BISHOPTON VRP - 2·5 NM NW of Glasgow Airport - to join on a L base for RW05. No traffic information was passed to the Harrier pilot about the DH6 at that time. MATS Part 1 clearly states that, within Class D CAS, "traffic information will be passed to VFR flights on IFR flights and other VFR flights". This was not done and several controllers stated that, with hindsight, they should have passed traffic information to the Harrier pilot prior to the Airprox. However, at the time, the controllers believed that the subject ac would be vertically separated by at least 1000 ft.

The APR Controller D stated that she had read the NOTAM on Faslane Fair but not the ACN, although she had been aware of its existence at the time. MATS Part 1 states that:

> "The responsibility for the accuracy of a hand-over lies with the person vacating an operational position. …… The order in which information should be passed from one controller to another should be as follows: a) General information, including variations from routine operations, b) Other supplementary information relating to the position, c) The detailed traffic situation."

The APP Controller C stated that although he had commenced his shift 2 hours before the Airprox and had been working an operational position previously, he had read neither the NOTAM nor the ACN relating to the Faslane Fair. However, he was aware of the event taking place - due to local press coverage, but he thought the air display was centred around *Faslane* and not *Helensburgh*. MATS Part 1 contains the following entry regarding taking over operational positions:

> "Controllers taking-over should be alert to the possibility of errors and omissions in the information being provided and must verify the data transferred to them by a thorough check of the radar display, flight progress strips and any other relevant information. Only when they are completely satisfied that they have a good awareness of the situation, should they indicate to the controller handing over that they are ready to accept responsibility for the operational position."

Both Controllers C and D reported that they had expected the Harrier pilot to report before commencing his display (though he had not been asked to do so) and also that the Harrier would maintain 3000 ft during the transit to the display area from the hold. This second assumption had no basis in fact other than no clearance had been transmitted to the Harrier pilot to leave his 'VFR holding pattern'.

Glasgow ATC were informed earlier that the parachuting event had been cancelled and so, with the exception of the Harrier display, all other activities were conducted at low level. The cleared routeing of the DH6 transmitted by ATC took it through the NOTAM'd display area but as the only activity taking place was at low level, this was considered acceptable by ATC and not queried by the DH6 crew. It would have been prudent for APP Controller C, or if he was busy APR controller D, to have reminded the DH6 crew of the display area at Helensburgh and that activity may be taking place within it, albeit at low level.

At 1259, the radar recording reveals the Harrier descended rapidly from its 3000 ft holding pattern and shortly before 1259:50, disappeared from the Glasgow radar displays. Because of the local topography the Glasgow SRE low level coverage in the mouth of the Clyde is poor, especially below 600 ft. The Harrier's radar return is not shown again until one Mode A return without Mode C at 1300:40. APR Controller D reported that the return had disappeared altogether from her radar and she had not seen its rapid descent. She asked her colleagues if they knew what the Harrier was doing, as she had seriously considered the possibility that it may have crashed. When she saw a weak radar contact some 12 NM to the NW of Glasgow, she realised that the Harrier might have left the hold and descended without clearance. APR Controller D passed traffic information to the DH6 crew - now some 13 NM NW of Glasgow – for the second time at 1301:10, "*…information for you the Harrier believed to be underneath you at this time unknown level he's not really showing so on radar therefore believed to be low level".* The DH6 crew responded *"roger we're visual he was low level orbiting and then he climbed rather rapidly and went up above us…and behind..but we've lost contact now".* The DH6 crew was advised by the APR Controller D that *"we have not very good radar contact at all with him so keep your eyes peeled"*, which was acknowledged. After a simultaneous transmission baulked his first attempt, the APR Controller D passed traffic information on the DH6 to the Harrier pilot for the first time just before 1301:40, (there had been no transmissions between APP/APR and the Harrier pilot in the intervening 8 min)*"…traffic information for you is a Twin Otter south of you range 2 miles similar track heading down the river VFR 2000 ft".* The Harrier pilot immediately retorted *"roger that…he has just flown directly through my display for a NOTAM'd display and I've just come very close…with him I'm passing left right across his nose this time and I've just ceased the display"*, whereupon APR Controller D acknowledged and at 1302:00, transmitted to the DH6 crew "*…If you can continue south please".* The Harrier reported that he was resuming the display at 1302:20 and, at 1303:10, the DH6 crew was instructed to contact Glasgow TOWER. The Harrier pilot next called Glasgow APP at 1308:10 after the display reporting that he was 'VFR down the Clyde'. Once again, a formal clearance to enter the control zone was neither requested nor passed in the usual format of 'From….to….via….at'. Controller D simply replied "*C/S copied continue down the Clyde remain on the North Bank and copied that you're fuel critical*". The Harrier subsequently positioned for RW05 and soon after landing reported that he would be filing an Airprox.

The Harrier pilot did not comply with the normal requirements for entering and leaving Class D airspace. However, the briefing that took place, some two hours before the Airprox probably had a bearing on subsequent events. Had it been properly recorded and disseminated it is probable that a greater awareness of the display might have been provided to the controllers concerned. APP Controller C and APR Controller D in position at the time of the Airprox did not have a clear understanding of either the Harrier pilot's requirements or what he had been told to expect. It was the responsibility of the ATC Watch Manager to ensure that all staff were fully briefed on the display.

The controller handover procedures, as detailed in MATS Part 1 and the Glasgow MATS Part 2, were not followed. The usual 'split' of responsibilities between APP and APR, which has developed at the unit is not documented and is accepted implicitly without being formally reiterated, as required by the unit's own MATS Part 2. Neither Controller C nor D ensured that they had a full understanding of the traffic situation before accepting the operational position. The APR Controller D stated that she was unaware of what the Harrier was doing until briefed by Controller A, some 10 min after taking over the APR position at about 1250. It would have been prudent, given the busy RT for Controller D to have ascertained from Controller A or B the intentions of the Harrier pilot prior to accepting the APR position. Controller C had not read the ACN or the NOTAM prior to taking over the APP position. Had this occurred then he would not have been under the misconception that the display would take place at Faslane.

The Airprox actually took place outside the Glasgow CTR in Class G airspace, when the pilots of both ac were operating VFR. Nevertheless, there were a number of ATC shortcomings. The responsibility for the handling and integration of VFR traffic, including the passing of relevant traffic information together with information useful for the safe and efficient conduct of the flight, rested with APP Controller C. However, it was APR Controller D - the radar controller - who actually cleared the DH6 crew into the CTR and passed traffic information, albeit only to the DH6 crew. Neither controller mentioned to the DH6 crew the NOTAM'd display area nor the ATS being provided outside CAS. None of the 3 qualified controllers had a real grasp of the situation due to inadequate briefing and handovers referred to earlier. Moreover, if the Harrier pilot had been instructed to report ready to commence his display, or to report ready to leave 3000 ft, it is very probable that the controllers would have been able to manage the situation in a more positive manner, providing traffic information as necessary, and the Airprox would not have occurred.

HQ STC comments that both the Harrier pilot and the display organiser appear to have taken all necessary precautions to ensure a safe event. However, the apparently inadvertent penetration of the NOTAM'd airspace was clearly of some concern to the Harrier pilot and it is fortunate that he had sufficient time to manoeuvre away from the intruder in a safe and controlled manner.

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 relevant RT frequency, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The STC member emphasised to the Board that this was the second season that the Harrier pilot had performed his display at Helensburgh. Difficulties experienced last year led him to take great care this time in briefing his intentions to the Glasgow ATC Watch Manager by telephone and he had run through the event in detail. This telephone brief did not replace a CAS joining clearance, but having given the brief and the subsequent acquiescence on the part of APR to his initial RT call, he did not perceive more information was needed. It was evident, however, that he had entered the CTR twice without being formally 'cleared' so to do, firstly to take up the hold and secondly after the display on his way into Glasgow for the scheduled refuel. On neither occasion did the APR or APP comment about this or challenge what he was doing. Here was a useful lesson for military pilots, which needed to be reiterated widely before the start of the next display season – entry into CAS needs specific clearance, regardless of whether it is prior to a display, and irrespective of any agreements or briefings

beforehand; if pilots are in any doubt whatsoever they must recheck on RT immediately. Indeed, all military pilots who do not fly frequently within CAS or under the control of civilian ATSUs should heed this reminder. Of necessity entry clearance into CAS must be requested in good time, so as to obtain clearance and also to complete a read-back as appropriate, before entry.

The Airprox had not occurred within CAS, but in the Class G FIR for which a NOTAM and ACN promulgated the display activity. ATSI's exhaustive and comprehensive analysis had determined several factors that had contributed to this incident. One was the apparent lack of knowledge on the part of some controllers as to what was going on, because they had not read the applicable documents that were available to them. Civil controller members considered this lack of preparation and incomplete self-briefing before taking over a controlling position most unprofessional. Another point was that the Harrier pilot had complied with the ACN and had contacted the Glasgow ATC Watch Manager on the day of the display to confirm his display profiles, but the information provided in this briefing had not been widely disseminated amongst the controllers on watch. If it had it may well have prompted explicit instructions to the Harrier pilot, to report when ready to depart the hold. As it was, the Harrier pilot made no mention of his departure from the hold and ran-in to the display area, under the impression that he did not have to say anything since he had passed on his exact intentions beforehand to all concerned. Members understood the pilot's misconception, but he had been wrong to depart his holding position without clearance. There was also a legitimate expectation on the part of APR for the Harrier pilot to request a clearance before leaving the hold in the CTR. In the members' view it was this 'silent departure' which set the scene for the subsequent close encounter; the Harrier pilot commenced his display from the E, unaware of the DH6 entering the display area at exactly the same time from the W.

The Board noted that the VFR DH6 crew was well aware of the display from the NOTAM. However, ATC had subsequently issued instructions to them to route through the NOTAM display area under VFR direct to the VRP at BISHOPTON. They presupposed that ATC would not permit them to fly through a display whilst it was in progress, and so were unaware that it had just started. It was evident from the traffic information provided to them and the pilot's subsequent comment that the DH6 crew thought the Harrier was still inside the CTR. However, the radar recording showed that the DH6 crossed into the display area at exactly the time programmed for the display to begin – which it did. Some CAT pilot members thought that the DH6 crew should never have been allowed to route through the area so close to the notified display timings. They held it showed a lack of appreciation on the part of ATC and poor airmanship by the DH6 crew who were responsible for their own separation while flying VFR in Class G airspace. Other members agreed, but understood why they had followed ATC instructions, to enter CAS; it was a salutary point of airmanship to all. There was agreement amongst the Board that a lack of effective communication on a number of fronts between all concerned was the crux of the issue. This led to the conclusion that this Airprox resulted from a series of assumptions and misunderstandings within Glasgow ATC, and between ATC and the Harrier pilot before and during the display, thus the DH6 Twin Otter crew was allowed to fly into conflict with the Harrier in a NOTAM'd display area.

Assessment of the risk inherent in this encounter led the Board to consider events from both cockpits. The Harrier pilot, once committed to his display would have been concentrating hard. When he pulled at 6g, to 30° nose-up, to be confronted by the DH6 in front of him all the Harrier pilot could do was roll and pull away hard from it. This resulted in about 0·6 NM separation according to the radar recording. Meanwhile, in the DH6 the PNF had spotted the Harrier as it climbed from sea level and warned the PF, who had not appeared to be operating under a particularly heavy workload. Both then watched the Harrier pass ahead from L – R, not at a distance to feel threatened. The Board agreed that the DH6 PF would not have been in a good position to avoid the fast jet if the Harrier pilot had not acted so promptly and robustly. CAT pilot members added that once the DH6 crew had been told to expect to join down the River Clyde and subsequently instructed to route via the BISHOPTON VRP the confliction was set up - unbeknown to ATC or the Harrier pilot. The apparently poor radar coverage in the area did not facilitate any earlier warning of the predicament and the APR passed traffic information on the DH6 to

the Harrier pilot, only after the Airprox had occurred. The eventual separation achieved owed much to the Harrier's energy and its pilot's quick reactions. Both had removed the risk of actual collision but members agreed unanimously that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Following a sequence of assumptions and misunderstandings within Glasgow ATC, and between ATC and the Harrier pilot, the DH6 Twin Otter crew was allowed to fly into conflict with the Harrier in a NOTAM'd display area.

Degree of Risk: B.

Contributory Factors:

Inadequate pre-briefing by controllers before taking over an operational ATC position.

Inadequate dissemination of operational information within the ATC watch.

Absence of traffic information to the Harrier pilot about the DH6.

Absence of clear instructions to the Harrier pilot on RT.

Harrier pilot should have obtained a clearance to leave the hold and the CTR.

AIRPROX REPORT No 84/01

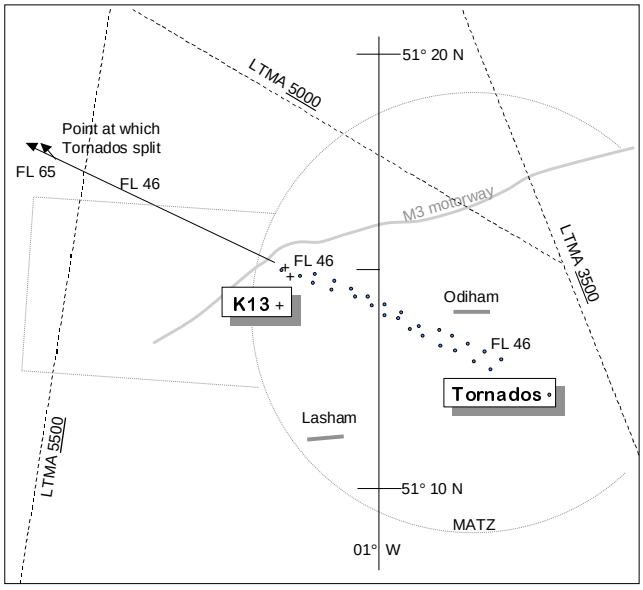
Date/Time: 3 Jun 1349 (Sunday)

Position: 5115 N 0103 W (1 NM SE of Basingstoke)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	K13 glider	Tornado GR x 2
Operator:	Civ Club	HQ STC
Alt/FL:	4100 ft (QNH)	NK (QNH)
Weather	VMC CLBC	VMC CLBC
Visibility:	Unltd	10 km+
Reported Separation:	100 ft V /3-500 ft	

Recorded Separation: NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE K13 PILOT reports heading 310° at 55 kt and was 3500 ft above Lasham's elevation (618 ft) when he heard the sound of fast jets approaching. They appeared from his right rear quarter; one passed about 100 ft directly overhead and then descended again to his level and the other, at a similar level, passed right to left across his nose a few hundred yards ahead. He had no time for avoiding action and assessed the risk of collision as high if he had not been seen. He thought from the jets' subsequent flightpath that they may have seen him. His glider has a red fuselage and wing tips with white wings. He felt some turbulence which could have been atmospheric.

THE TORNADO PILOT reports heading 280° at 360 kt and receiving a RIS from Farnborough while flying a stepped climb under the LTMA. He was No 2 of a pair flying in loose arrow formation. They were informed of multiple contacts ahead, possibly gliders. When passing 6500 ft, he thought, feeling

that the contacts were getting closer, he moved further left and above the leader; as he did so he saw a glider 3-500 ft directly below. He was not sure, when asked later, about where in the stepped climb the incident had occurred; it had been a busy part of the flight.

UKAB Note: LATCC radar recordings show the Tornados in arrow formation tracking 300° and passing 1 NM SW of Odiham airfield climbing to 4600 ft Mode C (4900 ft QNH). The pair, identified from their Farnborough squawk, maintain this level as they cross an intermittent primary-only return in the position given by the glider pilot. Some 7 NM further along track (5118 N 0113 W), passing FL 65 in a climb, the Tornados' returns separate into a wider formation, but with the No 2 on the right. The glider pilot was asked to confirm his altitude which he had reported as 4100 ft on QNH 1025 mb. He said that in fact he had been flying at 3500 ft on Lasham's QFE (he specifically noted this just after the incident) which would have put him at 4100 ft amsl. The QNH given was the same as quoted by Farnborough and confirmed from Met Office records. Because both pilots agreed that the vertical separation was less than the 800 ft indicated by this information, it is possible that the glider pilot was flying higher than his recollection.

HQ STC comments that the Tornados were in transit between display venues on a Sunday. The lead crew had endeavoured to navigate the formation safely through the Farnborough area at an appropriate quadrantal level below the base of controlled airspace and with a RIS. However, they found themselves approaching an area of high traffic density and were continually on the lookout for the contacts being reported by Farnborough Radar. As they approached the area to the NW of Lasham, multiple glider contacts were called to them 1 NM on the nose; however, in the time available, they were unable to avoid this last set of contacts by a more comfortable margin..

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 controller involved and reports from the appropriate operating authorities.

It was clear that the Farnborough controller had provided a comprehensive service to the Tornado pilots, passing almost continuous traffic information to them while simultaneously providing a service to many other ac. This had raised the Tornado pilots' awareness to search for the surrounding gliders, enabling one of them to see the glider, having fortuitously displaced his track from it. There were 2 main aspects to the Board's unusually long discussion of this Airprox; the undesirability of mixing fast jet movements with high density glider operations, particularly on a Sunday in an area where fast jets are rarely encountered, and the miss distance that pertained in this Airprox.

The Tornados were flying from Biggin Hill to N Ireland and members were unable to suggest an alternative routeing that would not have exposed them to just as much risk, (i.e. anti clockwise round the Heathrow/City Zones) or been prohibitively costly in fuel, or involve flight in the TMA for which ATC approval might well have been denied. The pilots were flying at reduced speed and using radar services, but gliders are notoriously difficult to see at the ranges required to avoid them in a fast jet. This led members to discuss the responsibility glider pilots have to look out for themselves; while it was agreed that no pilot of any ac should rely on others seeing and avoiding them, the glider pilot in this case was flying in an area rarely used by fast jets, on a Sunday, and the Board was not surprised that he was not scanning the horizon for such a threat. However, he did not see the Tornados in time to avoid them any more than the Tornado pilot saw the glider, in a situation where 'see and avoid' was the only means of collision avoidance, and the Board concluded that the too-late sightings were the cause of the Airprox. While a glider pilot member suggested that it might not be possible to see an ac approaching from the sector concerned, other pilots said that to take look-out seriously, it was important to move the ac to enable sectors concealed by ac structure to be scanned.

The Board's assessment of risk depended on the miss distance pertaining, and the best information in this case was that the Tornados were within 100 ft of 4900 ft QNH (from their Mode C which had checked out as accurate with Farnborough). The second best information was that the glider pilot was at 4100 ft QNH for the reasons given in Part A. There was no independent confirmation of this however, and although he was sure of his

recollection, this meant that there would have been 800 ft of vertical separation between them. At the same time, the Tornado pilot considered there was only 3-500 ft between them and this led the Board to conclude that the glider pilot must have been mistaken in his recollection of his altitude. By how much, members could only guess, but not by enough to persuade a majority of the Board that there had been a risk of the ac actually colliding. Members were well aware of how startling the unexpected appearance of fast jets could be and how this usually made them seem closer than they may actually be.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively a non-sighting by the Tornado pilot and a late sighting by the glider pilot.

Degree of Risk: C

AIRPROX REPORT No 85/01

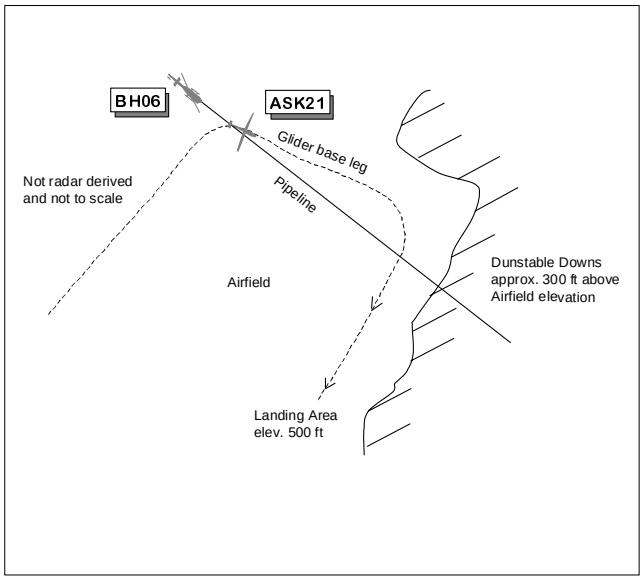
Date/Time: 4 Jun 0917

Position: 5152 N 0032 W (Dunstable Glider Site - elev. 500 ft)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	ASK21 Glider	BH06
Operator:	Civ Club	Civ Comm
Alt/FL:	400 ft ↓ (QFE NK mb)	400 ft (agl)
Weather Visibility:	VMC CBLC 20 km	VMC CBLC >10 km
Reported Separation:	0 H 50 ft V	0 H 200 ft V

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ASK21 GLIDER PILOT reports flying on a dual training sortie from Dunstable Gliding Site when the visibility was >20 km, 4000 ft below cloud, in VMC. The glider was white with a red nose and wingtips and was not fitted with a radio. During the downwind circuit leg at 700 ft QFE (1200 ft QNH) heading NE, he saw a helicopter about 2-3 NM away flying very low approaching from the N. He executed a steeply banked R turn onto base leg heading 150° at 55 kt so that the helicopter could see him as it had not changed course. He stated that the circuit pattern in use had a base leg sector that routed towards the Chiltern Hills (Dunstable Downs) with a R turn onto final approach being made normally at hill top height. As he could then hear the helicopter, he flew as high as possible and, at 400 ft QFE, the BH06, coloured black or dark blue with yellow markings, passed 50 ft beneath. It was seen to continue on track, following the pipeline course, and then pull up to pass over the 300 ft hill ahead. He assessed the risk of collision as high.

THE BH06 PILOT reports heading SE at 100 kt on a pipeline survey at 400 ft agl and was receiving an A/G service from Dunstable Radio having telephoned his flight details through earlier. The visibility was >10 km in VMC and the helicopter was coloured blue with a gold stripe with HISLs

switched on. He first saw a glider 2-5 km away, as he approached Dunstable Glider Site, and had intended to pass behind and below it on the downwind leg before it turned onto base leg. Unfortunately, the glider turned R onto base leg, just as he passed behind it, and overflew him by about 200-300 ft. He opined that the glider obviously did not carry a radio otherwise the glider pilot would have been aware of his intentions. He assessed the risk of collision as nil.

CAA FLIGHT OPERATIONS INSPECTORATE (FOI) reports that it appeared that both ac were operating in accordance with either the circuit procedure, in the case of the glider and radio instructions from Dunstable Radio for the helicopter. During subsequent telephone conversations with both pilots concerned he was satisfied that they had seen each other during the incident but they were not aware of that fact until he had informed them. The glider pilot stated that 300 ft agl was the minimum height to turn onto final approach and make a safe landing. The helicopter pilot had said that the reason for the early turn executed by the glider pilot to ensure he made the landing area and to make the glider easier to see had been unknown to him and had placed them within 200 ft of each other. In hindsight, he agreed that it would have been more prudent to have given the glider a wider berth in those circumstances. The CFI for the gliding club had said that he would look at the procedures with regard to non-radio gliders in the circuit but felt that the onus for avoidance should be with powered ac.

UKAB Note (1): The UK AIP at ENR 5-5-1-2 promulgates Dunstable Downs as a Glider Launching Site centred 515200N 0003254W for winch and aerotow launches where cables and tug ac maybe encountered to 2000 ft agl, during daylight hours.

UKAB Note (2): Analysis of the Debden Radar recording shows the BH06, squawking Mode A only, routeing S through the Dunstable Gliding Site. A pop up primary only return, possibly the ASK21 glider, appears briefly for one sweep on the radar, towards the end of the downwind leg before fading. The incident, as described by both pilots, is not observed on radar.

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 ATSI advisor reminded members that an A/G station operator cannot give instructions, only information, to pilots on the promulgated frequency. Pilot members wondered if the BH06 pilot had realised this or if he had mistakenly expected an element of 'control' would be applied by the A/G station operator on circuit traffic. In this incident, the BH06 pilot had telephoned his flight details to Dunstable but the subject glider was already airborne and unaware of the helicopter's impending pipeline survey. However, the glider pilot had seen the approaching BH06 in good time and had banked steeply to make himself more conspicuous whilst positioning onto base leg in the circuit for landing. Helicopter members discussed what the BH06 pilot did next. He had sighted the glider in good time and had intended to pass behind it when it was late downwind but unexpectedly the glider had then turned R (onto base leg). It was thought that in continuing at 100 kt to follow the pipeline, which routed through the glider site landing area, he had displayed less than ideal airmanship. The glider ahead was descending from above him in a position where it was committed for landing. Moreover, the ground ahead rose towards the 500 ft landing area and beyond that the Chiltern Hills rose immediately another 300 ft. The onus was always on the BH06 Jet Ranger pilot to give way to the glider. He had the option of slowing down or holding clear of the glider site until the glider was safely removed from his track but instead he had chosen to underfly the glider. The Board were clear that this manoeuvre had caused the Airprox and in doing so, he had flown contrary to the Rules of the Air Regulations, Rule 17 contained in the Air Navigation Order 2000: -

> *Rules for avoiding aerial collisions*
> *General – An aircraft which is obliged by these Rules to give way to another aircraft shall avoid passing over or under the other aircraft, or crossing ahead of it, unless passing well clear of it.*
> *Converging – An aircraft in the air shall*

give way to other converging aircraft as follows:

(i) flying machines shall give way to airships, gliders and balloons.

Overtaking – An aircraft which is being overtaken in the air shall have the right-of-way and the overtaking aircraft, whether climbing, descending or in horizontal flight, shall keep out of the way of the other aircraft by altering course to the right, and shall not cease to keep out of the way of the other aircraft until that other aircraft has been passed and is clear, notwithstanding any change in the relative positions of the two aircraft.

Throughout the incident the Jet Ranger pilot had maintained visual contact with the glider and, as such, members felt he had always been in a position to avoid an actual collision. However, the helicopter pilot had been caught out somewhat by the glider's unexpected turn and the glider pilot had few options left at that stage. These points and the geometry of the incident persuaded the Board that safety had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Jet Ranger pilot flew under the ASK21 glider, contrary to Rule 17 ANO.

Degree of Risk: B

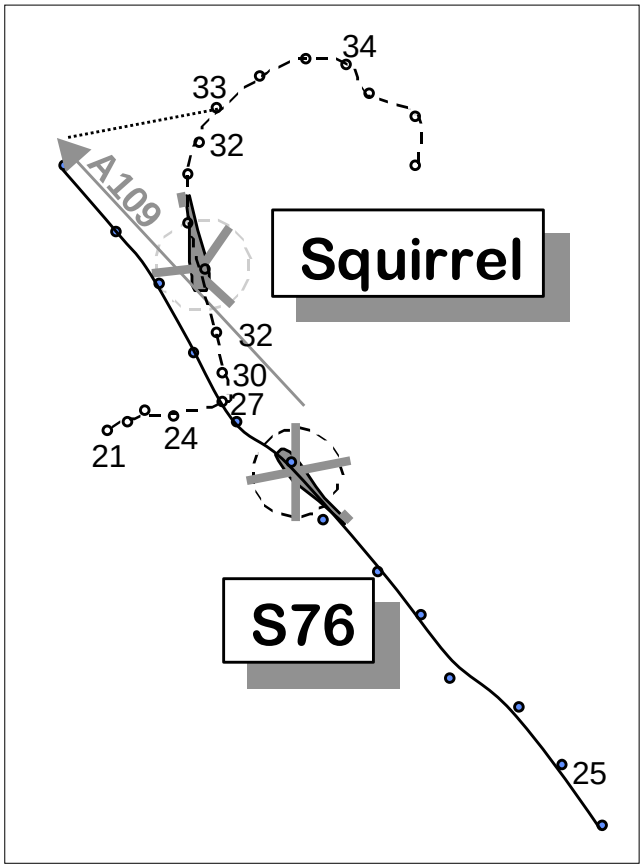
AIRPROX REPORT No 86/01

Date/Time: 5 Jun 1444

Position: 5232 N 0230 W (3 NM W of Bridgnorth)

Airspace: FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	S76	Squirrel
Operator:	Civ Comm	HQ PTC
Alt/FL:	2000 ft (QNH)	3000 ft↑ (RPS 1009 mb)
Weather Visibility:	VMC CLBC 25 km	VMC CLBC 20 km
Reported Separation:	300 ft H /NK	
Recorded Separation:	NK	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE S76 PILOT reports heading 305° at 135 kt in transit at 2000 ft and receiving a RIS from Shawbury on 120·77. Shawbury passed traffic information on an ac 5 NM away at 400 ft in his 1 o'clock which he saw but then lost sight of as it turned. The next traffic information gave it as 800 ft above in his 1

o'clock; he saw it and advised ATC. It was a black and yellow Squirrel which descended across his flightpath from R to L, passing through his level about 300 ft to his left as he turned right to avoid it; it would have been extremely close if he had not turned. There was an A109 about 4 NM ahead of him on a similar track which the Squirrel pilot, if passed traffic information, may have mistaken for him.

THE SQUIRREL PILOT reports heading 185° at 90 kt on an IF instructional sortie and receiving a FIS from Shawbury on 315·4. While at 3000 ft he was passed traffic information on a helicopter SE of him, tracking NW and 700 ft below. Looking, he picked up one about 500 ft below passing through his 12 o'clock about 1 NM away, and reported that it was in sight. His next exercise was a PFL so he completed the pre PFL checks which included a comprehensive lookout around and below. Seeing no other ac he simulated engine failure and the student reacted correctly, lowering the lever (inducing a RoD of about 2000 ft/min) and turning onto 250°, into wind. Once the exercise was complete the ac was recovered to normal flight. The helicopter filing the Airprox was not seen at all.

MIL ATC OPS reports that the pilot of the S76 was in receipt of a FIS from Shawbury Zone (ZONE) whilst transiting at 2500 ft 1019 mb (Barnsley RPS) squawking 0223 in the vicinity of Evesham en-route from Abingdon to Shrewsbury. Although the S76 pilot had originally requested a RIS on initial contact, ZONE had been unable to identify the ac – probably because the helicopter was below radar coverage – and had therefore only been able to provide a FIS. At 1434:59, whilst attempting to identify the S76, ZONE saw a 7000 squawk with a position and heading that matched the S76's profile; however, when questioned by ZONE, the S76 pilot stated *"Er no, that's probably an ac ahead of me, he's got Mode C at two thousand feet, an Agusta 109, I'm about 3 miles behind him"*. At 1437:12, the Agusta pilot freecalled ZONE stating *"C/S, is an Agusta 109 from Abingdon to Shrewsbury, just passing Kidderminster, two thousand five hundred feet, one zero one four, requesting FIS, and we're about four miles ahead of (S76's C/S)"*. ZONE acknowledged the transmission, provided the Barnsley RPS, confirmed that a FIS was being provided and instructed the Agusta pilot to squawk 0230. Around the same time, transmissions to both helicopters were interspersed with calls to 3 other pilots on frequency who were all receiving a service from ZONE. At 1441:05, ZONE instructed the S76 pilot to squawk ident and, shortly afterwards, the S76 was identified, placed under RIS at 2500 ft (RPS) and updated on the position of the Agusta, which was in the S76's 12 o'clock at 4 NM. At 1441:55, ZONE provided TI to the Agusta pilot regarding a Cessna 172 and the subject Squirrel, both manoeuvring at 4000 ft in the local vicinity; the Agusta pilot reported visual with both ac. After making several transmissions to other ac on the frequency, ZONE provided TI about the Squirrel to the S76 pilot stating *"C/S, traffic twelve o'clock, two miles, manoeuvring, Shawbury helicopter about eight hundred feet above"*. The pilot of the S76 stated *"C/S, visual with that traffic"* then 15 seconds later *"Is he aware of us"?*; ZONE confirmed that TI had been passed to the Squirrel. The S76 pilot transmitted *"It would be nice if he stayed away from us rather than, er, descending across my nose at two hundred yards"*; ZONE replied *"(S76) C/S, the Squirrel did call visual with you"*. The S76 pilot reiterated his previous comments regarding the proximity of the Shawbury helicopter (Squirrel) and ZONE repeated that the Squirrel pilot had called visual with the S76. After landing, the S76 pilot reported an Airprox to Shawbury ATC.

The Squirrel pilot was in receipt of a RIS from Shawbury Radar (RADAR) whilst conducting an instrument flying training sortie SE of Shawbury up to 4000 ft RPS and squawking 0243. RADAR was manned by a mentor and trainee whose workload was assessed as medium to high. At 1441:08, RADAR provided TI to the Squirrel pilot regarding the Agusta 109 stating *"C/S, traffic south-east, five miles, tracking north-west, no height information"*, which was acknowledged "*looking*". Later, at 1443:27, a second TI call was made: *"C/S, traffic south-east, three miles, tracking north-west, indicating seven hundred feet below"*; this referred to the S76. The transmission was, at first, acknowledged by the trainee pilot before the instructor pilot reported visual with the traffic. Some 10 seconds later, the squirrel pilot reported *"C/S, fanstop in Bravo* (a local flying area) *will report climbing away"*; RADAR acknowledged the call and placed the ac under FIS in accordance with local orders. At 1446:18, the Squirrel pilot reported climbing away and was placed under RIS by RADAR.

The Clee Hill radar recording shows the Agusta 109, squawking 0230 without Mode C, and the S76, squawking 0223 indicating 2500 ft, about 4 NM in trail to NE of Clee Hill on a NW track. The Squirrel is SW of Cosford on a southerly track squawking 0243 indicating 4200 ft. At 1441:53, the time of RADAR's first TI call to the Squirrel pilot, the Squirrel is in a left turn passing through 150° indicating 3900 ft, with the Agusta 3 NM SE maintaining track. Slightly afterwards at 1442:05, the time of ZONE's TI to the Agusta pilot, the Squirrel is between the Agusta's 1 and 2 o'clock tracking E and indicating 3800 ft; the S76 is still in 4 NM trail to the Agusta maintaining track indicating 2500 ft. Both the Agusta and the S76 maintain their tracks and spacing whilst the Squirrel continues its descending left turn. At 1443:27, the time of RADAR's second TI call, the Squirrel is maintaining its left turn passing through 230° and indicating 3300 ft; the Agusta is about 1 NM W tracking NW away from the Squirrel (A109 in the diagram), whilst the S76 is 3·5 NM SSE, tracking 315° and indicating 2500 ft. At 1443:40, the time of ZONE's TI to the S76 pilot, the Squirrel is passing through 195° indicating 3200 ft, about 5º R of the S76's track at a range of 2·5 NM. The Squirrel then steadies on a track of 170° between the S76 pilot's 12 and 1 o'clock whilst the S76 maintains a track of 315°. At 1444:07, the 2 helicopters have maintained their respective tracks and are about 0·5 NM apart, although the Squirrel is now indicating passing 3000 ft in a gentle descent. The radar responses of both tracks merge at 1444:15 with the Squirrel crossing the S76 from right to left by the shallowest of angles. As the returns diverge, the Squirrel begins a descending right turn passing 2400 ft.

The radar evidence indicates that the traffic information provided by both controllers was accurate and 'seemingly' effective enough for each pilot to have made a visual acquisition of the other ac without chance of a misunderstanding. Therefore, given that both the Squirrel pilot and S76 pilot appeared to call visual with each other, both ZONE and RADAR reasonably assumed that no threat existed to the ac under their control.

HQ PTC comments that despite accurate TI from Shawbury Zone, the Squirrel crew apparently did not register the fact that there was more than one civilian helicopter passing through their operating area. With 20/20 hindsight, the addition of one or 2 words to the second TI call to the Squirrel, such as 'further traffic…', might have been helpful. However, even without such TI, the pre-PFL lookout should have alerted the crew to the proximity of the second 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 and reports from the appropriate ATC and operating authorities.

This incident generated a lengthy discussion about the completeness of the traffic information to the Squirrel pilot for whom the Board had some sympathy. In the end members agreed that the cause of the incident was that the Squirrel pilot's clearing lookout did not disclose the S76 and consequently he descended into confliction with it. It had been below and to his left and would not have been in view after he rolled out of his clearing turn (his student was 'under the hood'). However, members agreed that a contributory cause was that the Squirrel pilot was unaware that there were 2 helicopters approaching on a NW track and he misidentified the one he saw for the subject of the second TI from RADAR.

It was argued that if he had listened carefully to the second TI he could have deduced that there was another helicopter. However, the pilot made this mistake, and both pilot and civil controller members agreed that in the circumstances, RADAR could have prevented it by using the phrase 'further traffic' or, as some ATCOs suggested, including the ac types in the TI. When members were asked 'under what circumstances should a controller be expected to know when to provide this information?' there was a chorus of 'always!' from the Board. There was a strong feeling that a phrase such as 'last reported traffic' or 'further traffic' should always be used (as appropriate) in such circumstances. While the TI as issued should in theory have been adequate, in the event it proved not to have been, but could have been with 2 more words added. It was observed that everyone knew there were 2 helicopters approaching the Squirrel, except its pilot, and this information could have been imparted. As to the accuracy of traffic

information, most pilots could remember when bearing and range information as seen from the cockpit differed from what was reported by ATC, who were always looking at information at least a few seconds old, and the Squirrel pilot might have thought this was one such occasion. Controller members also offered for consideration whether the controller should have provided further traffic information, or a warning, when the Squirrel pilot called 'Fanstop'. The close proximity of the Squirrel to the S76 at that juncture should have been clear on the radar display.

In considering the risk level members noted that the S76 pilot had the Squirrel in sight and was able to take effective avoiding action, but because the Squirrel crew were unaware of the S76 and might have turned in any direction, the Board concluded that the safety of the ac had not been assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Squirrel pilot descended into conflict with the S76, which he did not see.

Contributory factor The Squirrel pilot was unaware of the second ac and misidentified the TI passed by the Shawbury Radar controller.

Degree of Risk: B

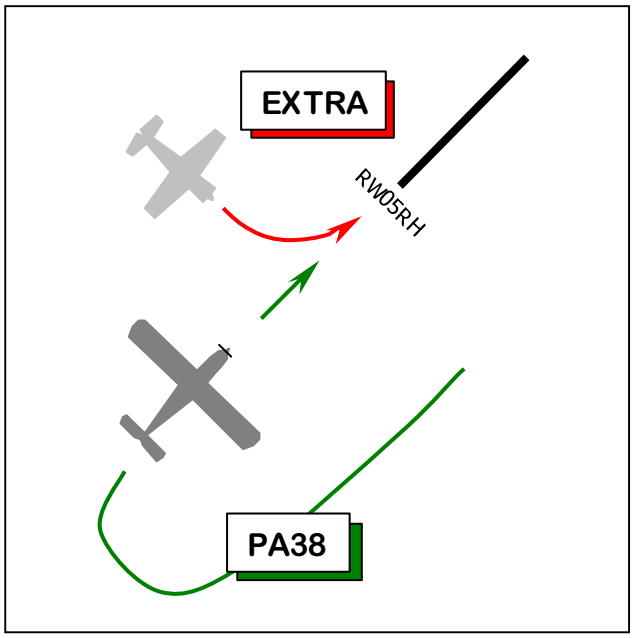
AIRPROX REPORT No 87/01

Date/Time: 3 Jun 1245 (Sunday)

Position: 5051N N 0314 W (Dunkeswell aerodrome - elev 850 ft)

Airspace: ATZ (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	PA38	EXTRA 300L
Operator:	Civ Pte	Civ Trg
Alt/FL:	250-300 ft ↓ (QFE)	500 ft ↓ (QFE)
Weather Visibility:	VMC CLBC >10 km	VMC CAVOK >10 km
Reported Separation:	0·25 NM	1000 ft H
Recorded Separation:	Not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA38 PILOT reports that he was inbound to Dunkeswell from Kemble; his ac has a blue and white livery, HISLs and the landing light were on. After he had established the Cct pattern from Dunkeswell RADIO, he joined downwind as No3 in the RHD Cct for RW05. The No2 ac in the same Cct extended downwind slightly to allow more separation on the landing ac so he also extended downwind slightly to maintain his Cct interval at 75 kt against the No 2. He called 'base' and then 'finals' for RW05 and by then the No2 was in the process of landing. With 0·5 NM to run to the threshold of RW05, another ac, subsequently identified as an EXTRA 300L, appeared from the L descending through his height, about 0·25 NM in front of his ac. The EXTRA pilot turned ahead onto the RW05 centre line and continued to descend, but as its speed was significantly higher than his PA38, the separation did not reduce below 0·25

NM, so avoiding action was not required. The EXTRA pilot completed a high speed low pass along RW05 at about 30 ft aal, before climbing away. During the low pass the EXTRA overflew the No2, which was just completing its rollout on RW05. He continued with the approach and when the previous No2 had exited at the far end of the runway transmitted 'short finals' at a height of 50 ft, to ensure everyone understood his intentions, before landing on RW05. The EXTRA landed shortly afterwards.

A subsequent discussion with the No2 student pilot's instructor – the pilot-in-command of the No2 - indicated that the EXTRA had overflown the No2 ac by about 30 ft, which was consistent with his own observation whilst on 'finals'.

He opined that the actions of the EXTRA pilot, flying his ac from the 'non circuit' side in between the No2 that had just landed and his, an ac on final, where there was only adequate separation for landing, and then doing nothing more urgent than a high speed low pass down the runway centre line was dangerous. Notwithstanding the disconcerting affect for himself on finals, if the No2 had needed to 'go around' for any reason, circumstances could have been very different. He spoke to the EXTRA pilot after landing, and found his reaction worrying.

UKAB Note (1): The UK AIP at AD 2.23 - EGTU – 1-2, promulgates Dunkeswell RW05 Cct direction as RHD.

THE EXTRA 300L PILOT reports that his ac has a white and blue colour scheme and HISLs were on. He flew a curving approach to RW05 at 130 kt from a low LHD circuit ahead of the PA38 which he was aware of; he had informed its pilot accordingly and there was no conflict. After landing, the visiting PA38 pilot remonstrated with him that the P38 pilot had the 'right-of-way' on finals, but as he thought he had been at the lower height on a curving approach very close to the threshold he disagreed. He believed that the PA38 pilot had not had to change speed or direction, and had landed nicely on a clear runway with a minimum horizontal separation of about 2 runway lengths [about 1950 m]. He added that the visiting pilot seemed a bit phased on several counts; he had "no clearance to land," there had been parachuting overhead, plus a descending parachuting ac and 4 ac in the circuit, plus 3 microlights, 2 non-radio departures, together with gliders operating in the ATZ and communicating with Dunkeswell RADIO. Furthermore, the PA38 pilot had been informed of all these activities including ac making low level 500 ft LHD bad weather circuits, which was when he had informed him twice of his position and intentions. He had been visual with the PA38 "at all times" and had made a go-around because of the possibility of wake turbulence from a preceding ac departure, so he could not understand the reason for the Airprox, especially as they had both seen each other and transmitted their individual intentions.

He added that he was well aware of Rule 17 Para 6 b (i) but did not think it totally relevant to this situation as he had been established on a final approach path to land and was the lower ac.

UKAB Note (2): Rule 17 Para 6 b (i) – Order of landing, of the Rules of the Air Regulations 1996, states that "…in the case of two or more flying machines…approaching…for the purpose of landing, the ac at the lower altitude shall have the right-of-way, but it shall not cut in front of another ac which is on final approach to land or overtake that ac."

UKAB Note (3): This Airprox occurred outwith the coverage of recorded radar.

UKAB Note (4): The UK AIP at AD 2-EGTU –1-1, promulgates Dunkeswell ATZ as a circle radius 2 NM, centred on RW05/23, from the surface to 2000 ft above the aerodrome elevation of 850 ft and active on Sundays in Summer from 0800 – 1800. An A/G Station, Dunkeswell RADIO, operates on 123·475 MHz during the same period.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The EXTRA pilot believed he was actually the lower ac when he was established on final approach, but he stated he made a curving approach to the RW centreline. Whereas the PA38 pilot flying along the centreline already, thought he was the lower ac when the EXTRA pilot descended through his

height. The Board pointed out that the accepted position of finals is on the extended RW centreline, and they could understand the PA38 pilot's concern once he had called "finals" to see another ac fly between his position and the threshold. It seemed to the GA pilot members that Rule 17 Para 6 b (i) did indeed apply, contrary to the EXTRA pilot's view, as he had not apparently intersected the RW centreline before the PA38 and may have cut in front of the other ac. Members noted also that the PA38 pilot had extended downwind and so was probably further out than normal once established on the RW centreline.

For whatever reason the EXTRA pilot chose to Cct left, in opposition to other traffic. It seemed to the Board that if the established aerodrome Cct being flown by other aviators at the time was right-hand, then the EXTRA pilot could and should have conformed to this pattern also. This was the Cct direction specified in the AIP for RW05 and apparently that relayed to the PA38 pilot by Dunkeswell RADIO. Moreover, there were at least 2 other ac in addition to the PA38 circuiting to land in that direction and it would appear that good airmanship and compliance with the established pattern so formed would have prevented this unfortunate occurrence. This was reinforced within Rule 17 Para (5) – Flight in the vicinity of an aerodrome, which requires ac commanders to "conform to the pattern of traffic formed by the other aircraft intending to land at that aerodrome, or keep clear of the airspace in which the pattern is formed", which the EXTRA pilot did not do. Furthermore, the Board also agreed that it was most unwise that the EXTRA pilot had overflown the No2 on the RW, as its pilot for whatever reason could have executed a go-around - a distinct possibility with a student at the controls - that would have been unknown to the EXTRA pilot at the time. The members concluded that the EXTRA pilot could have exercised better airmanship, and conformed to the pattern of the traffic formed by other ac intending to land; this was the cause of this Airprox.

With regard to the risk, the Board noted that no avoiding action was needed or taken by the PA38 pilot and that he had managed to land on a clear runway. Consequently, the Board agreed unanimously that no risk of a collision had existed in the circumstances that pertained.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Extra pilot did not conform to the pattern of the traffic formed by other ac intending to land.

Degree of Risk: C.

AIRPROX REPORT No 88/01

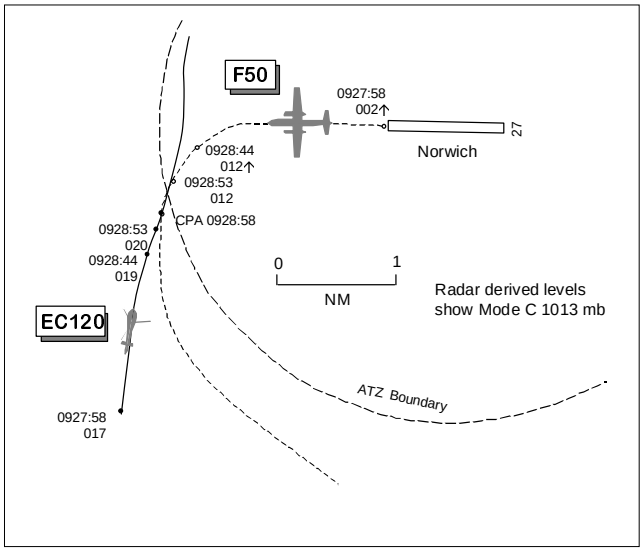
Date/Time: 4 Jun 0929

Position: 5240 N 0113 E (2.5 NM WSW Norwich Airport - elev. 117 ft)

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

	Reporting Aircraft	*Reported Aircraft*
Type:	F50	EC120
Operator:	CAT	Civ Pte
Alt/FL:	↑ 2000 ft (QNH 1023 mb)	2000 ft (RPS 1017 mb)
Weather Visibility:	VMC CBLC >10 km	VMC CBLC >10 km
Reported Separation:	0 H 600 ft V	0 H >500 ft V

Recorded Separation: 0 H 800 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE F50 PILOT reports departing Norwich RW 27 with an ATC clearance to turn L heading 130° and climb to FL 150. On passing 800 ft at 140 kt, the clearance was amended to *"stop climb 2000 ft"* and then TI was passed on a helicopter routeing N bound passing 3 NM E of Norwich, which was immediately corrected to 3 NM W of the aerodrome, at 2000 ft; he informed ATC that 2000 ft was his cleared level. By this stage the L turn onto 130° was well underway and almost immediately he saw the helicopter head-on, slightly above, at about 2 NM range. He levelled-off at 1300-1400 ft and passed directly below it 10-15 seconds later by about 600 ft; during the incident a TCAS TA alert was received. He opined that without taking the visual avoiding action, there had been a definite risk of collision and that the late TCAS alert would have left insufficient time to enable the crew to take suitable avoiding action if the weather had been IMC.

THE EC120 PILOT reports flying solo heading 023° at 2000 ft RPS and 115 kt en route to a private site at Cromer and he was receiving a FIS from Coltishall on 125·9 MHz. The visibility was >10 km 1000 ft below cloud in VMC and the helicopter was coloured blue with the anti-collision beacon switched on. When passing 2-3 NM W of Norwich he was made aware of an ac in his 1 o'clock, which he saw, in a L turn towards him, at a range of approx. 1 NM. It flew directly beneath him by >500 ft and he took no avoiding action as he felt neither ac were in any danger.

UKAB Note (1): Met Office archive data shows the Norwich METAR EGSH 0920UTC EGSH 29010KT 9999 SCT023 BKN042 13/08 Q1023.

MIL ATC OPS reports that the EC120 was en route from Battersea to a field location at Cromer and in receipt of a FIS from Coltishall Zone (ZONE) whilst flying at 2000 ft on the Yarmouth RPS (1018 mb). At 0921:38, ZONE contacted the Norwich Approach (APP) controller, who was also operating from the Coltishall Radar Room, to inform him about the EC120's transit. TI was also passed to the Coltishall Approach controller (face to face) as the ac's track would take it through the departure lanes for both airfields. ZONE offered to climb the helicopter if necessary, but it was finally agreed that APP would contact ZONE if required. As the helicopter approached Norwich, ZONE provided the pilot with TI on an unrelated ac operating in its vicinity and was then contacted by APP. The Norwich controller identified traffic (the F50), which had just departed from RW 27 at Norwich, to ZONE adding, at 0927:57, *"He's climbing to two thousand feet and should know about your VFR traffic."* ZONE acknowledged the call and then transmitted to the EC120 pilot *"C/S traffic one o'clock, one mile westbound, outbound from Norwich in the climb to two thousand feet."* The EC120 pilot immediately reported that he was visual, although this transmission was clipped, so ZONE made a further transmission to check, which the pilot confirmed. ZONE then negotiated the EC120's MATZ crossing with Coltishall Tower, before the helicopter pilot reported letting down at Cromer at 0935:24. The transit appeared to have been uneventful and it was not until 4 days later that Coltishall ATC was informed by HQ STC (ATC) Staff that the F50 pilot had filed an Airprox.

The Cromer radar recording shows the EC120, squawking 1743, tracking N at an indicated 1800 ft Mode C, on a track that takes it about 2 NM W of Norwich. The FK50 can be seen tracking W from Norwich, squawking 3702, in a gentle climb of about 100 ft per radar sweep. At 0928:44, the F50, indicating 1200 ft Mode C, commences a L turn towards the EC120, which is slightly under 1 NM to the SW and indicating 1900 ft. The radar contacts merge at 0928:59, as the two ac pass head to head, with no discernible horizontal displacement; the Mode C readouts cannot be seen, but in the previous and subsequent radar sweeps the F50 indicates level at 1200 ft with the helicopter 800 ft above it. As the tracks diverge, the F50 then resumes its previous ROC.

Following the exchange of TI with APP, ZONE made a wholly appropriate TI transmission, which confirmed that the EC120 pilot had sighted the F50. This, and the minimum vertical separation between the ac of 800 ft, would indicate that there was no risk of collision.

UKAB Note (2): Analysis of the Cromer radar recording and the RT transcript shows that at the time of the TI call was made from ZONE to the EC120, the subject ac were 2·6 NM apart and not 1 NM as passed by the radar controller.

ATSI reports that owing to problems with the replay of the Norwich Airport RT recording it has not been possible to transcribe the Tower frequency. However, fortuitously, the Tower frequency was selected for a significant period at the Norwich Approach position at RAF Coltishall and the resultant information has been transcribed.

As this Airprox occurred outside CAS, with one ac operating under VFR, ATC were not obliged to provide standard separation between the subject ac. Full co-ordination took place between the Norwich Approach Controller and the Military Controller working the EC120, with reference to the helicopter's routeing and also, subsequently, to the departing F50.

At 0926 the outbound clearance for the F50 was amended by Approach, from heading 130° and climb FL 150, to climb restricted to 2000 ft because of military traffic rejoining Lakenheath IFR at 3000 ft. No mention was made about the EC120 at the time although Approach had been informed about it at 0922. ADC were only warned about its presence, relative to the departing F50, at 0927:30, following a discussion between the Approach mentor and his trainee; this was after the F50 had been cleared for take off. The ADC Controller (trainee) passed the altitude restriction, (without giving the reason for it) and then issued TI on the crossing ac, both once the F50 was airborne. It is understandable why the pilot of the F50 was concerned when, after he had been instructed to maintain 2000 ft, he was informed of traffic in close proximity at that altitude.

Although it is assessed that the TI passed to the F50 allowed its pilot to sight the EC120 and to take appropriate action to avoid it, it may have been prudent for the Approach Controller to have resolved the potential confliction at an earlier stage, especially as the Military controller had offered to climb the EC120 above 2000 ft if necessary.

UKAB Note (3): RT transcript shows at 0928:30 the F50 pilot responding to the TI on the EC120 ("*.....south of you range two miles northbound similar level ....*") from Norwich ADC with *"c/s we have him visual we're levelling off at thirteen hundred feet and clearing him by seven hundred feet".*

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 why this incident, which appeared to be a confliction between an IFR departure and a VFR transit ac within Class G airspace, had occurred. The EC120 was flying VFR at 2000 ft RPS NNE bound, just above the Norwich ATZ, while the F50 had just got airborne, departing Norwich RW 27 IFR to route SE bound. Pilot members sympathised with the F50 pilot. He had been given an amended departure clearance to level at 2000 ft, against IFR Lakenheath traffic, followed by TI on the EC120 at 2000 ft which was in confliction. Perhaps he was expecting more 'control' or assistance to be applied even though it was Class G airspace where, ultimately, it was the pilot's responsibility to avoid other ac. The Norwich APP mentor and trainee had known the traffic situation and the potential for conflicting flightpaths. They had discussed the scenario and had stopped the F50 at 2000 ft, through the ADC, after co-ordination within the Coltishall Approach Room against IFR traffic into Lakenheath at 3000 ft. However, the reason for the revised stop-off at 2000 ft was never passed to the F50 crew. Subsequently, they had told the ADC to tell the F50 crew about the EC120 also at 2000 ft. This TI had allowed the F50 pilot visually to acquire the EC120 which he avoided sensibly by levelling off and passing beneath it. Contrasting these events, the EC120 pilot, although only receiving a FIS from Coltishall ZONE, was given radar information on the departing F50 which he saw passing in the opposite direction below. Members agreed from all of this that Norwich ATC had released the F50 into conflict with the EC120. The MATS Part 1, Page 2-1 states the ADC responsibilities: *Aerodrome control is responsible for issuing information and instructions to ac under its control to achieve a safe, orderly and expeditious flow of air traffic and to assist pilots in preventing collisions between ac flying in, and in the vicinity of, the aerodrome traffic zone.* There was no doubt that the Norwich ATC team had fulfilled their obligation of separating the departing IFR F50 against the IFR traffic into Lakenheath

but members thought that more positive instructions should have been given, in addition to the late TI on the EC120, to ensure safe deconfliction between the subject ac during the F50's critical phase of flight within the ATZ. This could have been achieved either by climbing the EC120, as offered by the Coltishall ZONE controller earlier, or by issuing a stop-off altitude to the F50 pilot below the helicopter until the ac had passed each other. In the end the F50 pilot resolved the conflict by adopting the latter solution on his own initiative.

Turning to risk, the TI had allowed the F50 crew to acquire the EC120 visually and to level off below it; this had been followed by a TCAS TA alert. The EC120 pilot had also received TI on the F50 and seen it ahead and had watched it pass below. One member thought that safety had not been assured during the encounter but the majority of the Board were persuaded that these factors had removed any risk of collision.

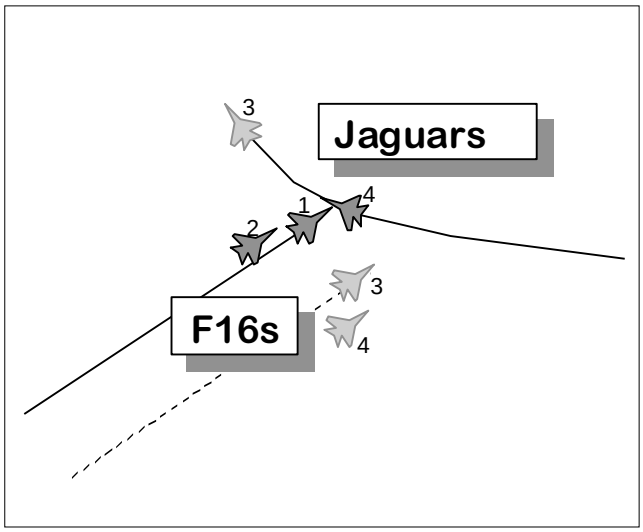
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Norwich ATC released the F50 into conflict with the EC120.

Degree of Risk: C

AIRPROX REPORT No 89/01

Date/Time:	7 Jun 0914	
Position:	5320 N 0011 E (7 NM SE of Louth)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Jaguar	F16 x 2
Operator:	HQ STC	Foreign Mil
Alt/FL:	FL 151	FL 150 ↓
Weather Visibility:	VMC CLAC Unltd	VMC CLAC
Reported Separation:	100 ft V	
Recorded Separation:		500 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JAGUAR PILOT reports heading 285° at 450 kt as the 3rd of 3 ac joining Donna Nook range at medium level. (He was 'C/s 4' in the formation; No 2 had not got airborne.) They had been refused an ATS for the transit by London Radar which was too busy and had received a RIS from Coltishall and then Coningsby before switching to Donna Nook's frequency. Some 3 minutes afterwards he saw the leader of a pair of F16s pass about 100 ft below; they had approached from his 11 o'clock but he did not see the leader until it was passing. He happened to be at FL 151 and considered that if he had been at FL 150, there would have been a collision. Neither F16 appeared to deviate.

THE F16 PILOTS' operating authority has not provided a report, despite many requests.

UKAB Note: A recording of the Jaguar pilot's HUD display and LATCC radar recordings show the Jaguar level at FL 151, heading 278° at 480 KTAS, having changed to Donna Nook range frequency at 0911:35. At 0914:40 the Jaguar pilot sets range

QFE (1007 mb) and 2 seconds later the F16 leader appears, closing from the Jaguar's 11 o'clock and descending through the HUD horizon bar. The Jaguar shows FL 151 Mode C at that point. The F16 continues to descend; 3 sec later it passes the Jaguar's 12 o'clock less than 0·5 NM ahead and its Mode C shows FL 146 as it merges with the Jaguar. The No 2 F16, NMC, follows a similar flightpath, passing almost directly beneath the Jaguar; the HUD recording indicates that it matches the leader's descent, passing a similar distance below the Jaguar.

MIL ATC OPS reports that the formation of 4 F16s were receiving a RIS from London Radar Controller 5 (CON 5) en route from Waddington to the ACMI Range, climbing to FL 150. Upon initial contact, CON 5 passed *"C/S….traffic slightly left of twelve o'clock at fifteen miles, reciprocal heading at flight level one five zero"*; the leader's reply was unintelligible. About one minute later, between 0913 and 0914, CON 5 stated *"C/S, previously called contact left, eleven o'clock, seven miles, passing down your left-hand side, indicating flight level one five zero and further contacts right, two o'clock, twelve miles, right left, indicating flight level one five zero, also believed to be a pair"*; the F16 formation No 1 replied *"Visual.. (unintelligible words). at my one o'clock"*. The remainder of the F16 formation's transit was routine and uneventful and the pilots freecalled the ACMI Range just before 0919.

At 0912:57, the time of CON 5's first TI, the Claxby radar recording shows the lead F16 10 NM E of Waddington tracking NE passing FL 104 with the remainder of the formation about 2·5 NM in trail on a similar track passing FL 106. An ac squawking 7002 (the lead Jaguar) is seen in the lead F16's 12 o'clock at 14 NM on a reciprocal heading indicating FL 152. The pair of Jaguars (Nos 3 & 4) appear as 2 contacts squawking 7002 8 NM SE of Donna Nook tracking 315° and indicating FL 151 and FL 153 respectively; shortly afterwards, these Jaguars turn L to track about 285º, taking them about 3-4 NM S of the range boundary. At 0913:35, about the time of CON 5's next TI call, the F16s are closing into formation 14 NM NE of Waddington, maintaining a track of about 050º and passing FL 124, whilst the previously called single Jaguar is slightly left of the formation's 12 o'clock at 7 NM on a reciprocal track still indicating FL 152. The pair of Jaguars, still showing as 2 contacts, have maintained their 285º track and level, and are in the F16's one o'clock at 14 NM crossing from right to left. Shortly afterwards, the singleton ac turns NW and away from confliction whilst the F16s and Jaguar pair maintain track over the course of the next 50 sec. At 0914:26, the F16s level at FL 150; the Jaguars still appear as 2 contacts, about 1 NM apart, slightly to the right of the F16's 12 o'clock at 3 NM crossing right to left. The first Jaguar contact crosses the lead F16's 12 o'clock at less than 0.5 NM with both tracks indicating FL 150, whilst the second Jaguar contact (C/S 3) is between the lead F16's 1 and 2 o'clock at 1 NM indicating FL 151. At 0914:53, as the F16 and the trailing Jaguar merge, the lead F16's Mode C indicates FL 146, whilst the Jaguar's secondary response is not visible. As the 2 returns begin to diverge, the trailing Jaguar's Mode C is indicating FL 154, whilst the lead F16 has descended to FL 144.

The TI provided by CON 5 was reasonably accurate and appears to have been sufficient for the lead F16 pilot to become visual with the Jaguar(s). In his signalled Airprox report, the Jaguar pilot mentioned that London Radar was unable to provide a radar service to his formation. The Jaguars were not receiving an ATS at the time of the incident, but the fact that a radar service had previously been obtained from Coningsby was not revealed to the military ATC investigators until 30 Aug 01, by which time the RT recordings had been re-used. The radar service aspects of the Jaguar's transit are discussed below.

RAF Coltishall prenoted their transit to London Radar at 0908. London Radar had been working to capacity at the time and were unable to provide a service to the Jaguars; indeed, between 0834 and 0910, London Radar had been compelled to refuse service to 6 speaking units (9 ac). This was not a random decision. Under such circumstances, London Radar Supervisors refer to a table within HQSTC SOPs that grades the priority of each sortie; higher priority sorties are retained whilst the lower priority sorties are refused service. The Jaguars' middle air transit was assessed as Priority 6, out of 8 possible categories, whereas the F16s would have been classified as Priority 3 traffic. In view of the demands placed upon the unit at the time, the decision to refuse service to the Jaguars was regrettable, but wholly appropriate; the issue of capacity at London Radar is currently under review. In view of the position of the Airprox (about

4 NM S of the range boundary) however, it is most unlikely that the Jaguars would still have been in contact with London Radar, as they would normally have been freecalled to Donna Nook by this point. If poor weather had prevailed and the pilots had required radar assistance, London Radar would have handed the Jaguars to Coningsby ATC for a radar let down prior to calling the range. The Jaguars switched frequency to Donna Nook (which is not radar equipped) about 3 min before the Airprox (0911:35). From the radar recording at this point, the Jaguars (tracking 315º) had at least 15 NM to run to the range boundary; the formations were separated horizontally by over 35 NM with the Jaguars having a significant 'lead' over the F16s (heading 050º). With this displacement, it is very unlikely that any controller would have made a TI call at this point. It is the Jaguar formation's L turn about 1·5 min later, as the ac appear to hold clear of the range, that subsequently places the ac on conflicting flightpaths.

HQ STC comments that contrary to the Jaguar pilot's report, all the video evidence (Radar and HUD) suggests that the miss distance was in the order of 500 ft vertically; nevertheless, it is understandable that he was alarmed by the unexpected appearance of another fast jet so close to his own. However, while operating in the open FIR without a radar service, responsibility for collision avoidance lay firmly with him and maintaining a good lookout remained imperative. The F16 pilot took appropriate measures to minimise the risk of such an encounter by obtaining a radar service and flying at a suitable quadrantal level. It appears that these measures ultimately afforded him sufficient time to resolve the confliction.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the Jaguar pilot, transcripts of the relevant RT frequencies, radar and HUD video recordings and reports from the appropriate ATC and operating authorities.

Members noted that the F16s had levelled at FL 150, a suitable quadrantal level, but that the Jaguars had not chosen a quadrantal, although they would shortly be manoeuvring while holding for the range. It could also be seen from the HUD video that the F16s probably became visually observable objects while the Jaguar pilot was setting Range QFE and that this probably contributed to the pilot's late sighting of the F16s. It could be seen that the F16s were descending to avoid the Jaguar, which they had acknowledged seeing, and the Board concluded that the incident was a confliction of flightpaths in the FIR which was resolved by the F16 pilots with the assistance of London Radar.

While the LATCC radar recordings did not show the Jaguar's level as the F16s merged with it, the HUD recording confirmed that it was at FL 151 at the time; ie 500 ft above the F16s as the latter passed beneath. Although the F16s could be seen to be at exactly the same level as the Jaguar at the moment they appear in the HUD FoV, and pass beneath some 3 sec later, it appeared they had taken positive action to remove the risk of collision. Some members thought that having been warned of traffic at FL 150, the F16 pilots could have descended earlier, but without a report from them, the Board came to no conclusion on this point.

The Board agreed that in the event, since the Jaguars had switched to range frequency some minutes before the incident, the capacity problem at London Radar was not a factor in the Airprox, and members made no further comment on it.

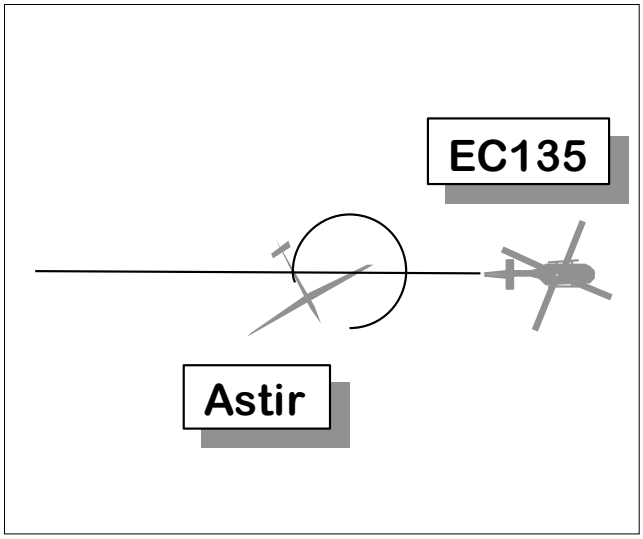
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction of flightpaths in Class G airspace, resolved by the F16 pilots.

Degree of Risk: C

AIRPROX REPORT No 90/01

Date/Time:	30 May 1753	
Position:	5207 N 0050 E (4 NM SSW of Rattlesden – elev 305 ft)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Astir glider	EC135
Operator:	Civ Club	Civ Comm
Alt/FL:	2200 ft (QFE)	3000 ft (QNH)
Weather Visibility:	VMC CLBC Unltd	VMC CLOC > 10 km
Reported Separation:	50-100 ft	/500-1000 ft
Recorded Separation:		NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ASTIR PILOT reports circling left at 45 kt while thermalling when he saw a helicopter approaching from 2 km away. He tightened his turn to make his ac more conspicuous, being in a poor position to take avoiding action to the right. The helicopter passed 50-100 ft above his thermalling orbit and he considered the risk of collision to be high. Although it was an excellent day for thermalling and he was aware of many gliders being airborne, he did not think there were any close to him at the time of the Airprox.

THE EC135 PILOT, in transit to Wattisham, reports heading 070° at 130 kt with 2 observers on board. He had transferred from Essex Radar to Wattisham Approach. Workload was low and a white glider was seen by all occupants in an orbit, apparently to the right, about 5-6 NM ahead, or about 3 min before passing it. It was well below and he estimated it would pass to the right which it eventually did by some 2-400 m and 500, perhaps 1000, ft below. He saw no need for avoiding action and there was no risk of collision.

UKAB Note: LATCC radar recordings show the helicopter, identified by its squawk, tracking E towards Wattisham and passing a single, near stationary, primary-only contact at 1753:19, in the position reported by the glider pilot. There are no other similar returns nearby. It is showing 2800 ft Mode C at the time which would have been 3000 ft on the local QNH. The glider pilot reports being at 2200 ft QFE above Rattlesden (2500 ft QNH).

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 difference between the pilots' perceptions of this incident suggested that the glider seen by the EC135 pilot might not have been that flown by the reporting pilot. However, the radar information tended to confirm the glider pilot's impression that there was only one glider and that the incident occurred exactly where both pilots reported it. Members agreed that there probably was only the one glider; such differences in perception were not uncommon in an Airprox. The radar recording also confirmed the helicopter pilot's reported altitude which was 500 ft above the glider's altitude based on his reported QFE; this led the Board to the conclusion that the Airprox report stemmed from a mistaken impression of the vertical separation by the glider pilot. Helicopter pilots on the board said that in general it was not a good idea to fly close to

an unpowered ac and agreed that if the EC135 pilots had deliberately turned away from the glider it could have saved the paperwork. However, in safety terms, the separation was seen as perfectly adequate and members agreed that there had been no risk of a collision.

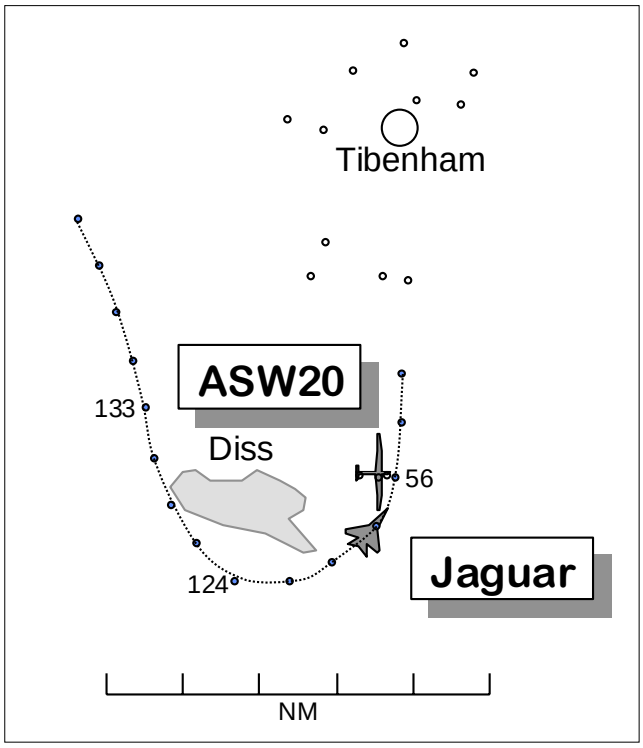
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Mistaken impression of vertical separation by the glider pilot.

Degree of Risk: C

AIRPROX REPORT No 91/01

Date/Time:	30 May 1330	
Position:	5223 N 0110 E (1 NM E of Diss)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	ASW20 glider	Jaguar
Operator:	Civ Pte	HQ STC
Alt/FL:	5400 ft (QFE 1013 mb)	↑ ↓
Weather Visibility:	VMC CLBC 25 NM +	VMC CLOC good
Reported Separation:	75-100 ft	/NK
Recorded Separation:		< 0.25 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ASW20 PILOT reports circling left at 50 kt in a strong thermal when she suddenly became aware of the noise of a jet ac off her starboard wing tip. On looking right, she saw the jet banked somewhat to the right at a similar level (± 50 ft) and crossing ahead by 75 to 100 ft, at high speed. It had come from behind, outside her field of view, leaving her no opportunity for avoiding action; she expressed the risk of collision as 60-70%.

THE JAGUAR PILOT reports flying various headings at medium level at 450 kt on a Thermal Imaging and Laser Designator (TIALD) training sortie. There was a lot of scattered cloud below between 4-6000 ft which increased the task's inherently high workload, and precluded a full attack. He turned N to clear the airspace after a call from Coltishall advising of multiple, possibly glider, contacts in the area; while vacating, he saw several gliders about 1000 ft below but was not aware of an incident such as described by the glider pilot.

MIL ATC OPS reports that the Jaguar pilot was conducting a general handling sortie in the vicinity of Honington whilst under a RIS from Coltishall ZONE on 293·42. At 1325:07, ZONE transmitted *"C/S, limited traffic information from ahead for the next ten miles due to intense aerial activity, believed to be gliders around Tibenham"*, which was acknowledged. At 1330:58, ZONE updated the TI as *"..numerous contacts in your twelve o'clock range one to five miles, still no height, believed to be gliders"*, which again was acknowledged.

LATCC radar recordings show the Jaguar to the east of Honington manoeuvring on a NW-SE racetrack. Whilst it is difficult to substantiate the

accuracy of timings, ZONE's second TI at 1330:58 appears to provide an accurate picture of events to the Jaguar pilot as he flies a northerly track in the vicinity of Tibenham at FLs around 160. However, from the information available, the incident occurred at 1330:44, when the Jaguar's return, having descended sharply from medium level, overlaps an intermittent contact 6 NM S of Tibenham. It is not surprising that ZONE did not pass specific TI regarding this contact, as individual gliders are extremely difficult to see on radar, if indeed this contact was actually picked up by Coltishall's radar some 25 NM away. At its closest to the return presumed to be the glider, the Jaguar's Mode C shows FL 56, tracking 010°, in the process of levelling and rolling out of a steep (21500 ft/min) descending left turn.

HQ STC comments that it is possible that the traffic information from ZONE, reasonable though it was, focused the Jaguar pilot's attention on activity in the Tibenham overhead, which might explain why he does not seem to have seen the ASW20 operating some 5 NM or so to the south of the field. Nevertheless, in spite of his reported intentions to turn north to clear the airspace, the Jaguar pilot's decision to route towards a known and active glider site did little to aid deconfliction.

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 and operating authorities.

It seemed strange to the Board that the Jaguar pilot had dived towards Tibenham having been warned of possible glider activity in that area, but understood the pressure to achieve his training task in weather conditions that made it very difficult. The cause of the Airprox was clearly the non sighting of the glider by the Jaguar pilot. The glider pilot reported that the Jaguar was belly-up to her at the moment it passed; the turn away from her was fortuitous as she had not been seen. This aspect, and the close passage as confirmed on the radar recording, led members to agree that there had been a risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non sighting of the glider by the Jaguar pilot.

Degree of Risk: A

AIRPROX REPORT No 92/01

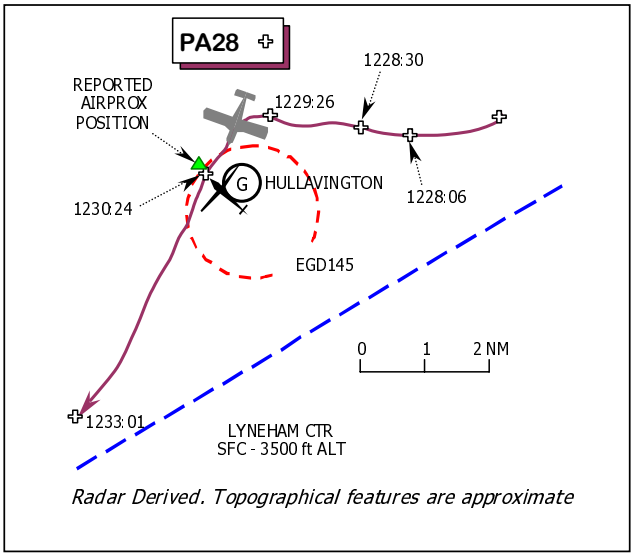
Date/Time: 9 Jun 1230 (Saturday)

Position: 5132 N 0209 W (1 NM NW of Hullavington GS - elev 343 ft)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Viking Glider	Piper PA28
Operator:	HQ PTC	Civ Pte
Alt/FL:	950 ft (QFE 1005 mb)	2200 ft (RPS 1010 mb)
Weather Visibility:	VMC CLBC >10 km	VMC CLBC 10 km
Reported Separation:	300 ft V, nil H	Not seen

Recorded Separation: Not recorded



Radar Derived. Topographical features are approximate

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VIKING GLIDER PILOT reports that he was gliding in the Hullavington RW23 RH circuit; the glider has a white colour scheme with orange dayglow wingbands. Flying straight and level at 950 ft Hullavington QFE (1005 mb), whilst approaching the end of the crosswind leg heading 310° at 50 kt, he observed a white-coloured PA28 over the starboard wing about 600 ft away. The other ac passed about 300 ft above his glider from R – L with a *"low"* risk of a collision. No avoiding action was taken as the other ac passed clear overhead, but he expressed concern at the *"persistent violation"* of Hullavington gliding site.

THE PIPER PA28 PILOT reports that his ac has a white colour scheme with red/blue stripes. He had departed Oxford and was inbound to land at Garston Farm (about 1 NM NNW of Colerne) under a FIS from Lyneham and squawking A4530 with Mode C. Approaching Hullavington at 85 kt he was warned by APPROACH of activity at Hullavington. Therefore, he elected to divert to the N of it and made a conscious lookout for gliders including telling his passenger to keep a lookout. The lowest altitude flown in the vicinity was 1800 ft Cotswold RPS for a very short period whilst he was preparing to call Colerne on 120·075 MHz, prior to the Approach to Garston Farm. However, he did not see the glider or any other traffic and he thought that he had not been informed of any specific traffic by ATC.

UKAB Note (1): The UK AIP at ENR 5-5-1-3, promulgates Hullavington Glider Launching Site for winch launches, where cables may be encountered to 2000 ft agl, during daylight hours on Saturdays, Sundays, PH and as notified by NOTAM.

UKAB Note (2): EGD145 was not notified active.

MIL ATC OPS reports that the PA28 was en-route from Oxford to Garston Farm; the flight was under a FIS from Lyneham ZONE at 2200 ft Cotswold RPS (1010 mb). The PA28 was initially tracking to the S of Hullavington, but as the ac passed N abeam Lyneham it turned onto a westerly heading. At 1228:06, ZONE advised the pilot *"...caution as you transit overhead Hullavington there is gliding taking place there"* and he also asked the pilot to confirm his altitude which was still 2200 ft Cotswold RPS. This equated to 2050 ft Hullavington QFE (1005 mb) and the pilot advised that he would *"keep a good lookout.".* At that point the PA28 was about 2·5 NM ENE of Hullavington; ZONE observed a radar contact near the glider site and, at 1228:30 transmitted *"...traffic slightly left of your twelve o'clock, two miles left-right, believed to be a glider out of Hullavington."* This traffic information call was accurate. ZONE then observed the PA28 turn onto a north-westerly track, subsequently passing about 1·5 NM N of Hullavington. The PA28 pilot changed frequency to Colerne at 1233:56.

Later that day, a glider pilot from Hullavington, telephoned Lyneham ATC to report an Airprox between his Viking glider and a light fixed wing ac. The glider pilot reported flying in the Hullavington circuit at 950 ft QFE (1005 mb) and being overflown by a light ac about 200 ft above. The PA28 was the only ac in the vicinity working Lyneham at the time.

UKAB Note (3): Analysis of the Clee Hill radar recording is inconclusive and does not illustrate this Airprox at all. The PA28 can be tracked continuously as it transits through the area of the reported Airprox position at 1230:24, squawking A4530. However, no Mode C data is evident at all. Although occasional and very intermittent primary returns are evident in the vicinity it is impossible to determine if they are from the glider flown by the reporting pilot.

HQ PTC comments that although the PA28 seems to have made a positive attempt to keep clear of the gliding at Hullavington in response to traffic information, he did not see the Viking in the circuit. However, contrary to the perceptions of the Viking pilot, there was no airspace violation since there is no reserved airspace for the gliding activities at Hullavington. The misperception of 'persistent violations' – since clarified with the VGS staff – may have triggered submission of this report following what was an acknowledged low risk encounter.

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 noted that the Viking Glider colour scheme was white with dayglo wingbands; it was explained that a recent trial at Cranfield had revealed that this type of scheme is far from ideal and may degrade conspicuity as it disrupts the outline. Certainly it had done little to attract attention in this instance, as the PA28 pilot had not seen the glider at all despite accurate traffic information from ZONE. The Board felt that the ZONE controller had exercised sound judgement in forewarning the PA28 pilot about Hullavington, but it was unfortunate that the pilot subsequently had not given it a wider berth. Indeed some members questioned the efficacy of the PA28 pilot's pre-flight planning; further analysis of his chosen track (from Oxford to Garston Farm) revealed a straight line directly through Hullavington which is clearly marked on VFR charts. Moreover, the PA28 pilot had shown little inclination to deviate from his 'straight line'. This was a disappointing aspect of this Airprox being one that is 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. One member voiced the opinion that the chart symbology for glider sites - especially where there is a danger of encountering winch cables – 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 gliders (apart from joint-use facilities like Lasham) seldom if ever used by powered ac. The Board concluded that this Airprox resulted from a non-sighting of the glider by the PA28 pilot in the vicinity of a notified Glider Launching Site.

When considering the risk, the Board was unable to determine the vertical separation that pertained. In the absence of Mode C information - which was surprising - the Board could not resolve the apparent anomaly of the Viking Glider pilot's reported 300 ft separation, with the PA28 pilot's reported lowest transit at 1800 ft RPS (1010 mb) - the equivalent of 1650 ft Hullavington QFE (1005 mb). Using the QFE (1005 mb) as a common base line, this suggested the PA28 had passed above the glider without seeing it by some 700 ft. This margin happened by chance, but the PA28 was still below the maximum height where cables may be encountered. Whilst the risk posed by any potential encounter with a cable might have been significant or not, the glider pilot reported that this was a low risk encounter with his glider requiring no avoiding action on his part, an assessment reinforced by the Command's view. Members concurred. It was assessed, therefore, that no risk of a collision had existed between the glider and the PA28.

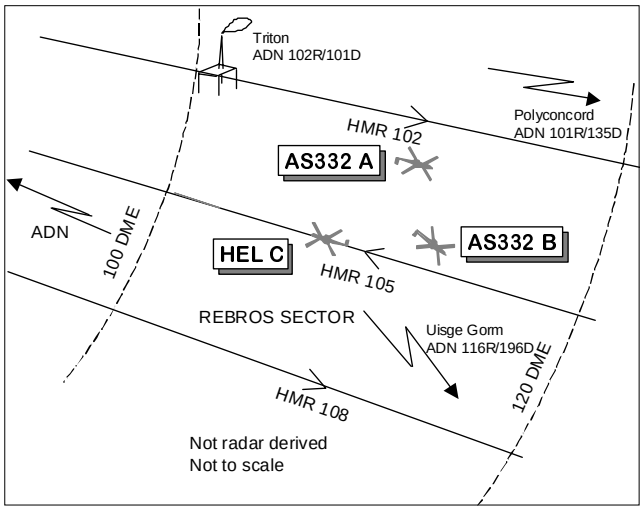
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non-sighting of the glider by the PA28 pilot in the vicinity of a notified glider launching site.

Degree of Risk: C.

AIRPROX REPORT No 93/01

Date/Time:	14 Jun 0812	
Position:	5657 N 0106 E (ADN 104R 111D)	
Airspace:	HMR (*Class:* G)	
	Reporting Aircraft	*Reported Aircraft*
Type:	AS332 (A)	AS332 (B)
Operator:	CAT	CAT
Alt/FL:	3000 ft (RPS 1011 mb)	2000 ft ↑ (RPS 1011 mb)
Weather Visibility:	IMC KLWD NK	VMC CLOC 10 NM
Reported Separation:	0 ft V <3 NM H /1000 ft V 3-5 NM H	
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE AS332 (A) PILOT reports heading 106° at 3000 ft RPS 1011 mb and 125 kt en route from Aberdeen to Polyconcord. The weather was IMC and he was receiving a FIS from Aberdeen on 135·17 MHz. Another helicopter, HEL (C), who was inbound on the 105° R at 2000 ft, had been asked by ATC if there was a problem with a request from AS332 (B) to climb to 3000 ft; position reports indicated 20 NM separation and the pilot of HEL (C) agreed to the request. ATC then informed him of crossing traffic, AS332 (B), at position 104°R 111D. The GPS equipment fitted to his ac had been known to give inaccurate information but he was surprised at being as far S as the 104°R. However, his GPS system indicated his position to be on the 104°R at 111D. He estimated that the subject ac were less than 3 NM apart and at the same level so he lowered his collective to commence a descent to avoid the other ac; he was still IMC, in cloud, with zero visibility.

THE AS332 (B) PILOT reports departing Triton and climbing at 110 kt to 1500 ft RPS 1011 mb heading 145° en route to Uisge Gorm, a direct track of 138° range 99 NM. The visibility was 10 NM 2000 ft below and 3 NM horizontally from cloud in VMC and he was receiving a FIS from Aberdeen on 135·17 MHz. He requested further climb to 3000 ft and he was advised of an ac, AS332 (A), at 3000 ft on the ADN 102°R and another ac, HEL (C), at 2000 ft on the ADN 105°R. He climbed to 2000 ft on a SE track, which he maintained for 2 minutes, whilst he diverged from AS332 (A). He then commenced a climb to 3000 ft to be above HEL (C) on the ADN 105°R, but was surprised subsequently to hear the AS332 (A) pilot file an Airprox. He estimated the separation to be 3-5 NM and 1000 ft.

THE AS332 (A) FLIGHT OPERATIONS DEPT comments were addressed to the Aberdeen Helicopter Main Routes (HMRs) structure and operations.

Historically, the HMRs were set up to provide a common lateral separation standard for offshore helicopter traffic. The HMR radial structure was set up, based on the ADN VOR, with the master 032° radial keyed to 'Lima Gate' off the East Shetland Basin. The HMRs are spaced every 3°, with alternate outbound & inbound traffic flow. As variation at the ADN changes over the years, the HMR will not move but the HMR will be redesignated downward to the nearest whole degree when the variation reduces past 0·5°.

The HMRs are understood to be great circle routes. In practice, they are flown as rhumb lines between waypoints, spaced every 40 NM along the great

circle HMR, up to the UK Median Line, or to the East Shetland Basin. The waypoints are provided by Racal (or its successor company) to all operators, and, depending on the navigation fit of the ac, are stored in the commercially produced fixed database as 'hard' waypoints. This is to differentiate them from pilot programmable, or 'soft' waypoints.

Operationally, on departure from ABZ, the helicopter will normally be routed to 80 NM on its required outbound HMR by ABZ Radar at 3000 ft, or the correct quadrantal. After that, it will navigate along the HMR using the rhumb line track between waypoints 80–120 NM, etc. The helicopter informs ABZ ATC before leaving the HMR for the rig, and calls for the descent from 3000 ft to land at the destination. On passing 1500 ft it will normally clear ABZ ATC frequency for the rig frequency, although it is normal practice to remain listening out to keep the big picture. On lifting off from the rig to return to ABZ, the climb is normally stopped at 1500 ft. When clearance is obtained from ABZ Offshore, a climb to the inbound altitude is requested. This is normally given with routeing direct to a range on the correct inbound radial. The inbound altitude is 2000 ft or the correct quadrantal.

With crossing traffic, helicopters routeing between installations & crossing HMRs currently do not have laid down procedures. However, the advice (airmanship) is to be either 1000 ft northbound and 500 ft southbound in VMC, or 1500 ft if IMC (Sector Safe Altitude offshore). If VMC, some crews climb up to the correct quadrantal, thus establishing communications with ABZ Offshore for crossing the HMRs. They are, however, climbing through the HMR lower levels to achieve this.

When the range & bearing of the ac from the ADN VOR is requested, the GPS is consulted. It will give the rhumb line answer to the problem but this is when earth convergency comes into the picture. If the ac is E (or W) of the VOR by any significant distance, earth convergency will introduce an angular difference between the rhumb line answer & the HMR (radial) great circle value. This difference will increase with distance away from the VOR. Ac crossing the HMRs, therefore, will be looking at the bearing & distance (rhumb line with earth convergency) whereas the helicopter on the HMR will be looking at the segment of the great circle route it is on. These two pieces of information may differ in bearing (but not range) by several degrees.

THE AS332 (B) FLIGHT OPERATIONS DEPT comments that the routes flown from ABZ used to be (c1960s) the radials from the ADN VOR until the ac got out of range and then by Decca navigation aiming to keep to the track of the radial. There was a 'master' radial, the 032, which was stated to be a line joining the ADN VOR to the 'Lima gate' for the East Shetland Basin. Routes followed the radials every 3 degrees alternating 'out' and 'in' thus the 032 route followed the 032 radial outbound from the ADN VOR to the Lima gate of the East Shetland Basin and the 035 and the 029 were inbound to the VOR. As time went by, magnetic variation changed and thus the routes, whilst still being called 'radials', were no longer coincident with the real 'radial'. About 3 or 4 years ago, it was decided that the routes were carving a path through the same patch of air as they had always done but their 'radial' label was now very inaccurate and changes were needed.

It was agreed that the 'master' line should remain that line joining the VOR and the Lima gate. Other routes would still alternate 'out' and 'in' at 3° intervals but to avoid confusion, it was proposed that these routes be known by the international nomenclature 'KOPTER' (e.g. "Kopter 032"). Unfortunately, this proposal was not accepted and the 'old' term 'radial' continued in daily use. The 'master' route was re-named as the '033' (to be closer to the actual radial) and the remainder re-numbered accordingly.

Position reporting errors became more obvious when the GPS became the standard area navigation equipment. It was noted that one could nominally be on (say) the 051 route at (say) 120 NM but actually be on the 053 radial. Given that the routes were being referred to (by aircrew and ATC alike) as 'radials', as they had always been in the past, the potential for confusion was set. Calculations, on the example above, shows that a 2° 'error' at 120 NM range equates to a difference in position of 4 NM. Thus, for a simple 'slip' in the word used (radial or route) an ac can be perceived to be in one location when it is in another.

To combat this potential for confusion pilots were encouraged to use the terms "route" and "radial" in their proper context (e.g. *"Aberdeen, c/s just*

airborne the East Brae with 20 souls presently on the 055 radial at 145 miles, 1500 ft, looking to join the 057 route at 120 miles and FL 40 to cruise").

With 20/20 hindsight and having spoken to the crew shortly after they landed I believe that their 'situational awareness' was actually very good but that to 'thread the needle' in the way they did was perhaps rather ill advised given that both the terminology in current use (misuse?) and the way in which the differing types of GPS fitted to the different ac resolve the bearing information, differ.

ATSI reports that the Airprox reportedly took place close to the ADN 104°R, range 111 NM, within class G airspace of the Northern North Sea Airspace and outside radar cover. AS332 (A) was outbound from Aberdeen at 3000 ft on the Helicopter Main Route (HMR) 102°R to the 'Polyconcord' offshore platform, located just N of this HMR at a range of 135 NM from the Aberdeen VOR. HMRs are based on a radial track system, centred on the ADN VOR, which is keyed to the outbound master HMR 030 terminating at the ESB (East Shetland Basin) boundary. The other HMRs, spaced at 3 degree intervals, are designated alternately 'inbound' or 'outbound' and are identified by three figures (UK AIP ENR 1-15-5 refers). The other flight involved, AS332 (B), had recently lifted off from the 'Triton' platform (HMR 102 at range 101 NM) en route for the 'Uisge Gorm' platform, some 99 NM to the SE. A third AS332, HEL (C), while not cited in the incident, was nevertheless in the vicinity at the time. This flight was en route to Aberdeen on the inbound HMR 105 at 2000 ft.

At the time of the incident the subject flights were receiving an Enhanced Flight Information Service (FIS(E)) from the REBROS Aberdeen Offshore Sector, located at Aberdeen ATSU. A FIS (E) is available to the helicopters of two offshore operators that are signatories to a Memorandum of Understanding made between them and the provider of ATS at Aberdeen. The Aberdeen MATS Part 2, 2-Appendix A-4 states that: *"FIS (E) is not intended to take the place of the requirement to provide a FIS, but constitutes an additional service which may be provided to helicopters. No elements of procedural 'separation' will be applied and pilots remain responsible for the provision of their own separation".* Specifically, for traffic on *"Adjacent and Crossing Tracks/HMRs"*, the REBROS controller is required, under a FIS (E), to advise pilots *".....of any other known helicopter operating on adjacent or crossing HMRs when it is known from position reports that there is less than 20 NM and less than 1000 feet vertical separation between them."*

An examination of the relevant RT transcript shows that, apart from an error in which an enquiry was apparently addressed to the 'wrong' flight, the REBROS controller would appear to have fulfilled her FIS (E) responsibilities by providing appropriate TI to the flights involved, based on the position reports supplied to her.

AS332 (B) was notified of the traffic which would affect its proposed climb to 3000 ft, as it proceeded SE, crossing the HMR track system. Firstly, HEL (C) was at 2000 ft, inbound on the HMR 105 at a range of 120 NM from Aberdeen, while, at the same time, AS332 (A) was outbound at 3000 ft at a range of 100 NM, ostensibly on the HMR 102, its flight plan route, though its pilot does not mention the radial or HMR prior to the incident either on the RT or in his subsequent written report. Communications difficulties are apparent during this period, causing some calls to ac to be repeated and occasionally responses being received out of sequence, a consequence, no doubt, of the limitations of the REBROS system. Nevertheless, the controller was persistent in her dissemination of TI. Unfortunately, however, on one occasion, when responding to a request by the pilot of AS332 (B) for approval from HEL (C) to climb to 3000 ft, the controller addressed AS332 (A) instead, apparently in error. Not surprisingly, AS332 (A)'s pilot did not approve the request, as he was now at a range of 103 NM with AS332 (B) having just reported at 106 NM. Subsequently, the pilot of HEL C did agree and a request was made by AS332 (B) for a climb clearance to be issued. This, the controller explained, she could not do, reiterating AS332 (A)'s reported range of 103 NM. The pilot of AS332 (B) responded by stating *"Roger in which case we're clear to three thousand thank you c/s "*. AS332 (A) was immediately advised that AS332 (B) had commenced a climb and the pilot responded by requesting its track. AS332 (B) was asked to *"report your track crossing radial and range please".* The reply was *"range one zero eight crossing the one zero four radial this time c/s ".* A short while later, AS332 (B) reported crossing the same radial but now at a range of 111 NM. This same report was relayed to AS332 (A), when

its pilot requested descent to the 'Polyconcord', one and a half minutes later. Following a few other exchanges, the RT records a transmission attributed to AS332 (A) in which the pilot says *"That's both of us on the one oh four radial two miles apart ma'am"*, which was closely followed by a report leaving 3000 ft *"...at range 113 on the oh four" and* the comment that *"I believe he's a bit too close".* AS332 (B) was asked if it had copied the other ac's position, prompting an affirmative response and a report that it had now passed the 105 radial at a range of 117 NM.

This was an unusual occurrence. It would appear that the HMR 'radials' do not necessarily coincide with the VOR 'radials' and this is what led to confusion but why this difficulty has not figured in previous reported Airprox/Incidents is not readily apparent. However, it is clear that ATC fulfilled their responsibilities with the provision of a FIS (E) and therefore it is concluded that there are no ATC causal factors in this Airprox. The wider issues may need to be debated in a forum comprising Aberdeen ATC and the two operating companies.

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.

Members were informed that follow-on meetings were taking place at Aberdeen between the interested parties and that any agreed changes would be issued when finalised. A helicopter member said that the subject AS332 operators had different GPS/NAV equipment fit within their ac fleets and this had led to some problems with interpolating the GPS data and extrapolating it into useable position/bearing information. 'In-house' briefings had been carried out within AS332 (A)'s company to ensure better familiarity by the crews with the differing NAV kit fits within their own fleet. Subsequently, the pilot of AS332 (A) had withdrawn his CA1094 statement, with reference to the unreliability of the GPS data, after a detailed debrief. Also, Flight Safety Instructions (FSIs) had been issued by the helicopter operators, post incident, to address the confusion between the use of the words 'route' or 'radial' during routine operations. Both operators thought that the use of the Dutch term 'kopter' instead of 'route' might further clarify the situation but this was still under discussion. All that aside, members were surprised that the HMR structure did not appear to have any agreed procedures for crossing traffic. In addition to the existing agreed directional traffic flows and agreed levels inbound and outbound (2000 and 3000 ft), it was felt a HMR crossing procedure needed to be promulgated that avoided the inbound/outbound levels, particularly in IMC. This aspect was also being discussed by the Aberdeen parties.

Discussion then moved on to the relative positions of the subject ac during the encounter. It was believed that helicopter (A) was on the HMR 102 (route) but actually on the ADN 104R (radial) which the GPS had revealed was possible owing to the combination of great circle route with rhumb line track and earth convergency. Both crews were using GPS derived information but there was possibly some confusion with the terminology used by all parties, including ATC, during the exchange of position reports. From the outset, leaving this radial/route discrepancy aside, the range (DME) element of the pilot reports, which is known to be correct, indicated that the helicopters were always about 3 NM apart in range. The RT transcript had shown that the ATC TI to the AS332 (A) crew on AS332 (B) when it requested descent, was over two minutes old; this seemed to have given the helicopter (A) crew the notion that the subject ac were indeed much closer than they were and they had commenced a descent to avoid. An updated position report from crew (B) almost immediately after the incident, again showed the ac more than 3 NM apart in range as well as 1° laterally in bearing and diverging. From all the information available to the Board, members believed that AS332 (A) had perceived a confliction with AS332 (B) (understandably), whilst using a position reporting system which GPS had exposed as inadequate. It was reassuring to know that the relevant parties were now in discussion to resolve these deficiencies within the HMR system that this incident had highlighted.

Turning to risk, some pilot members wondered whether AS332 (B) had climbed too early before ensuring that a greater margin of separation existed between the subject ac, but recognised that climbing to a higher level as soon as practicable

did improve radio communications with Aberdeen. It was noted that the helicopter crews were expecting ATC TI on any traffic within 20 NM or 1000 ft and from this information the pilots were responsible for their own separation. AS332 (A) had been steady at 3000 ft on the HMR in IMC when TI passed by ATC indicated that another helicopter was within 3 NM of it. Crew (B) had a different 'air picture'. They reported the weather as VMC and had elected to climb, from 2000 ft to 3000 ft when clear of (A) who was 'pictured' behind and to one side (102°R), to be above HEL (C) inbound on the 105R at 2000 ft. Members were unable to determine the ac displacement in azimuth - even the AS332 (A) crew were surprised that the NAV kit had shown them as far S as the 104 R when following the HMR102. However, taking the worst case where the subject ac were on the same 'radial', the RT transcript had shown the pilots consistently reporting DME ranges of 3 NM or more apart. This information as well as the AS332 (B) crew's climb in VMC persuaded the Board that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Perceived confliction between AS332 (A) and AS332 (B), who were using a position reporting system that the use of GPS had exposed as inadequate.

Degree of Risk: C

AIRPROX REPORT No 94/01

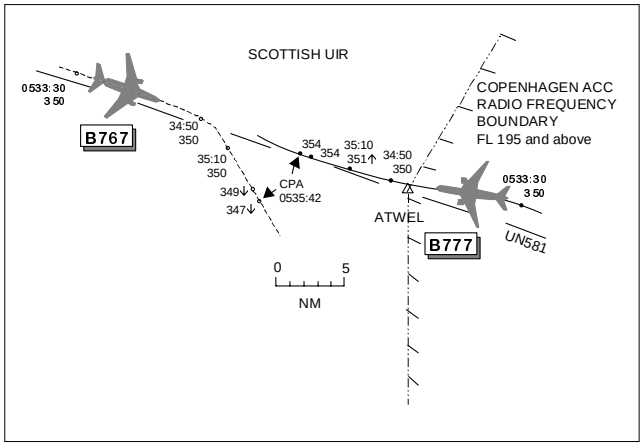
Date/Time: 15 Jun 0536

Position: 5633 N 0312 E (10 NM W of ATWEL)

Airspace: UAR (*Class:* B)

Reporter: ScACC

	First Aircraft	*Second Aircraft*
Type:	B767-300	B777-200
Operator:	CAT	CAT
Alt/FL:	FL 350	FL 350
Weather	VMC NK	VMC CLNC
Visibility:	NK	>10 km
Reported Separation:	NK	600 ft V NK H
Recorded Separation:		700 ft V 4.8 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SCACC MONTROSE SC reports that taking over the Sector approx. 15 min prior to this incident. The B767 was flying E bound at an Opposite Direction Level (ODL) and had been co-ordinated with Copenhagen ACC to leave the Sector at FL 350. At some time between taking over the Sector and the Airprox occurring, a fps was received on the B777 which he put into the correct fps bay but did not take into account that the subject ac were in confliction. He first noticed the problem when the B777 called him at ATWEL but thought that there was enough time to resolve it using radar vectors. However, he was unable to identify the B777 or turn it to the R, so he tried to turn the B767 to the R which he accomplished after two attempts.

Up to then, the B777 was still not identified and its pilot was transmitting simultaneously with him as well as the B767 crew. He tried again to turn the B777 R but, owing to a further crossed transmission, he believed the crew had called him turning L. He immediately decided to issue an avoiding action descent to FL 330 to the B767 crew which the B777 crew acknowledged. He instructed the B777 crew to maintain FL 350 and again instructed the B767 crew to descend which was finally acknowledged. The B777 crew then informed him of a TCAS RA "*climb"* alert, levelling off at FL 354.

THE B767 PILOT reports that he had not observed anything unusual during his flight and was unable to contribute to the investigation.

THE B777 PILOT reports heading 285° on UAR UN581 at M 0.84 and cruising FL 350. The visibility was >10 km in VMC and the sky was clear. Whilst the FO, PNF, established 2 way communications with ScACC on 134·77 MHz he observed an opposite direction ac on TCAS range 40 NM at the same level. He heard ScACC ATC pass a R turn instruction twice to another ac but there had been no response. By now TCAS showed the other ac as proximate traffic and ATC was heard to give descent instructions to FL 340 (he thought) to the other ac but again there was no response. As the proximate traffic became a TCAS TA alert and owing to the lack of response from the other ac, he queried with ATC if the descent clearance was for him; the reply was negative and to maintain FL 350. The controller was then heard to give an avoiding action descent to the other ac as well as TI on his ac. He then received a TCAS RA *"climb",* which he complied with by levelling at FL 354, and he informed ATC whilst the other ac then acknowledged the avoiding action descent clearance. The other ac was seen to be the subject B767, as it passed down his LHS, with about 600 ft separation whilst the B767 crew informed ATC that they were also visual with his ac.

ATSI reports that the controller was operating the Montrose Sector Tactical and Strategic roles combined. During the night a number of sectors had been bandboxed to form a combined Upper Airspace (UAS) 'Sector' and this was operated from the Hebrides Sector position in the operations room. In preparation for the handover from the night to the morning watch, the controller involved in the Airprox had 'split' the Montrose Sector away from the UAS sectors. 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.

Whilst the UAS Sectors were still bandboxed, the B767 contacted Scottish Control, on the Montrose Sector frequency, at 0453:00, en route from Washington to Copenhagen. The controller cleared the ac to route direct to VESTA, which took it approx. along the centre line of UN581, maintaining FL 350. At 0518, the fpss on the B777 were printed out, showing the ac to be routeing westbound on UN581, maintaining FL 350 and estimating ATWEL at 0533. The flight progress strip for the B767 showed an ATWEL estimate of 0536.

Given these estimates, it was apparent that the ac would pass just W of ATWEL, within ScACC airspace. At around the time the strips for the B777 were being printed, arrangements were being made for the Montrose Sector to be split off and opened on the opposite side of the operations room from the Hebrides Sector. The 'bandboxed' UAS Controller could not recall receiving strips on the B777 and so it is very probable that these strips were delivered direct to the Montrose Sector and the controller involved in the Airprox. However, at 0524, the UAS Controller telephoned Copenhagen and asked if they would accept the B767 at FL 350, which was an Opposite Direction Level (ODL). Copenhagen confirmed that they would accept the B767 at FL 350 but no mention was made of the B777, which would be in direct conflict with it on UN581, presumably because they assumed that, since ScACC had the estimate on the B777, they would provide separation as necessary. The Montrose Controller was advised shortly after 0524, by the UAS controller, that the B767 had been co-ordinated at FL 350. At interview, a representative from unit management stated that following this Airprox, they had decided to conduct an internal review of the procedures in respect of splitting bandboxed sectors, prior to the handover from the night to the morning watch.

The ScACC MATS Part 2 states in the GEN section: 'Except when crossing International UIR boundaries, where procedures for the acceptance of ac at ODLs have been agreed, traffic allocated

an ODL is to be cleared to a correct semi-circular flight level before leaving the MRSA.' There are no procedures detailed in the Montrose Section of the MATS Part 2 which refer to the use of ODLs with Copenhagen. However, although the controller involved in the Airprox advised that it was not his normal practice to use ODLs for traffic routeing into Copenhagen's airspace, the impression gained at interview was that, subject to prior co-ordination, it was not uncommon for traffic to be transferred to Copenhagen at ODLs.

The Montrose Controller recalls receiving the strip on the B777 and placing it in his data display. As he was operating in the combined 'tactical and strategic' mode, the responsibility for initial conflict detection was his. He advised that his normal practice was to check the level on any new strips and, if there was a potential confliction, to then check the times. He did not follow this methodology with the strip on the B777 but simply placed it in the display, not recognising the confliction with the B767. He explained that he would not have expected to receive details on westbound traffic from Copenhagen, opposite direction and at the same level as traffic which had just been co-ordinated with Copenhagen.

The B777 called on the frequency, at 0533:30, and it was then that the Montrose Controller spotted the confliction. His response was the first transmission he had made after opening the sector shortly before. The two ac were opposite direction, at the same level and approximately 35 NM apart. The controller stated that his initial plan, which he had thought would provide the requisite separation, had been to turn both ac R. (As both ac were more than 120 miles from the Great Dun Fell radar, the required separation is 5 NM in range or 10 NM in azimuth). *Note: During the unit's investigation they raised the question as to when the lateral separation changed from 'range' to 'azimuth' from a controller's application perspective. This question has been passed to the Air Traffic Services Standards Department to determine how this separation will be applied.* Although the SSR code that had been allocated by Copenhagen to the B777 was passed as part of the estimate message, this had converted to a callsign of 'J72', therefore, until the B777 selected the code allocated by the Montrose Controller, it remained unidentified. The B777 was instructed to squawk 3267 and report its heading. There was no reply and so straight away the controller instructed the B767 to "*turn right immediately 30 degrees report your heading please*". There was no reply from the B767 and the instruction for the pilot to report her heading was repeated. The pilot of the B777, having heard the controller addressing these transmissions to the B767 and receiving no reply, then asked the controller if he should maintain heading. The controller did not respond to this and, again, asked the B767 to report its heading. Finally, some 20 sec after being first asked, the B767 replied and reported the heading as 112°. The controller then instructed the B767 to turn R immediately onto 150° which was acknowledged by the pilot. STCA activated after the controller had recognised the confliction and issued the turn instruction.

The controller asked the B777 to report his heading to which the pilot replied "..*confirm to turn left*". The controller replied by instructing the B777 to turn right immediately 30° but there was no response. At no time during these transmissions was the term 'avoiding action' used. The controller explained that he had still been under the impression that he could resolve the conflict by 'normal vectoring'. Evidence from previous Airprox investigations shows that words such as 'immediately' do not always provoke the same prompt response as use of the phrase 'avoiding action'. Crews have, in the past, treated such instructions as 'non urgent'. The controller's plan would have required a rapid response by both ac in order to achieve the requisite separation, given the closing speed and distance between the two ac.

By 0534:50, the ac were only 15 NM apart, opposite direction, and so the controller gave an "*avoiding action"* instruction to the B767 to descend to FL 330. This was acknowledged by the crew of the B767, who were then passed TI on the B777 and reported the traffic in sight. However, it was not until 35 sec after the instruction had been given, when the ac were less than 7 NM apart, that the B767 reported leaving FL 350. Shortly afterwards the B777 reported a 'TCAS climb' and climbed to FL 354.

The B767 eventually passed 4·8 NM S of the B777 with 700 ft vertical separation. Once the ac had passed, the B767 was instructed to resume its own navigation to TINAC, which was subsequently

changed to VESTA. The controller advised the pilot of the B767 that a report would be filed, however, she replied that they had the traffic in sight all the time and would not be filing. The B777, having reported back at FL 350, was then cleared direct to the ADN VOR and passed the ScACC squawk once again.

No TI was passed to the B777 and the reason for this, as explained by the controller, was that, because he believed satisfactory two way communications could not be established with the ac, he had elected to concentrate on the B767 whilst he attempted to resolve the confliction. The controller advised that, in his experience, RT coverage at ATWEL had been known to be poor in the past. A representative from unit management stated that, some 2 years previously, there had been changes to the transmitter and receiver sites used for the Montrose Sector frequency and that now coverage is much better. ATWEL is within the frequency's Designated Operational Coverage. The Airprox report submitted by the crew of the B777 clearly describes the instructions given to the B767 by the controller and the lack of response by that crew. However, it made no mention of the instructions to the B777 to change the squawk to 3267 or to report the ac's heading.

Both ac appeared to suffer from communication difficulties and this may have accounted for the delay in responding to the controller's instructions. However, the reluctance on the part of the controller to use the words 'avoiding action', until late in the sequence of events, may have contributed to the slow reaction by the B767 crew. Based on the evidence from this Airprox, the RT coverage in the area would appear to be less than ideal and, accordingly, it is considered that relevant procedures should reflect this. Certainly, the use of ODLs at the Copenhagen / ScACC interface would appear inappropriate. The wording in the ScACC MATS Part 2 in respect of the use of ODLs is slightly ambiguous and should be clarified.

The decision by the unit management to review their procedures, in respect of splitting bandboxed sectors following night operations, is welcomed and would appear necessary in the light of this 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.

The ATSI adviser confirmed that the ScACC MATS Part 2 was being reviewed and that a working group had been formed to determine when lateral separation would be deemed to change from range to azimuth from a controller's perspective. An ATCO member told members this incident had been co-opted for use within ScACC as part of the ATCOs' annual Training for Unusual Circumstances and Emergencies (TRUCE) scheme. It was noted that Copenhagen accepted the B767 at an ODL when the B777 fpss had already been printed within ScACC; the estimates had shown the ac to be crossing W of ATWEL within ScACC airspace. Normally, if no comment is made by the receiving ACC when the fpss are printed, co-ordination is deemed effected. However, in this case, the ODL co-ordination had been carried out by the UAS SC, prior to splitting the sector, but without reference to the W bound B777 flight, whose fpss were delivered later directly to the Montrose Sector. ATCOs felt that perhaps Copenhagen should have mentioned the B777 when accepting the B767 at the same level; this co-ordination was a two-way agreement to a course of action and an assumption, by Copenhagen, that ScACC would separate the subject ac, was thought to have been unacceptable in these circumstances. Subsequently, the oncoming Montrose SC received a handover from the UAS SC on the B767 having been co-ordinated out of the sector Eastbound at FL 350. He probably then would not have expected to be presented on his sector with fpss on an ac, the B777, at the same level but in the opposite direction and in confliction. For whatever reason, the Montrose SC did not detect the conflict from the fpss at this stage; he may well have assumed that the sector traffic would have been deconflicted during previously effected co-ordination. He did eventually notice the conflict when the B777 called on his frequency. The Board agreed that it was this late detection of the confliction by the Montrose SC that had led to the Airprox. The SC's planned

use of tactical headings to resolve the confliction appeared sound but it did rely on a prompt response and compliance by both crews which proved less than satisfactory. The RT transcript shows that there were several missed or crossed calls which hindered the SC's plan and this had added to the cause. ATSI had commented that the RT coverage appeared less than ideal although the incident occurred within the published DOC for the frequency. The geographic area concerned is covered by a combination of transmitters (Txs) and receivers (Rxs), selectable either together or individually, by the SC. It was known that a selection of combined Txs/Rxs on the same frequency could degrade the RT performance, particularly in clarity and range, and it was normal practice for the SC to select individual Tx/Rx legs dependant on the ac's position to improve the situation. It was apparent from the B777 pilot's report that he had good situational awareness. He had heard the ATC transmissions addressed to the B767 crew go unanswered but he had not mentioned any difficulties with his own RT communications although ATC had passed a squawk change and heading instructions which were missed. Effective RT coverage is currently the subject of a survey which commenced two weeks before this incident and remains in force. One ATCO member felt that criticism of the Montrose SC's reluctance to use the words 'avoiding action' was harsh. The SC had been confident that his vectoring plan would maintain standard separation but had been thwarted by RT difficulties with both crews. He had then concentrated on the B767 the crew, who were acknowledging his transmissions, but were then slow to follow their R turn instruction. When he realised that separation could not be achieved, he did issue the B767 crew an avoiding action descent and TI on the B777. The B767 crew reported visual with the other ac and, for whatever reason, delayed their avoiding action descent by 35 sec, which had compounded the situation. Members were all too aware that the incident occurred at 0536 UTC, when the human 'body rhythms' of all the subject parties were possibly at a low ebb. The B767 was coming towards the end of a transatlantic flight, the B777 was halfway through a transcontinental flight to the USA and the SC was approaching the end of a night shift having been on duty since 2200. This may have contributed towards the slow reactions to the ATC 'immediate' turn instructions and the late detection of the conflict by the SC.

The B777 crew had been aware of the situation from the outset. TCAS had shown the conflicting traffic and the crew had monitored the RT and were aware that the SC was busy passing instructions to another ac but without success. When they received a TA alert, they queried whether the avoiding action descent instruction had been for them; the answer was negative. They complied next to an RA alert, levelling once clear at FL 354; ATC before that had passed TI to the B767 crew on their ac and they saw the B767 visually as it passed to their L and below. The Board agreed that this action combined with the turn and descent by the B767, albeit late, as well as the visual acquisition by both pilots of each other's ac had removed any risk of collision.

Following the sector splitting review, a ScACC Operational Notice (SCON) was issued detailing the requirement for opening ATSA positions to support the sectors, particularly with respect to the timely provision of fpss from adjacent printers.

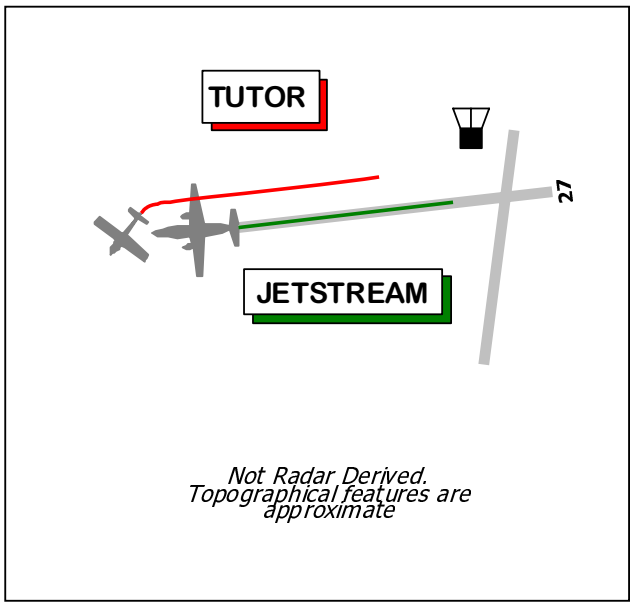
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late detection of the conflict by the ScACC Montrose SC compounded by RT difficulties and slow reaction, for whatever reason, by the B767 crew.

Degree of Risk: C

AIRPROX REPORT No 95/01

Date/Time:	13 Jun 1430	
Position:	5301N 0029W (Cranwell Aerodrome Circuit elev - 218 ft)	
Airspace:	MATZ	(*Class: G*)
	Reporting Aircraft	*Reported Aircraft*
Type:	Jetstream T1	Grob Tutor
Operator:	HQ PTC	HQ PTC
Alt/FL:	750 ft QFE (1007 mb)	800 ft QFE (1007 mb)
Weather	NR	VMC
Visibility:	NR	10 km into sun
Reported Separation:	50 ft V, nil H	100 ft V, nil H
Recorded Separation:		Not recorded.



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JETSTREAM T1 PILOT, a QFI, reports he was departing from RW27 at Cranwell into sun and in communication with TOWER (TWR); his ac has a red and white colour scheme, red anti-collision beacons were on but HISLs are not fitted. After take off, during the initial climbout at 150 kt and passing 750 ft QFE (1007 mb) for the visual circuit height of 1000 ft, a Tutor appeared in the top of the front windscreen panel. It was a *"very late"* sighting with insufficient time to initiate any action to avoid the Tutor, which passed 50 ft above them whilst joining the light ac visual circuit at 800 ft QFE. He added that there had been a high risk of a collision and the Tutor had been obscured by the Jetstream's roof panel.

THE GROB TUTOR PILOT, a QFI occupying the RHS with a cadet in the LHS, reports his ac has predominantly white colour scheme with blue markings and HISLs were on. He was recovering to Cranwell and in communication with TWR whilst joining through 'initials' for RW 27 – a left hand circuit - at 100 kt, level at 800 ft QFE (1007 mb). He flew 'dead' side to the upwind end of the runway before turning L crosswind to fit into the light ac visual circuit pattern at 800 ft QFE. Two Jetstreams were in the circuit at the time; one late downwind and the other just commencing the downwind leg. As he turned across to the live side, another Jetstream, which had just taken off from RW27, passed about 100 ft beneath his ac *"too close for comfort"* with a *"high"* risk of collision. There was no time to take avoiding action.

He believed that the Jetstream could have climbed at a greater rate than normal, probably with a light fuel load and was approaching 800 ft by the upwind end of the runway. Whilst flying the ac from the RHS of the Tutor, with a cadet in the LHS, it is difficult to see an overtaking ac which appears from the port side. He believes that consideration should be given to restricting the initial climbout height for Jet and Turboprop ac when a light ac is joining dead side through initials at 800 ft.

He added that he was giving the cadet in the LHS the standard instructor 'patter' through initials who remarked that it was close enough for him to see the 'windows' clearly.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

THE PILOTS' UNIT comments at the time of the incident, there were 2 Jetstreams downwind so the Tutor pilot judged his turn from deadside to fit in behind them. As he did so, he turned towards the subject Jetstream that had just taken off and was climbing rapidly. The Tutor pilot did not identify the

departing Jetstream before commencing his turn partly because he assumed that it would pass well beneath him. In fact he had underestimated the rate of climb of the Jetstream but more importantly, he did not look out properly before turning. Consequently, the Tutor pilot did not maintain adequate clearance from the Jetstream just airborne, which would have had insufficient energy to take avoiding action.

The Jetstream crew was not aware of the Tutor's position just above and ahead of them. However, the RT transcript shows that the Tutor pilot had called initials after the Jetstream had been cleared to line up so the Jetstream crew should have been aware of the Tutor and taken positive steps to identify it as soon as they were airborne. Since they were not visual with the Tutor, the Jetstream crew should have asked ATC to confirm its position or remained below the light ac circuit height until clear of the Tutor. With the limited visibility afforded by the Jetstream cockpit it is essential to make a strenuous effort to look out and listen out carefully. The result of not doing so was that the Jetstream crew did not spot the Tutor until a very late stage.

Around the time of the Airprox, there was a considerable amount of RT associated with a moderately busy circuit but the various calls were concise and clear. Both QFIs involved should have been aware of each other's intentions from the RT calls. However, with the distraction of pattering to students, it is easy to miss a vital RT call. This incident highlights the importance of correct RT procedures but moreover, the need to listen out carefully whilst maintaining a good lookout. The Tutor pilot was not well placed to see the other ac because he was sitting in the RHS with a cadet in the LHS. Had he positioned himself wider on the deadside during the join he would have found it easier to check for ac climbing out. It is always incumbent on the ac joining the circuit to fit in with those already in. The Tutor had a number of options including extending upwind and delaying his turn until after the Jetstream had climbed through his level.

The Tutor pilot's suggestion that climbout restrictions should be introduced for departing ac when other ac are joining the circuit has been considered. The solution is to give this Airprox the widest possible publicity and to emphasise the importance of thoroughly checking the area ahead before turning or climbing – regardless of the difficulties associated with offset cockpit seating or restricted cockpit visibility.

MIL ATC OPS reports that Cranwell TOWER was manned by a trainee and mentor. The weather was good, with a visibility of over 10 km; 'nil weather'; 2/8 cumulus at 4000 ft, which improved to 1/8 CU during the period. At 1428:58, the Tutor pilot, C/S '—A', called to rejoin and was advised in accordance with current practice of the RW in use – 27; QFE - 1007 mb and the number of ac in the circuit – 2 other Jetstreams. The next transmission on the same frequency, a few sec later, came from the Jetstream pilot, C/S '—J', when he advised *"C/S '—J' ready for departure"* but was instructed to hold. Just under a minute later, at 1430:09, following 6 transmissions to/from other ac, the Jetstream pilot was instructed to line up, which the pilot acknowledged *"line up C/S '—J' "*. In the 10 sec between 1430:20 and 1430:30, the Tutor pilot reported *"(C/S'—A') initials",* to which TWR responded *"(C/S '—A') one deadside, one joining downwind",* acknowledged by the Tutor pilot: *"C/S '—A'"* whereupon TWR reported the *"Surface wind calm".* At 1430:36, about 16 sec after the Tutor pilot reported initials, TWR cleared the Jetstream pilot for take off, which was acknowledged. A total of 20 transmissions were made over the next 1·5 min between TWR and 4 other ac, which had either joined or departed the circuit – indicative of a moderately busy airfield circuit with a steady stream of RT - not uncommon at flying training establishments. The next transmission from the subject ac was at 1432:30, when the Tutor pilot reported *"...downwind to land."* and was advised that there were 2 ac ahead. At 1433:00, the Jetstream pilot stated that he wished to pass a message and stated *"Will you advise the supervisor, I just wanted to speak to him about, err (Tutor C/S'—A') proximity to me on my initial climbout."* Shortly afterwards, the Jetstream advised that he was downwind and departed the circuit, after which the Tutor pilot reported *"..finals."*

Neither the Jetstream nor Tutor pilots' reports are particularly clear as to whether or not the pilots concerned were aware of each other's ac. The Tutor pilot was obviously well aware of two other Jetstreams in the circuit and had delayed his turn into the live side of the circuit in order to fit in behind

the second ac, which had just commenced the downwind leg; he first mentions the subject Jetstream as it passed beneath his own ac. Cranwell operates a number of different ac types with differing performance characteristics, and so ac callsigns are given an additional letter suffix to identify the ac type to both ATC and other station based pilots - A for the Tutor and J for the Jetstream.

Current practices at military aerodromes require the controller to inform the pilots of ac joining the circuit about the number and position of all ac ahead which have not touched down; these details are passed as the 'number in', after the pilot's first call, and the specific position of the ac ahead when the pilot reports at the Initial Point. Thereafter, the responsibility shifts to the pilot to fit in with ac already in the circuit, with the expectation that all further RT calls are closely monitored by the pilots and a good lookout is maintained. In this case therefore, the controller would have expected the Tutor pilot to have known about the departing Jetstream following the *"line up"* call, shortly before the Tutor pilot reported at the Initial Point, and the Jetstream's clearance to take off, which was transmitted shortly afterwards. Similarly, as the Jetstream crew were on frequency and 'lining up' on RW27 when the Tutor Pilot reported *"C/S '—A' initials",* the Jetstream pilot should have noted the Tutor's presence. The controller therefore, saw no requirement to provide any further information to either pilot, and this reflects the current military ATC stance on the degree of control exercised by aerodrome controllers over circuit traffic.

HQ PTC comments that although the ATC frequency was busy, with hindsight there was sufficient information available for both crews to have been aware of each other, although with high cockpit workloads, it would have been easy for either to have missed the relevant call. However, while not specifically stated, it can be inferred from their statements that each was indeed aware of the other. With limited visibility and a limited capacity for evasive action immediately after take off, the Jetstream crew could reasonably expect the Tutor to remain clear of them, even had they been able to see him earlier. On the other hand, it was incumbent upon the Tutor pilot, as he joined the circuit, to position himself safely with respect to all other traffic already in the circuit, including the ac taking off. Before commencing his turn from the deadside, therefore, and regardless of any expectations he might have had concerning the Jetstream's flightpath, the Tutor pilot should have ensured that his intended flightpath was clear.

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, and reports from the appropriate ATC and operating authorities.

The PTC member emphasised that the Jetstream pilot's climb to circuit height was in no way rapid or abnormal and was executed entirely in accord with SOPs. Moreover, he believed that the RT procedures and phraseology used by all concerned reflected prevailing standards and current practice. Nevertheless, a few extra words of caution from TWR could have prevented this occurrence he believed – a point which engendered strong support. Military controller members also opined that the Tutor instructor should have been more aware of the Jetstream than he evidently was. The Jetstream crew taking off had right of way in the circuit over the joining Tutor, whose pilot had to look out for other traffic and integrate accordingly. This was clearly what he was trying to do with regard to the other two Jetstreams on the downwind leg but he had somehow not taken sufficient account of the one departing. TWR was not required to include information on departing traffic, which had not been cleared for takeoff when the Tutor reported initials. Military circuit procedures rely on lookout and listening out; more than one review in recent times had confirmed that the service provided was generally in line with the customer's needs. However, that does not prevent a controller exercising judgement if the situation warrants by providing additional information; it would be unjust to criticise a controller for excessive RT, when conscientiously trying to provide a good service to resolve conflicts in the circuit. One member thought that problems would ensue if pilots got used to expecting such helpful information, and if for whatever reason it was subsequently omitted at a critical point. Another civilian member believed that the Jetstream's climb through the light ac circuit height of 800 ft to achieve his circuit height of 1000 ft reflected an unsound procedure and contributed

to the confliction. Some experienced instructor members agreed with the Tutor pilot's suggestion of keeping the Jetstream below circuit height until clear of the circuit area. Much debate followed about the efficacy of military aerodrome circuit procedures compared with those in use at civil aerodromes. Civil controller members considered military procedures to be wholly inadequate. On the other hand, military controllers and flying instructor members alike thought the more restrictive civil procedures would not work at busy military flying training establishments such as Cranwell, with their diversity of patterns and ac types. While some civilian controller members remained unconvinced by this argument, it was pointed out that these procedures had evolved and worked perfectly well at military aerodromes over 80 years. Pilot members believed the Tutor pilot would not have turned crosswind onto the live side when he did, if he had realised where the Jetstream was; he could not rely on his LHS cadet for lookout, who the Board was informed was a mere 14 year old. A short reminder or prompt from TWR about the Jetstream to the Tutor pilot such as "one on for departure" or "Jetstream departing shortly" could have made all the difference. However, the IFS adviser identified the crux of the problem, insofar as good airmanship dictates that pilots, whether flying from the RHS or not, should displace their joining run-in far enough into the deadside to ensure a satisfactory view of the runway, so that they could maintain visual contact on any ac departing from it - a singularly important point. This teaching allowed pilots to integrate safely into the aerodrome circuit, which in the Board's opinion the Tutor pilot did not do and this had caused the Airprox.

With regard to the risk inherent in this encounter both pilots agreed there was no horizontal and little vertical separation when their respective flightpaths crossed – 50 ft according to the Jetstream pilot and 100 ft from the Tutor pilot's perspective. Neither handling pilot saw the other's ac in time to take avoiding action and nothing more than luck had prevented them hitting. Members concluded unanimously that an actual risk of a collision had existed.

Following these assessments the Mil ATC Ops adviser informed the Board that Cranwell ATC had supplemented their SOPs with the use of the phrase "one on for departure", when appropriate.

PART C: ASSESSMENT OF CAUSE AND RISK

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

Degree of Risk: A.

AIRPROX REPORT No 96/01

Date/Time: 9 Jun 1436 (Saturday)

Position: 5011 N 0152 W (12 NM NE of ORTAC)

Airspace: Airway (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	BN2III	Unknown
Operator:	CAT	Unk
Alt/FL:	FL 40	Unk
Weather Visibility:	VMC SKC >20 km	Unk Unk
Reported Separation:	50 yd, Nil V	Unk

Recorded Separation: <0·2 NM H

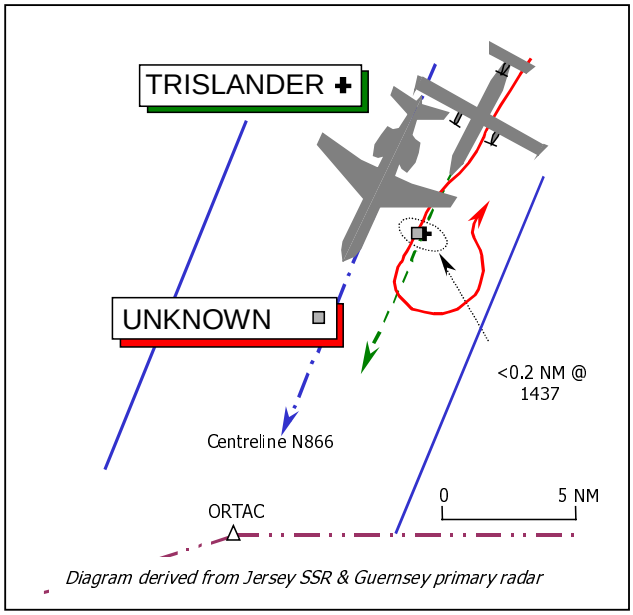


Diagram derived from Jersey SSR & Guernsey primary radar

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BN2III TRISLANDER PILOT reports his ac has a blue and white colour scheme; he was flying single pilot from Southampton to Jersey under IFR, routeing N866 (about 1 NM E of the centreline he thought) to Alderney and was under a RCS from London CONTROL on 135·05 MHz. The visibility was >20 km under a clear sky; TCAS was not fitted. Heading 210°, 13 NM NE of ORTAC at 140 kt in level cruise at FL 40, he looked out of the starboard cabin window to see another ac at 4 o'clock, passing less than 100 m away at the same level. No avoiding action was taken as the other ac overtook him at a speed of >200 kt as it passed <100 m down the starboard side – UKAB Note (1): he reported *" about 50 yd"* on RT. He thought that this other ac was also routeing along airway N866 and immediately queried this with the controller who had no knowledge of the ac and which did not show on his radar display. Whilst communicating with London CONTROL, the other ac broke L, about 500 m ahead of him and crossed from R – L as it descended rapidly, he lost sight of it at about 2000 ft ALT as it headed off to the E. He identified it as a three-engined Falcon Jet with a low-wing and pronounced anhedral on the tailplane. If the Falcon pilot had not seen his ac he assessed there had been a high risk of a collision and stressed that he was unaware of its approach from astern until it was first seen at 4 o'clock.

AIS (MIL) report that despite extensive tracing action they have been unable to ascertain the identity of the reported ac, which the Trislander pilot was adamant was a Falcon 900. None of the recorded LATCC radars illustrate this encounter; a Jersey SSR recording does show the Trislander tracking SW at FL 40, but not the reported ac. Enquiries with Guernsey elicited a digital primary radar recording, which when analysed, showed in addition to the Trislander a plot-extracted radar contact acting in a similar manner to that described by the reporting pilot. Regrettably this contact was only tracked for a short period during the encounter and thereafter apparently descended below radar coverage, so no aerodrome of departure or destination was revealed. Whilst the radar data was being analysed, procedural tracing action was also undertaken with aerodromes in the UK and all UK registered Falcon 900 owners were contacted individually. Despite checks with the FAF and operators of similar types all tracing action proved fruitless.

UKAB Note (1): Tracing action was terminated by the UKAB on 2 Nov 2001, some 5 months after the Airprox. The reported ac, therefore, remains untraced.

THE HURN EAST SECTOR CONTROLLER (SC) reports he was controlling HURN EAST Sector, with busy traffic levels, which was also the case with the other HURN WEST sector.

The Trislander was southbound to Guernsey at FL 40 within the airway, when the pilot called 10 NM N of ORTAC and advised that he had been in confliction with another ac at the same level about 50 yd away. There was no evidence of another ac on the radar at all, neither a primary nor secondary contact. No FPS for any possible ac was displayed, hence there were no other ac in receipt of an ATC Service in the vicinity within the airway.

He checked his display to confirm the radar source in main mode; the base of primary cover from the Pease Pottage radar source was about 7800 ft in the area of the Airprox and the Jersey radar service was providing secondary data only. Neither the STCA nor the SMF was triggered.

The Trislander was subsequently transferred to Jersey ZONE without further incident.

UKAB Note (2): A review of the HURN EAST Sector RT transcript reveals that shortly after the SC instructed the Trislander pilot to switch to Jersey ZONE, he reported at 1436:50, *"…Dassault jet 3 engine…looks like a 900 just went past about 50 yd off my RHD side same level descending through in front of me now, any ideas".* The SC responded *"…negative nothing showing on radar"*, to which the Trislander pilot retorted *"well he's definitely there…"*. The Trislander pilot added that *"…well it was pretty close but I didn't get a reg*(istration)*…I imagine he had me in sight I don't now whether it 's a military one or not…"*. Following a comment by the SC reiterating that he could see nothing on his radar display at all in the vicinity, the Trislander pilot reported, *"…he's now eastbound about...a mile off my…LHD side and descended down to about 1500* (ft) *by the looks of things"*. The pilot then switched to Jersey.

UKAB Note (3): The Guernsey primary radar detected another ac in the vicinity of the Trislander [which was level at FL 39 Mode C (1013 mb) throughout] from 1434:58, closing from astern on a similar track, but without Mode C it is not possible to determine the vertical separation that pertained and the exact geometry. The unknown ac overhauled the Trislander to starboard, with a horizontal separation of <0·2 NM at about 1437, and then turned L in the manner described by the Trislander pilot. The unknown ac's return disappeared at about 1439:10, heading NE.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of the Trislander, a transcript of the relevant RT frequency, radar recordings and a report from the air traffic controller involved.

It was regrettable that further information from the pilot of the other ac was not available, but it was clear to the Board that AIS (Mil) had done all they could to identify it and trace its pilot. The HURN EAST SC had been completely unaware of the presence of the other ac when the Trislander pilot reported it to him and the LATCC radar and RT recording confirmed that it was neither detected nor displayed to the SC. Some pilot members queried if the lack of primary radar coverage here in an airway was acceptable but an ATSI adviser confirmed that not all CAS was completely encompassed by primary radar coverage from NATS radars. As with this portion of N866 adjacent to the FIR boundary, primary radar cover was not a prerequisite for the establishment of an airway. Reliance was placed on SSR in these areas – hence its mandated carriage and operation. Also, the provision of a procedural Air Traffic Control Service on the basis that all traffic should be complying with mandatory IFR for flight in Class A CAS and in communication with the controlling authority – LATCC HURN Sector - who would ensure standard separation between such flights. However, the extensive analysis of the Guernsey radar confirmed that the other ac had flown the profile reported by the Trislander pilot; there was no reason to doubt that it was at the same level as the Trislande– as reported by its pilot – and thus within CAS. It was clear to the Board that the pilot of the unknown ac had not complied with the requirements for flight in Class A CAS and penetrated N866 without a clearance - unknown to the controller at the time. There was no doubt that the cause of this Airprox was an unauthorised penetration of N866 by an untraced ac.

Turning to risk, as the untraced ac was neither squawking Mode A nor Mode C, this also prevented the LATCC Short Term Conflict Alert from highlighting this conflict to the SC; TCAS was not fitted to the Trislander but would similarly have been blind to the presence of the untraced ac and powerless to alert the pilot in this situation. So there were no other safety nets to protect the ac involved other than the pilot's eyes. It was evident that the alert Trislander pilot could not have seen the intruder any earlier than he did. Some members thought it unlikely the pilot of the untraced ac would have flown so close to the Trislander if he had seen it but others were not so sure. Unfortunately, it was not known if the pilot of the untraced ac had seen the Trislander or not. This led some members to conclude that there was insufficient information to assess the risk. Other members believed that the evidence from the radar recordings showing a CPA of less than 0·2 NM and the untraced ac's entry into CAS without a clearance was sufficient to determine that the safety of the ac involved had been compromised. The two viewpoints were fairly evenly balanced amongst the members but in the end, by the narrowest of margins, the former view prevailed and the Board assessed that there was insufficient information available to determine the risk involved.

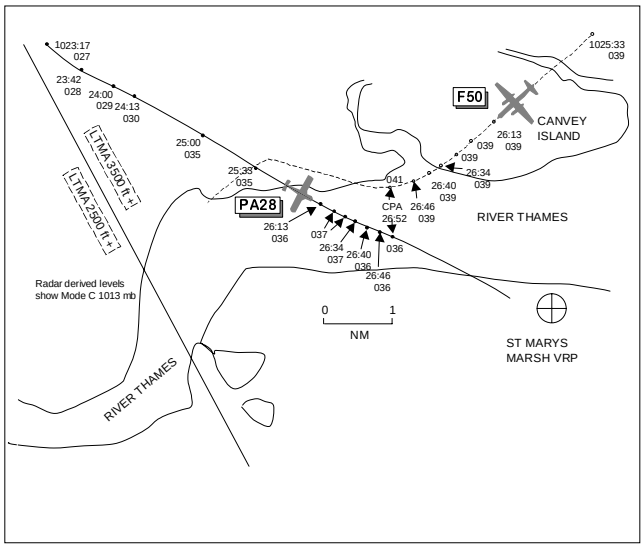
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of CAS by an untraced ac.

Degree of Risk: D.

AIRPROX REPORT No 98/01

Date/Time:	21 Jun 1027	
Position:	5130 N 0032 E (7 NM SW of Southend)	
Airspace:	TMA	(*Class:* A)
	Reporting Aircraft	*Reported Aircraft*
Type:	F50	PA28
Operator:	CAT	Civ Club
Alt/FL:	4000 ft (QNH 1018 mb)	2500 ft (QNH 1016 mb)
Weather Visibility:	IMC KLWD NK	VMC CBLC >10 km
Reported Separation:	100 ft V 1 NM H	NK
Recorded Separation:		500 ft V 0·7 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE F50 PILOT reports flying at 180 kt in a descent for an approach to London City RW 28. The weather was IMC and he was receiving an approach radar control service from Thames Radar on 132.7 MHz. Shortly after levelling at 4000 ft QNH 1018 mb on a radar heading of 245° to intercept the ILS LLZ, he saw traffic on TCAS in his 11 o'clock range 3 NM indicating 100 ft below. He informed ATC and, as the controller responded, a TCAS TA alert was received. Simultaneously, as ATC issued a R turn onto heading 340°, he thought, TCAS annunciated *"climb now"*; a R turn and climb were immediately executed. After climbing by approx. 400 ft and turning through 40°, TCAS annuciated *"monitor vertical speed"* followed shortly thereafter with *"clear of conflict"*. He levelled the ac at 4300 ft, informed ATC of the situation, and initiated a descent to 4000 ft; ATC issued a new intercept heading once he became clear of the traffic. He estimated that the conflicting ac passed about 1-1·5 NM clear on TCAS but it was not seen visually.

THE PA28 PILOT reports heading 120° at 106 kt flying VFR to Le Touquet at 2500 ft QNH 1016 mb, he thought. He was carrying three passengers who were all non pilots. The visibility was >10 km 2000 ft below cloud in VMC and he was receiving a FIS from London Information squawking 7000 with Mode C. He did not see the subject F50 whilst en route. After landing back at Elstree, the CFI at the flying club informed him that the Mode C encoding altimeter was known to be over-reading by 1000-1500 ft which he had not been aware of prior to that day's flight (see UKAB Note (5)).

UKAB Note (1): Met Office archive data shows the London City METAR EGLC 1020UTC 30006KT 250V330 9999 BKN040 16/07 Q1018.

ATSI reports that the Airprox was filed by the pilot of the F50, after the ac was involved in a TCAS event with unknown traffic. The incident occurred about 8 NM SW of SPEAR, close to the base of the class A controlled airspace of the LTMA. The F50 was inbound to London City Airport from Amsterdam and at the time of the incident was receiving an APR service from Thames Radar, located at the Heathrow ATSU. Subsequent tracing action identified the other ac as the PA28, operating VFR and in receipt of a FIS from the FISO (A) at LATCC. The pilot reported later that the ac was wearing the conspicuity code 7000, with Mode C height readout.

The PA28 established communications with London Information at 1021, reporting en route from Elstree to Le Touquet and currently *"5 miles east of Stapleford er VOR"* (most likely a nomenclature for

LAM VOR) at 2500 ft. The pilot added that it was his intention to climb to 5500 ft once the base of controlled airspace would allow. The LATCC FISO (A) acknowledged the details, placed the flight under a FIS and requested a report at DOVER. Three minutes later, at 1024, the pilot reported climbing to 3500 ft.

UKAB Note (2): The Debden radar recording at 1022:00 shows the PA28 to the SE of LAM, where the base of the LTMA is 2500 ft; it was displaying the SSR code 7000 with the Mode C readout indicating FL 026 (2745 ft QNH 1018 mb). At 1024:00 the PA28 can be seen, having just crossed the boundary of the LTMA where the base changes from 2500 ft to 3500 ft, indicating FL 029 (3045 ft QNH 1018 mb) in a slow climb.

At 1025, the F50 made its first call to Thames Radar, reporting descending to 4000 ft altitude. Although in an area where the base of the LTMA is 3500 ft, this descent clearance was quite legitimate and within the guidelines provided by the MATS Part 1, 1-58, para 9, which states that *".....controllers should not normally allocate a level to an ac which provides less than 500 feet vertical separation above the base of a control area or airway. This will provide some vertical separation from ac operating beneath the base of controlled airspace."* The flight was placed on radar heading of 240° and instructed to report established on the ILS localiser for RW 28 at London City Airport. At 1026:13, the Thames Radar controller was telephoned by a colleague at LATCC TC who warned him of the presence of traffic transponding code 7000 which appeared to be climbing into conflict with the F50. It was most probably the activation of STCA, a few seconds earlier, that had alerted the TC controller to the potential conflict. Unfortunately, Thames Radar is not STCA equipped and whilst it was unfortunate that the unknown ac's climb had not been noticed earlier, there was no requirement for the controller closely to monitor the F50 in respect of traffic not expected to climb into controlled airspace. The traffic, while unknown to the Thames Radar controller, was the PA28.

UKAB Note (3): The radar recording at 1026:13 shows the PA28 tracking 120° in the F50's 1 o'clock position converging at a range of 2.8 NM, with an unverified Mode C indication of FL 036 (3745 ft QNH).

The controller immediately instructed the F50 to *"....turn right now please turn right heading er three one zero".* The instruction was read back and before the controller had an opportunity to issue any TI the pilot reported *"traffic indicating TCAS minus one hundred feet".* The controller stated that the traffic had just appeared on radar and enquired if it could be seen visually. The pilot said he could not, but reported that he was now responding to a TCAS climb.

UKAB Note (4): By this time (1026:34), the PA28 had moved into the F50's 12 o'clock position at a range of 1·6 NM and was now indicating FL 037 (3845 ft QNH), with the F50 at FL 039 (4045 ft QNH). At 1026:46, when the PA28 was in the F50's 11 o'clock position at a range of 0·9 NM the Mode C indications were FL 036 and 039 (3745 ft and 4045 ft) respectively. CPA occurs 6 seconds later as the ac pass port to port by 0·7 NM, although by this time 500 ft of vertical separation had been established, following the F50's TCAS prompt climb through FL 041 (4245 ft QNH).

Coincidentally, at 1027:00, and not known to Thames Radar, the PA28 made a routine call to London Information reporting *"...abeam Brentford at 3500 feet"*, but the pilot made no mention of an encounter with another ac. (Note: The position reported could not be reconciled with the ac's position on the radar - Brentwood is about 13 NM to the NW and Brentford is approx. 30 NM to the W). A short while later the F50 reported clear of the traffic and subsequently completed its approach and landing at London City Airport without further incident.

UKAB Note (5): During a subsequent telephone conversation with the PA28 pilot, he stated that he had flown the route on previous occasions and was familiar with the airspace boundaries in the area. However, he could not remember whether 1016 mb was the pressure he used on the day in question as normally he used the RPS. The RT transcript shows the LATCC FISO (A) made a broadcast at 1027:30 that the Chatham RPS was 1013 mb, about 15 seconds after the PA28 reported level at 3500 ft. He was unaware that when the base level of CAS was defined as an altitude that flying at that level would mean penetration of CAS and that it was recommended practice to obtain a QNH from an adjacent aerodrome to ensure separation from airspace base levels was achieved. Close scrutiny

of the radar recording during the analysis phase of the investigation was made paying particular attention to the Mode C indications in correlation with known pilot reports to the LATCC FISO (A). Firstly, the PA28 pilot's initial report 5 NM E of LAM VOR at 2500 ft on radar shows the PA28 indicating FL 026 (2745 ft QNH). Secondly, the pilot reported level at 3500 ft at 1027:00, immediately after the incident, when the Mode C indicates FL 036 (3745 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 reports from the appropriate ATC authorities.

Pilot members expressed concern at the CFI's acknowledgement that the encoding altimeter in the PA28 had been known to over-read by 1000-1500 ft. The pilot had been unaware of this prior to the flight and this 'fault' should have been brought to his attention during the booking-out phase within the flying club and/or the equipment should have been placarded in the ac to this effect. However, as shown during the investigation, correlation of the pilots' reports to the LATCC FISO (A) and the recorded radar data had shown the Mode C to be within the ±200 ft tolerance allowed. A second point of serious concern was that the PA28 pilot had been unaware of the need to avoid flying at the base of CAS (AIP ENR 1-1-2-1 para 1.4) which he had reported to the LATCC FISO (A) during his initial cruise at 2500 ft and the subsequent climb to level at 3500 ft. Also, he had not been aware of the need to use a QNH of an adjacent aerodrome when flying below TMAs and CTAs below the Transition Altitude (AIP ENR 1-7-1 para 3.10). By erroneously using the RPS (Chatham 1013 mb), instead of a local QNH (London 1018 mb), for flight beneath the London TMA, he had inadvertently penetrated CAS and flown into confliction with the F50. This incident had highlighted the need for pilots to adhere strictly to these procedures, promulgated in the AIP, when flying adjacent to CAS. It was common practice for flights inbound to London City airport to be given descent to levels that were close to the base of CAS because of the need to establish themselves on the required descent profile for the ILS approach to the E of the airport.

Members noted that the Thames Radar controller, without the 'safety net' benefit of STCA, had been alerted to the confliction by his colleagues at LATCC TC who had better equipment; he had then turned the F50 R onto heading 310° to pass behind the intruding PA28. The F50 pilot immediately reported a TCAS TA *"traffic"* alert then an RA *"climb"*, which he complied with, as he was unable to see the conflicting traffic owing to IMC; he finally levelled at 4300 ft before being vectored back towards London City when he was clear of the conflict. These elements had combined effectively and led the Board to conclude that any risk of collision had been removed.

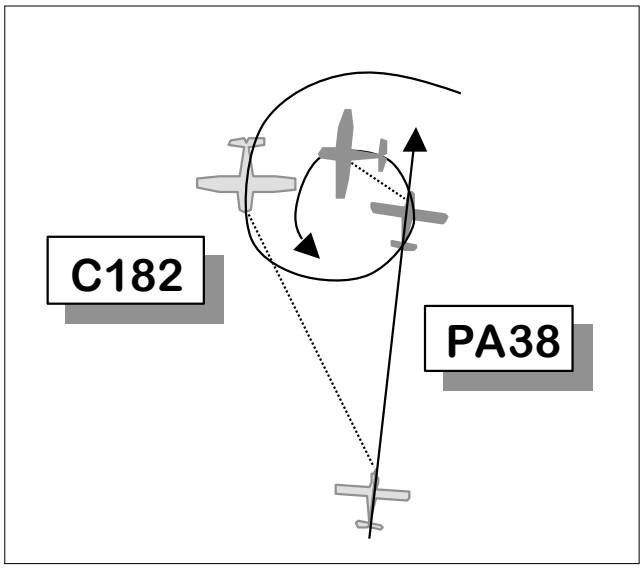
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA28 pilot inadvertently penetrated CAS without clearance and flew into conflict with the F50.

Degree of Risk: C

AIRPROX REPORT No 99/01

Date/Time:	21 Jun 1439	
Position:	5253 N 0054 W (Langar - elev 109ft)	
Airspace:	FIR	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Parachutists	PA38
Operator:	Civ Club	Civ Club
Alt/FL:	2800 ft ↓ (QNH)	2800 ft (QNH 1015 mb)
Weather Visibility:	VMC CLBC 20 NM	VMC CLBC 10 km
Reported Separation:	3-400 ft V /NK	
Recorded Separation:		NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C182 PARADROP PILOT reports climbing in an orbit over Langar with 2 student parachutists to be dropped one at 3000 ft and the other at 3500 ft. The first jumped at 3300 ft after a 'clear drop' from the ground and, after a small orbit, the second exited onto the step at 3500 ft having again received a 'clear drop'. Ground control then called 'Abort'. Although it became apparent that there was another ac about, she allowed the jump to continue because of the possible extreme danger to the ac and those left on board when a student is asked to get back in from a step exit after being cleared to drop. Luckily the ac below, overflying Langar, missed both students. It passed 3-400 ft above the first and 3-400 ft below the second, but there had been a danger of collision with them. The Jumpmaster in the cabin had checked the airspace and gave the 2nd student's exit orders. He was then busy controlling the student and static line until she had jumped and then saw the other ac pass between the parachutists.

THE PA38 PILOT reports heading N at 90 kt en route to Teesside at 2800 ft and receiving a LARS (FIS) from Waddington. While uncertain of his position, and actively trying to obtain a fix, he overflew Langar without seeing any other ac or parachutists. There was no notification from Waddington that they had crossed Langar until the filing pilot called on RT. He realised that overflying Langar could have caused a major incident but he and his fellow pilot were becoming seriously concerned about avoiding E Midlands' airspace. In hindsight he realised he could have asked for more help from Waddington, and obtained an updated W/V which might have helped to avoid the original problem. He offered his apologies for the inconvenience caused and to the parachutists and their pilot.

THE PA38 PILOT'S CFI reports that the pilot who qualified in Jan 01 was returning from the school's annual fly away; his co-pilot had about 6 hours experience. Both were much chastened by the event and have learned from it.

UKAB Note: LATCC radar recordings show the ac tracking as indicated in the diagram but, although both pilots reported squawking (0033/7000) with Mode C, no Mode C returns show for either ac. Waddington RT recordings show that at 1441 the C182 pilot called to report the Airprox and ask if the 'other' ac could be seen on radar. The controller saw a 7000 NMC contact just N of Langar and shortly afterwards the PA38 pilot called giving a position 5 NM N of Newton. The VDF trace passed directly through the contact now 2 NM N of Langar and its identity was confirmed using SSR. Neither ac was receiving a service from Waddington at the time of the Airprox.

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 questioned the thoroughness of the cross country training provided to the inexperienced PA38 pilots who had been tardy to seek help. Rightly concerned about the E Midlands CTA, they should have called either E Midlands or a LARS unit before they became 'seriously' concerned. The Board concluded that their inadvertent flight into the Langar DZ, and their non sighting of the Cessna or the parachutists was part of the cause of the Airprox which members agreed contained a risk of collision. It was felt that the Parachute School would be well aware of its duty of care to its customers as evidenced by their use of a ground party to assist in determining if the airspace was safe to drop into. However, members observed that the ground party had not detected the intruding PA38 soon enough to call 'abort' in time to affect the outcome. Indeed, the call came at a time which put the Cessna pilot in a most invidious position vis-à-vis the student parachutist on the step. Also, the PA38 was not detected by the Cessna pilot (who would have been in a position to see it during her orbit), or buy the jumpmaster. This was effectively a non-sighting of the PA38 by the main components of the parachuting 'team' and the Board considered that this was also part of the cause.

After an earlier Airprox the Board had recommended the school's pilot to obtain a LARS from Waddington or Cottesmore. She had found Waddington very busy in the past but has since undertaken to try Cottesmore; members urged strongly that she should do so. The Airprox demonstrated that expecting E Midlands to keep traffic away would not work if the traffic was not talking to them.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: While uncertain of his position, the PA38 pilot inadvertently flew through a promulgated parachute DZ, into conflict with parachutists whom he did not see; compounded by a non sighting of the PA38 by the parachute team.

Degree of Risk: A

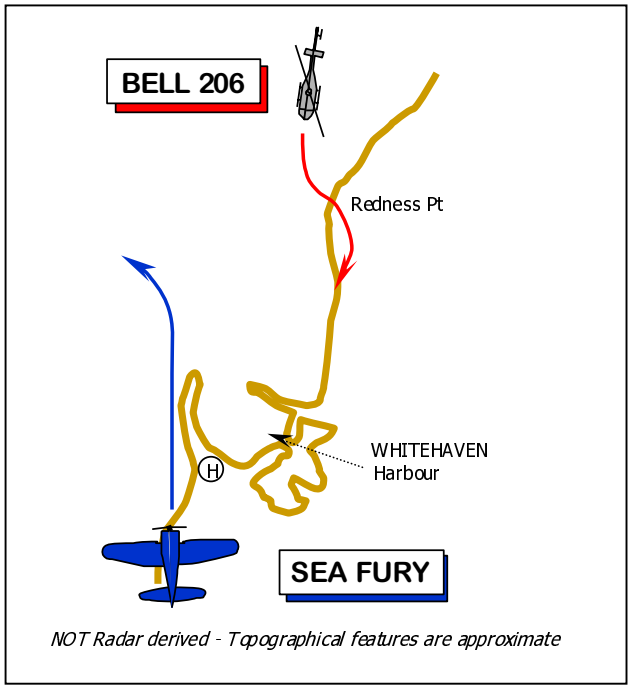
AIRPROX REPORT No 100/01

Date/Time: 23 Jun 1100 (Saturday)

Position: 5433 N 0335 W (Whitehaven Harbour)

Airspace: London FIR (*Class:* G)

	Reporting Aircraft	*Reported Aircraft*
Type:	Hawker Sea Fury	B206 JetRanger
Operator:	COMNA	Civ Comm
Alt/FL:	↓200 ft (QNH)	800 ft (QNH)
Weather Visibility:	VMC >10 km	VMC CAVOK 30 km
Reported Separation:	500-1000 m	900 m H, 600 ft V
Recorded Separation:		Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWKER SEA FURY FBII PILOT reports his ac has a grey and sky camouflage scheme with black and white recognition stripes; HISLs are not fitted. He had been tasked to participate in an air display at the Whitehaven Marine Festival and had received a brief from the 'display organiser' prior to take-off from Blackpool for the display. The start time of his display had been confirmed as 1100 UTC and he was briefed that a helicopter pilot conducting pleasure flights at the festival had been specifically briefed to be on the ground at 1045, 15 min before his allocated display. He was operating under a FIS from Scottish INFORMATION on 119·875 MHz (he could not raise London INFORMATION on RT) and squawking 3/A 7000; Mode C is not fitted.

The display was commenced at exactly 11:00, as briefed. He 'ran-in' to the display location along the display line from S to N, descending from 2500 ft to 200 ft amsl, whilst accelerating to 350 kt, expecting "the display airspace to be sanitised of other ac". At 'crowd centre', just as he started to level off at an altitude of about 200 ft, he spotted a helicopter on the nose at the same altitude flying toward him about 500 m away. He pulled up and L at 4G to avoid the helicopter, which passed about 500 – 1000 m to starboard before he levelled his ac at 4000 ft amsl. The helicopter was monitored from a safe distance as he watched it land adjacent to the harbour and shut down its rotors, before recommencing his display.

He assessed that the risk of a collision had been "extremely high" and he reported the Airprox to the display organiser upon landing back at Blackpool at 1130. He filed the Airprox when he returned to Yeovilton 2 days later.

UKAB Note (1): This display was the subject of a NOTAM originated by Airspace Utilisation Section (AUS) and promulgated by the NOTAM Office at AIS Heathrow to civil operators as H3589 and to military operators as U4480/01. This gave details of the Sea Fury display within a 2 NM radius of 54°33 N 003°35 W (Whitehaven Harbour), sfc – 2000 ft agl, 11-11:15 daily for the weekend of 23/24 Jun. This was included in the AIS Bulletin (AB 5433) along with the three other displays at different times spread through the day but with a 5 NM radius on the same co-ordinates.

THE BELL 206 JETRANGER PILOT reports he was conducting pleasure flights at the Whitehaven Marine Festival and was listening out on the company frequency of 122·95 MHz, whilst operating out of the private landing site (HLS) at Whitehaven Harbour in CAVOK conditions. His helicopter had a blue and white livery and navigation lights, landing lights and HISLs were on when he took off from the pleasure flight HLS at about 10:55 UTC for a 3 min flight with 4 passengers. His intention was to be back on the ground at 11:00, which he knew was the published Sea Fury display start time. At about 10:57 he was returning to land at 90-100 kt, when his groundcrew called him on RT reporting that the Sea Fury was on its way in from the southeast. He spotted the Sea Fury about 5 NM away and in order to stay clear of its display area over the sea turned L from 188° onto 158° (T) to pass over Redness Point, before turning R onto 210° to regain his approach path and make good his HLS. He thought the Sea Fury arrived a couple of min earlier than the promulgated time and his avoiding action detour resulted in him landing at the HLS at 11:03, later than planned. He added that he was in good visual contact with the Sea Fury throughout; the minimum horizontal separation was 700 m plus 600 ft vertical separation and there was no risk of a collision.

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

UKAB Note (3): In a subsequent telephone conversation with the event organiser it was revealed that it was he who had briefed the Sea Fury pilot by telephone on the day of the occurrence. The event organiser confirmed that the Sea Fury pilot had been briefed that the pleasure flight helicopter operators would be on the ground before his display but it was for 10 min beforehand. As a direct result of this Airprox this was subsequently increased to 15 min before and after the allocated display times for successive displays and the B206 pilot was required to sign an acknowledgement of this subsequent revised instruction. He confirmed that only military ac participated in the flying events (Sea King/Tornado/

Spitfire) and asserted that the organisers had obtained written briefs about the organisation of air displays from the RAF, which had been followed. The B206 pilot, had been sub-contracted to operate the pleasure flights by the company contracted by the organisers.

UKAB Note (4): A Director of the company contracted to arranged the Helicopter Pleasure flights was present at the HLS and operating the company radio in communication with the B206 pilot. He had contacted Warton and Carlisle ATSUs on either the Thursday or Friday before the event to ascertain what frequency the Sea Fury pilot was operating on, but to no avail. He also tried to contact the Sea Fury pilot through Blackpool ATC but without success. None of the other participants conducting air displays that day contacted him on his company frequency, which he asserted was known to them. He stated that *"although this was not specifically mentioned, we decided to ground the pleasure flying helicopter for the duration of these* (display) *flights"*. He added that the B206 was lifted on its final 3 min circuit before grounding it for the Sea Fury's display, *"aiming to have it on the ground before the 1200* (1100 UTC) *deadline"*. He heard the Sea Fury approaching from the S at about 1157 and informed the B206 pilot that he should turn inland. The helicopter was held-off until the Sea Fury was in a loop about 1 NM S of the HLS, when he brought in the helicopter to land. He asserted that he was in a position where he could see for many miles along the display line and had kept the B206 pilot informed of the exact movements of the Sea Fury until the helicopter had landed at the HLS.

UKAB Note (5): Another of the organisers asserted that the contracted Helicopter Operator had been given clear instructions by fax to ensure that the helicopter was on the ground 15 min before the start of the Sea Fury's and other military ac's displays.

COMNA comments that the Sea Fury pilot, an experienced display pilot, was clearly shaken by this event and strongly believes that, had he not sighted the helicopter and taken immediate evasive action, a collision would have occurred. The Airprox took place in Class G airspace and it is accepted that despite NOTAM action being taken for the Sea Fury display, other ac may well be encountered in the area. However, the event co-ordinator had issued specific written instructions, confirmed by telephone on the day, that the helicopter pleasure flights would be stopped 15 min before the Sea Fury's display, and would only recommence once the display was over. It would appear that these instructions, for whatever reason, were not complied with. It is considered that the risk of collision was high.

FOI (H) comments that Article 70 of the ANO 2000 states the regulations pertaining to display flying and the licensing of relevant authorities, and also states the relationship between military and civil displays. Article 70(8)(b) makes it clear that a civil display authorisation is not required at displays where the only ac displaying are military, which places the burden of responsibility with the military.

There was no military display director notified for this event; once information regarding the display had been passed from the event organisers to the pilot of the Sea Fury, there was no further military control over the display or the event other than the flying of the ac.

The event organisers had no experience in aviation and had contracted a company to provide a helicopter for pleasure flights. Whilst it would have been prudent for either the organisers or the company to provide a notified point of contact for co-ordination of the ac, this was not required by law. The event organisers were, understandably, ignorant of aviation matters.

The helicopter pilot displayed poor airmanship by deliberately being airborne near the display line, within only 3 min of the anticipated arrival of the Sea Fury, despite the posting of ground staff for early warning. Whilst 3 min separation might be sufficient in an organised display with air traffic co-ordination, it was too short a time interval considering that there had been no verbal contact and not even a time check, between the two pilots.

There was no co-ordinating frequency, manned or otherwise, allocated for separation, neither did the pilots of the ac involved liaise directly with each other. There appears to have been some attempt at co-ordination by the company but this was ineffective until after the Airprox had taken place.

The FOI (H) Inspector recommended that:

a. A clear single point of contact, with relevant aviation experience, should be mandated for all displays where there is more than one ac flying (whether part of the flying display or not) at non-military locations, whether the ac are civil, military or mixed.

b. A VHF frequency should be allocated for deconfliction at such events, and it should be strongly recommended that ac flying at the event are able to, and do, use this, whether controlled or not.

c. Should there be no means of communication between potential conflicts at such events, it should be recommended that pilots of non display ac be on the ground at least 5 min before the scheduled start of a display.

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.

The COMNA member briefed the Board that prior to the display, both the Sea Fury pilot and RN Historic Flight (RNHF) had done all that they thought necessary at the time to co-ordinate the Sea Fury's short display within the Whitehaven Festival – an event which it would appear attracted more than 10,000 spectators. The Sea Fury pilot had no reason to doubt the brief he had been given by the event organiser that the pleasure flight B206 helicopter would be safely on the ground before he ran in for his display and arrangements had seemed satisfactory. The helicopter pilot reported he had taken off at 1055 intending to be on the ground at 1058. Though the Board could not determine the exact time the Sea Fury pilot commenced his display with absolute certainty, it was thought unlikely that this very experienced display pilot would have started his display other than 'on time'. This would mean running-in just before the 'start time'. The COMNA member thought that the time buffer afforded by the B206 operator far too short as highlighted in the comments by FOI (H) - a point that engendered strong support amongst the members. Nevertheless, the Board thought that 5 min was still too short an interval and 10 min was the minimum preferable. It was also clear that there was no form of control or radio communication to forestall potential problems such as occurred here. Whereas, the organisers of the event professed that appropriate time buffers had been built into their briefed programme - 10 min originally it would appear, which was subsequently increased to 15 min after the Airprox - there was no documentary information to support that the helicopter pilot had been made aware of this. The Board had no reason to doubt the organiser's word but it would appear that, for whatever reason, neither the B206 pilot nor his ground organisation had complied or had been able to comply with the organiser's plan. It was recognised that the NOTAM did not imply exclusive use of the airspace by the Sea Fury pilot – more a warning to other airspace users of the high energy manoeuvres and activity that would take place within it. That the B206 pilot was aware of the imminent Sea Fury display when he took-off at about 1055 with 4 fare paying passengers, led members to question the helicopter pilot's airmanship. Moreover, when he was informed that the Sea Fury was running in for his display, rather than clearing the area until it was complete, the helicopter pilot continued into the display area, albeit that his ground crew had kept him appraised of what the Sea Fury was doing. In contrast the Board felt that the Sea Fury pilot had acted correctly when he detected the presence of the helicopter and climbed out of the area in good time to a safe height. Although a civil helicopter pilot member believed that the regulatory authorities kept a very tight rein on helicopter pleasure flying, he and other members thought that in this instance commercial imperatives had been allowed to override flight safety. The Board considered the points made by FOI (H) and agreed that the recommendations were well founded. Members were in no doubt that the helicopter operators had cut it much too tight and should not have launched the B206 so close to the Sea Fury's planned display start time. Their actions, some added, showed scant regard for the safety of their fare-paying passengers. The Board agreed unanimously that this Airprox resulted because the B206 JetRanger pilot knowingly flew into the NOTAM'd display area as the Sea Fury pilot began his display.

However, it was also clear to the members that the Sea Fury pilot had spotted the helicopter in sufficient time to take robust avoiding action. This, coupled with the B206 pilot's early sighting as a result of his ground-crew's warning enabled him to turn inland away from the display ac, which led the Board to conclude that no risk of a collision had existed.

Considerable discussion ensued about the organisation of air displays in general and arrangements for co-ordination and deconfliction between participants. From the civil perspective, if all the flying participants involved are military, then the FOI (H) report made it clear that the CAA does not involve itself in the establishment of an appropriate organisation and no 'permission' is required of the CAA for the display organisation under Article 70 of the ANO 2000 - as here. Similarly if the display took place at a MOD aerodrome the CAA have no responsibility for the event. Consequently, there was no apparent oversight of the co-ordinating arrangements at Whitehaven. With no civil participation – the B206 flights were not a display within the meaning of the definition – it was argued that the responsibility lay with the military participants for effecting all co-ordination for the various elements of this display and any other activity such as the pleasure flights. Article 70 of the ANO appeared unambiguous and laid responsibility for the supervision of military ac only displays with the MOD. Here COMNA believed that the pilot and RNHF had fulfilled their responsibilities as best they could and it seemed to the Board that the organisers of the Whitehaven event had done all that could reasonably have been expected of them. The IFS adviser explained that the organisation of events such as these, where RAF ac participate, were checked but not all shows could be covered during the busy display season. It was mentioned that HQ STC also had a responsibility for the participation of RAF ac at flying displays, but some military members believed that, for purely civilian events such as Whitehaven, scarce military resources might not always be available to carry out the detailed scrutiny, co-ordination and deconfliction necessary at the large number of events that occur during the year. The STC member quoted the BBMF who participate in many of the smaller civilian events, often covering several shows in one day; BBMF captain's could exercise discretion to terminate their display immediately if arrangements were in any way unsatisfactory. The Board was unable to ascertain whether any pro-active co-ordination had been effected by other military participants and it was clear from the discussion that there were some widely held misunderstandings about this complex issue. Some contended that if civil event organisers wanted military ac to participate at their events, the burden of responsibility for organisation and air safety co-ordination should fall to them, overseen by the CAA who have the necessary legislation behind them. Furthermore, some thought it would be difficult for the military to impose conditions, which could not be backed up without a CAA permission. It was evident from all of this that misgivings on policy for the co-ordination of those flying displays limited to military participation, but at civil venues, warranted further review before the start of the 2002 Air Display season. Members agreed with the recommendations made by FOI (H) but it was unclear if these sensible measures were being pursued. FOI (H) Recommendation b, might not be feasible, given the dearth of VHF frequencies, and pilots wondered who would operate it and whether blind broadcasts were sufficient. Moreover, the Board agreed that an interval of 10 min would be more appropriate than the 5 min specified at FOI (H) Recommendation c. Whilst endorsing the FOI (H) recommendations within the foregoing caveats, the Board went on to recommended that policy on the co-ordination of civilian events, where only military ac have been invited to participate in flying displays, should be jointly reviewed by the MOD and CAA, to ensure a consensus between all three services and the civilian regulatory authority.

PART C: ASSESSMENT OF CAUSE AND RISK

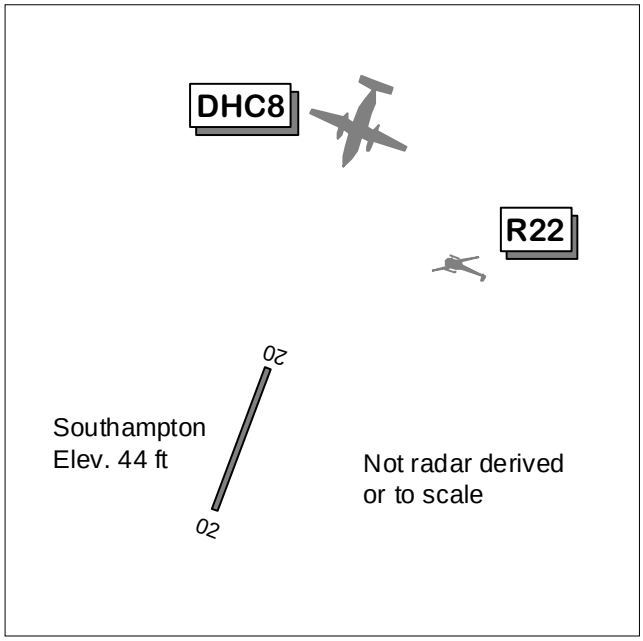
Cause: The B206 JetRanger pilot knowingly flew into the NOTAM'd display area as the Sea Fury pilot began his display.

Degree of Risk: 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.

AIRPROX REPORT No 101/01

Date/Time:	25 Jun 1819	
Position:	5058 N 0120 W (1.5 NM N of Southampton - elev. 44 ft)	
Airspace:	ATZ/CTZ	(*Class:* D)
	Reporting Aircraft	*Reported Aircraft*
Type:	DHC-8	R22
Operator:	CAT	Civ Pte
Alt/FL:	700 ft ↓ (QNH 1019 mb)	500 ft (QFE NK mb)
Weather	VMC CAVOK	VMC CBLC
Visibility:	NK	25 NM
Reported Separation:	0 V 0·5 NM H	100 ft V 3-400 m H
Recorded Separation:	not recorded	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DHC-8 PILOT reports flying inbound to Southampton at 140 kt with ATC clearance to join R base for a visual approach to RW 20. He reported at 5 DME on R base and was instructed to continue approach owing to traffic backtracking the RW for departure. When established on final approach at 700 ft QNH 1019 mb, he thought, ATC cleared him to land but were then heard to say *"R22 c/s, make an immediate right turn you were not cleared to final, only to orbit"*. He looked to his L and saw a helicopter in his 10 o'clock at a range of 0·5 NM at about the same level heading towards him; he immediately turned R and executed a missed approach into a RH visual circuit. The helicopter passed 0·5 NM clear on his LHS and he assessed the risk of collision as high. Even though the crew were busy during the final approach phase of the flight, they were sure that TCAS had not given any alerts.

UKAB Note (1): Met Office archive data shows the Southampton METAR EGHI 1750UTC 13005KT 090V170 CAVOK 25/14 Q1020.

THE R22 PILOT reports flying solo on a diversion into Southampton having planned to route from a private site near Guildford to Sandown IOW. The visibility was 25 NM well below cloud in VMC and the helicopter was coloured dark/light blue with the anti-collision light switched on. He had routed towards Bishops Waltham VRP whilst in contact with Southampton Approach on 120.22 MHz and had suffered a 20-30 seconds loss of RT communications with ATC as he approached the CTA boundary; he thought the problem lay with ATC. When the RT was re-instated, the frequency became very busy with 3 or 4 other ac trying to establish contact which resulted in him having to orbit E of the VRP whilst attempting to obtain ATC entry clearance. Once this was achieved, he was transferred to Southampton Tower who told him to join L base for RW 20. He thought that this clearance was unusual as small helicopters are not normally cleared to approach large airfields via a circuit position owing to their slow airspeed. What he had expected was a low level approach to the aerodrome boundary to cross the active RW at 90° and he thought the ADC may have missed the fact that he was a helicopter owing to the busy RT. He reported on L base but did not receive a reply. As he approached the RW 20 C/L, heading 300° into low sunlight at 500 ft QFE and 60 kt, he noticed a small high winged airliner ahead on final approach in his 1 o'clock range 300-400 m and approx. 100 ft above. He immediately entered a R turn and he noticed the other ac then made a slight R banked turn and commence a missed approach. ATC then told him to orbit to the E of the airfield followed by a descent towards the E boundary to make an

approach. As he had already commenced a R turn when the conflicting ac saw him, he believed there had been no risk of collision.

ATSI reports that the ADC Controller at Southampton is responsible for providing both Air and Ground Movement Control (GMC) as there is no dedicated GMC position. He described his workload as moderate at the time of the incident and the weather conditions were reported as CAVOK.

The Robinson R22 helicopter, inbound to Southampton from a private site at Guildford, established contact with Solent Approach at 1806 and was told to stand by. Subsequently, not able to raise ATC because of RT problems at the airport, the pilot orbited outside the Southampton CTR at Bishops Waltham, a Visual Reference Point (VRP) situated on the CTR boundary at SAM VOR 095°/ 5 NM. Two way communication was re-established at 1812, when the R22 was cleared to enter the CTR VFR, via Bishops Waltham, not above 1500 ft. The helicopter was transferred to the ADC frequency at 1814. Meanwhile, the DHC-8 had contacted the Solent Approach frequency, when S of the Needles, and was being radar vectored RH downwind for RW 20, the promulgated RW in use.

The ADC confirmed that he was aware of the R22's details before it contacted him at 1814. The pilot reported NE of Bishops Waltham at 900 ft and a clearance was passed again to enter the CTR, VFR, not above an altitude of 1500 ft. The controller said that he could see a secondary return (7000) on the ATM, in the appropriate area, which he associated with this traffic. Approx. one minute later, he called the R22 pilot transmitting: *"....position yourself on to a left base for runway two zero report left base QFE is one zero one nine"*. The pilot replied *"set up for left base on two zero"* and queried the QFE. No mention was made about the instruction to *report* on base leg. (NB. It is not a requirement for ATC to ensure that such items are read back by a pilot.) The radar recording at 1816:00 shows a 7000 squawk, believed to be the R22, 7 NM E of Southampton Airport. The DHC-8 is passing approx. 4·5 NM W of the airport, on a downwind heading, at 1900 ft.

The ADC Controller stated, at interview, that he considered, from their relative positions, that the R22 would probably be number two to the DHC-8. However, he did not inform the pilot of the R22 of his number in traffic, or pass information about the DHC-8, at the time, as he was busy dealing with the traffic situation on the apron. He considered that he would probably gain a visual sighting of the R22 as it routed from the VRP towards base leg but, as a back-up, if that was not achieved, a base leg report would then allow him to issue the pilot with the appropriate instructions/information to facilitate its positioning into the circuit. This would have fulfilled the ADC Controller's responsibilities, as stated in the MATS Part 1, Page 2-1: "Aerodrome control is responsible for issuing information and instructions to ac under its control to achieve a safe, orderly and expeditious flow of air traffic and to assist pilots in preventing collisions between ac flying in, and in the vicinity of, the aerodrome traffic zone."

The radar recording taken from the LATCC Pease Pottage Radar i.e. the same SSR source as that utilised by Southampton ATC, reveals that the 7000 squawk disappeared from SSR radar coverage at 1817:22, when it was 4 NM E of the airport, at the same time as the DHC-8 was turning onto R base 5 NM to the NNW. The ADC commented that he would not expect the SSR return of an ac at 900 ft (the last reported altitude of the helicopter) to be displayed inside a range of 4 NM from the airport. Additionally, it would only show as a primary return when it was within about two miles. This, he reiterated, was why he was relying on a visual sighting of, or a base leg report from, the R22.

The DHC-8 had been cleared by Solent Radar, following co-ordination with the ADC, for a visual approach to RW 20 but with the proviso that it extend the downwind leg because of a Jetstream ac backtracking the RW, prior to departure. Consequently, when the pilot reported turning R base at 5 NM, he was instructed to continue his approach because of the backtracking ac. Once this flight had taken off, the DHC-8 was cleared to land. The controller had been looking for the R22, although not continuously as it had been necessary for him to turn his attention to the traffic situation elsewhere on the airport, but had not sighted the helicopter. He could not explain why he had not seen it as he would have expected even a small helicopter, like an R22, to have been visible. He thought that, possibly, when the DHC-8 had reported on final approach and he had scanned the area for a visual sighting of the R22, it may

have been hidden behind one of the pillars of the VCR.

The controller said that he first sighted the R22 when it was on base leg, approaching the final approach track. He added that, from his perspective, he could not estimate the distance between the subject ac. He instructed the R22 pilot to take up an immediate RH orbit and warned him of traffic on final ahead. The R22 pilot reported the other ac in sight and was told to remain in the orbit until advised. The controller said that he could now see a primary return, on the ATM, which indicated that the helicopter was in a RH orbit. Subsequently the R22 pilot reported that, on sighting the ac on final, he had commenced a R turn before ATC passed the instruction to orbit. The controller stated that he believed that the action he had taken had resolved the potential confliction between the subject ac and, for that reason, he had not considered it necessary to pass TI to the pilot of the DHC-8. When the DHC-8 reported going around shortly afterwards, he did not immediately comprehend that the reason was to avoid the helicopter. The DHC-8's pilot reported, later, that he had seen the helicopter when it was in his 10 o'clock position, about 0·5 NM away, heading straight for his ac and he had carried out a go around. The DHC-8 was cleared into a RH visual circuit and its pilot requested that the helicopter was routed further to the E. The R22 was instructed to widen its orbit to remain at least two miles to the E of the final approach track before being instructed to route S to the airport boundary and, subsequently, to cross at the RW mid-point, after the DHC-8 had landed.

When asked about the joining instructions given to the helicopter the ADC confirmed that he was aware of the R22's type and added that it was standard operating practice, at Southampton, to issue joining instructions to all traffic, including small helicopters, as if they were fixed wing, although this is not stated in the MATS Part 2. Subsequently, the SATCO advised that this procedure had been requested by the Airport Authority, mainly to minimise noise, but, as a result of this Airprox, ATC were now considering reviewing it. (NB. A direct routeing for small helicopters would also mean that the provision of appropriate vortex wake spacing would not be an issue, as they would only be crossing behind arriving traffic once it had landed and vortices were no longer being generated. On this occasion, because a DHC-8 is categorised as 'small', compared to an R22 as 'light', the required spacing on approach would have been 4 NM.)

Further enquiry by the UKAB, confirmed that the pilot of the R22 had received the request to report on base leg. He added that he had made the appropriate call but did not receive an acknowledgement. The RT recording reveals that simultaneous transmissions were received at about 1817, the time the R22 could have been reporting base leg.

UKAB Note (2): The Airprox occurred below recorded primary and secondary radar cover.

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 Southampton ADC had planned to integrate the R22 into the ATZ and cct pattern by relying on the pilot's base leg report or visually acquiring the helicopter from the VCR. He had cleared the R22 to join on base leg but the pilot's subsequent RT call announcing his arrival appeared to have been lost during simultaneous transmissions. However, pilot members thought the R22 pilot should not have ignored the lack of response from the ADC, to his base leg report and he should have repeated the position report. In the event, he had continued to fly towards final approach without being in receipt of either TI on the DHC8, or his number/position in traffic. Members acknowledged the ADC had attempted to acquire the R22 visually with the subsequent intention of issuing his number in the traffic pattern. Nevertheless, if ATC had issued either TI or his number in traffic, the R22 pilot would have been made aware of the conflicting ac and been able to integrate himself more appropriately into the cct. Compounded by the lack of TI to the DHC8 crew on the R22, the situation ended up with late sightings by both crews. The only person who had the full picture had been the ADC and the Board were unanimous in agreeing that he had allowed the R22 to fly into conflict with the DHC8 on final approach. Members were fully aware of the

difficulties of seeing this type of small helicopter and re-emphasised the benefits of enhanced conspicuity in the cct by selecting strobe and/or landing lights on.

In assessing the risk, although members perceived late sightings by both crews, the R22, flying at 60 kt, had seen the DHC8 in his 1 o'clock on final approach and had commenced a R turn to avoid it; this had been prior to ATC instructing him also to turn R. The DHC8 pilot noticed the helicopter after hearing the ATC transmission to the R22 pilot and, owing to the surprise element of seeing unexpected traffic late, had commenced a go around, which was entirely reasonable in the circumstances. Unknown to the DHC8 crew, however, the R22 pilot had seen the DHC8 in sufficient time to start manoeuvring away from it sufficient to deconflict their respective flightpaths. These actions were enough to persuade the Board that any risk of collision had been removed.

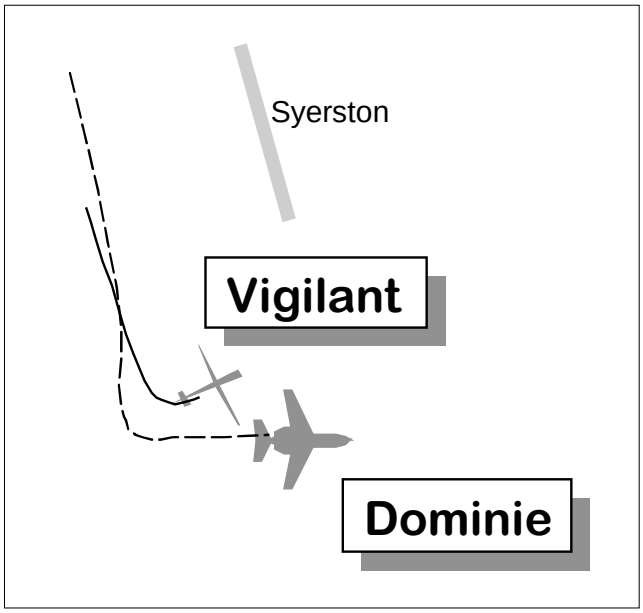
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Southampton ADC allowed the R22 to fly into conflict with the DHC8 on final approach.

Degree of Risk: C

AIRPROX REPORT No 102/01

Date/Time:	26 Jun 1040	
Position:	5300 N 0055 W (Syerston - elev 228 ft)	
Airspace:	ATZ	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	Vigilant	Dominie
Operator:	HQ PTC	HQ PTC
Alt/FL:	1400 ft ↓ (QFE 1012 mb)	1500 ft (QFE 1009 mb)
Weather Visibility:	VMC HZNC 15 km+	VMC HZBC 6 km
Reported Separation:	500 m H, 100 ft V /1 NM, 4-500 ft V	
Recorded Separation:		NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VIGILANT PILOT reports entering the Syerston ATZ from the NW to parallel RW 16 to the W of it at 60 kt. About 1 NM S of the airfield he started a left descending turn to join downwind for RW 16 RH. Shortly after starting the turn, passing 1400 ft, he saw a Dominie in his 9 o'clock heading S through the ATZ at about 1500 ft. It performed a gentle S turn to avoid his glider and passed about 500 m away and 100 ft above. He continued his descending turn away from it and considered the risk of collision would have been high if he had not been descending as it was closing from behind him.

THE DOMINIE PILOT reports heading 180° at 200 kt following radar vectors to a PAR at Cranwell. It was a hazy day and, flying into sun, the front crew were concentrating hard on lookout. Shortly after being instructed to turn left onto 090° he was advised of 2 contacts 4 NM to the E manoeuvring and saw 2 motor-gliders in his 11-1130 at 1 - 1·5 NM. To maintain a good separation he turned back

onto 180° until past them before turning left onto 090°. He did not consider there had been a risk of collision.

UKAB Note: LATCC radar recordings show the ac tracking as described by their pilots until the Vigilant, squawking 7000 NMC, disappears from radar coverage in its left turn to the SW of the airfield. The Dominie turns right temporarily before turning left onto E; the track of this turn is somewhat outside the track of the Vigilant's turn and is at 1700 ft Mode C throughout.

MIL ATC OPS reports that the Dominie pilot, established communications with Cranwell Director (DIR), whilst returning to Cranwell from the N for a PAR approach. Whilst the weather was good, the Dominie was one of a number of ac, all receiving a RIS, on instrument approaches to RW 09 at Cranwell. Added to this were a large number of unknown ac squawking 7000 in the area and therefore the controller's workload was high. At 1037:36, having been descended to 2500 ft QFE (1009 mb) the Dominie was vectored onto a southerly heading as No 2, on a 15 NM L base leg, with the No 1 ac on a northerly heading to intercept the centreline at about 9 NM. At 1038:11, DIR transmitted to the Dominie pilot *"...traffic south, three miles manoeuvring, no height"* to which the pilot replied *"Looking C/S, ...levelling two thousand five hundred feet."* At 1038:37, when the Dominie was just to the N of the extended centreline, the pilot was recleared to 1500 ft and advised to conduct his cockpit checks when level. At 1039:06, having just transferred the ac ahead to talkdown, DIR turned the Dominie L 090º and passed traffic information on two radar contacts manoeuvring about 4 NM to the E. At 1039:49, whilst DIR had been transmitting to another ac, the Dominie pilot transmitted *"C/S just turning right to avoid some gliding"* following which, DIR added *"...there has been reports of multiple motor gliders in the area"* and the pilot responded *"C/S is visual with two, just turning behind".* DIR continued vectoring the ac for the PAR, during which traffic information on a number of other contacts was passed, and transferred it to the talkdown controller at 9.5 NM from touchdown.

The LATCC Claxby radar recording shows that at 1038:38, when DIR descended the Dominie to 1500 ft, the ac is about 1·75 NM N of Syerston, with the contact assumed to be the Vigilant 10ºL of its track at a range of 2·5 NM. The Dominie starts its L turn at 1039:26, indicating 1700 ft Mode C (equivalent to 1580 ft CWL QFE, 1670 ft Syerston QFE), with the other contact 1 NM to the SE. At 1039:50, the Dominie reverses its turn to the R and overflies the last observed position of the other contact at 1040:06 at an indicated 1700 ft Mode C; a second is seen about 1 NM ESE of the Dominie, tracking SE. The Dominie reverses to a L turn at 1040:20, still indicating 1700 ft Mode C, before resuming its allotted heading of 090º.

The incident occurred during what had been a very busy controlling session for DIR, albeit in good weather conditions, and the controller was making a positive effort to keep ahead of the game, hence the apparent 'rush' to descend the Dominie at about 15 NM. 1500 ft QFE is the 'pattern height' for PARs to RWY 09 and so, once the spacing from the ac ahead had been achieved, there seemed to be little point in delaying the descent until closer (with the possibility that the descent may be forgotten whilst dealing with another ac). In giving the descent instruction so early however, DIR overlooked Syerston's presence and the recorded information clearly indicates that the Dominie was vectored into the Syerston ATZ. The Supervisor was well aware of how hard DIR was working and had previously advised her to limit radar services, due to the traffic density. During this period, however, the Supervisor had been distracted whilst dealing with problems involving mains radio servicing and so he did not notice the Dominie's early descent. In mitigation, although Syerston was indicated on DIR's radar video map, the ATZ boundary was not shown, and the map symbol itself was obscured by SSR labelling. As a result of this Airprox, the horizontal dimensions of the Syerston ATZ are now permanently displayed on the radar video map and a review of other local airspace restrictions, to assess the requirement for their inclusion on the map, has also been undertaken.

HQ PTC comments that they are entirely sympathetic to the situation in which Cranwell DIR found herself: too much traffic – both speaking and background – and not enough clear airspace. The temptation to gain time by an early descent was clear, but misguided. However, Cranwell ATC has taken what measures it can to discourage a repetition by reviewing their videomaps and adjusting their guidance to controllers.

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.

The Board agreed the primary cause of the incident was that DIR had cleared the Dominie to descend and had vectored it through the Syerston ATZ. However, members agreed that under any ATS, the Dominie pilot was not bound to accept a vector that was unsafe or likely to lead to a breach of regulations, and the crew would have been perfectly capable of avoiding the ATZ; that they did not do so was also considered to be part of the cause.

Members also observed that Syerston is authorised to winch launch gliders to 3000 ft (3224 ft amsl) and that both aircrew and ATC at Cranwell should bear this in mind when choosing a height to overfly this ATZ.

The Board assessed that both pilots had the other ac in view for long enough to ensure there was no risk of them actually colliding.

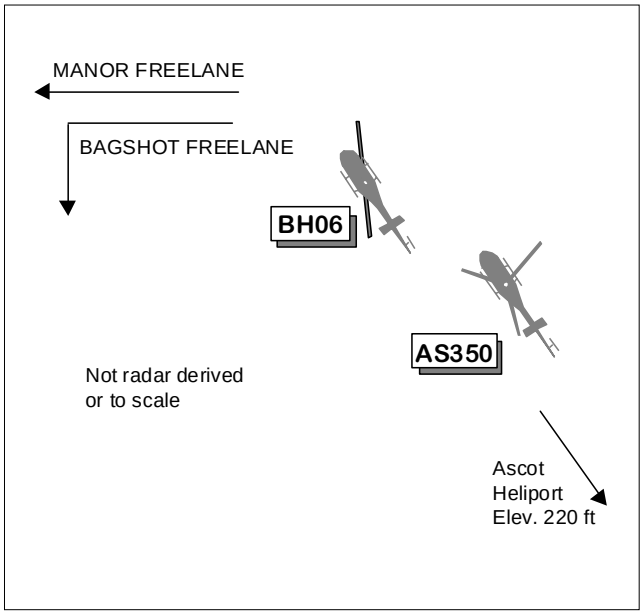
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: DIR vectored the Dominie through the Syerston ATZ and the Dominie pilot did not challenge the clearance.

Degree of Risk: C

AIRPROX REPORT No 103/01

Date/Time:	21 Jun 1653	
Position:	5126 N 0040 W (0·5 NM NW of Ascot Heliport - elev. 220 ft)	
Airspace:	ATZ	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	BH06	AS350
Operator:	Civ Comm	Civ Pte
Alt/FL:	500 ft ↑ (QNH 1016 mb)	dep↑ (QNH NK mb)
Weather Visibility:	VMC CAVOK >10 km	VMC CAVOK NK
Reported Separation:	0 V 65 ft H	0 V 150 m H
Recorded Separation:		not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BH06 PILOT reports awaiting departure from Ascot parking Gate 2 to route to Biggin Hill via the Bagshot Freelane. The visibility was >10 km with sky clear in VMC and the helicopter was coloured silver/blue with the anti-collision light switched on. He called Ascot TOWER ready for take-off and was instructed to lift towards RW 33, giving way to an arriving helicopter on the approach, and then was cleared for take-off. He lifted into a hover after the arriving helicopter taxied past, lined up and then departed. The take-off was normal until passing 250-300 ft agl (500 ft QNH) when he suddenly became aware of another helicopter, he thought an AS355 Twin Squirrel which was dark in colour, overtaking him at speed, very close on his RHS at

the same level; he estimated the horizontal distance as about 2 rotor discs, 60-70 ft. Once the other helicopter was ahead, it then turned L to cross in front of him at a distance estimated as 4 helicopter lengths (150 ft) before it continued on a W track along the Manor Freelane. His immediate reaction had been to maintain his heading and climb attitude, as he had been totally unaware of the other helicopter's intentions to carry out this manoeuvre in such an early phase of flight. He assessed the risk of collision as high. After returning from Biggin Hill to pick up some more passengers, he tried to contact Ascot OPS, via RT, to report the incident but was unsuccessful. He changed back to Ascot TOWER but, owing to the frequency being busy, was again unable to report it and he departed for Biggin Hill. Subsequently, he reported the incident to the aerodrome operator the next day.

THE AS350 PILOT reports (3 weeks after the incident) departing Ascot RW 33 en route to a private site near Stratford. The weather was CAVOK and the helicopter was coloured dark green with anti-collision and strobe lights on. He had been given take-off clearance from the parking area and he was following a BH06 which was about 0·5 NM ahead as he commenced his take-off run. As he started his initial climb, he noticed that the BH06 was slower in forward speed and ROC than his helicopter, so by altering course 30-40° to the R, onto a N heading, he put himself onto a diverging relative track. He then climbed and accelerated to overtake the BH06, on its starboard side by 150-200 m, keeping it in sight throughout. He felt that he maintained more than adequate separation both horizontally and vertically and had not felt uncomfortable with the separation or manoeuvre. The BH06 did not alter its course nor was any RT transmission heard from its pilot relating to the incident.

UKAB Note (1): A further 1094 report was received from a pilot flying another BH06 departing Ascot RW 33 as No 3 in line behind the subject ac. Following about 200 m behind the AS350, the pilot said he watched the AS350 deviate to the R in the climb and overtake the subject BH06, at the same level, displaced by about 100 ft.

ATSI comments that this incident occurred within the temporary Ascot Heliport ATZ (1·5 NM radius, vertical limit 1000 ft agl). Free flow procedures were in force at the time. The ADC cleared the BH06 for take-off first, followed by clearance to the AS350 to depart behind it. The controller reported that he did not notice the subsequent alleged event. There were no apparent ATC causal factors.

UKAB Note (2): The Airprox occurred outside recorded radar coverage. However, both helicopters appear on radar, post incident, W of the Ascot ATZ, the AS350 departing via the Manor Freelane and the BH06 via the Bagshot Freelane.

UKAB Note (3): RT transcript at 1652:30 shows ASCOT ADC transmitting *"BH06 c/s, lift and go three three"* followed shortly by *"AS350 c/s, following the Jet Ranger that's er just turning round for a three three departure lift and go behind it"*.

UKAB Note (4): Supplement to the AIP S12/2001 ROYAL ASCOT TEMPORARY HELICOPTER ARRANGEMENTS para 3.8 states 'Pilots using the freelanes should note that no ATC separation will be provided within the freelanes'.

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.

Although not considered a contributory factor in this incident, the non-standard RT used by the Ascot TOWER controller during the incident attracted adverse comment from several members. A helicopter member, who had flown into similar special events, remarked that traffic levels could be high and the RT correspondingly busy, especially during peak times. Briefings were normally held prior to the event, to ensure that operational procedures to be used were communicated to all parties. The aim was to reduce the amount/content of RT used and probably explained the brevity shown from the transcript during the incident. Although this Airprox occurred within the temporary Ascot ATZ (Class G airspace), the ATCO had informed the AS350 pilot of the departing BH06 ahead so the onus was on the AS350 Squirrel pilot to avoid.

Members were clear that the incident had been an overtaking manoeuvre by the AS350 of the BH06 early in the initial climb out phase from Ascot. Clarification of Rule 17 was sought from the Rules of the Air Regulations 1996 contained within the Air Navigation Order 2000 which states:

> *Rules for avoiding aerial collisions*
> *General –Notwithstanding that the flight is being made with air traffic control clearance it shall remain the duty of the commander of an aircraft to take all possible measures to ensure that his aircraft does not collide with any other aircraft.*
> *An aircraft shall not be flown in such proximity to other aircraft as to create a danger of collision.*
> *An aircraft which is obliged by these Rules to give way to another aircraft shall avoid passing over or under the other aircraft, or crossing ahead of it, unless passing well clear of it.*
> *Overtaking – An aircraft which is being overtaken in the air shall have the right-of-way and the overtaking aircraft, whether climbing, descending or in horizontal flight, shall keep out of the way of the other aircraft by altering course to the right, and shall not cease to keep out of the way of the other aircraft until that other aircraft has been passed and is clear, notwithstanding any change in the relative positions of the two aircraft.*

Members noted the concern expressed by the BH06 Jet Ranger pilot, who said the Squirrel had overtaken him on his RHS in close proximity; a manoeuvre which he had no warning of. His estimate was that it had passed within 60-70 ft and then crossed ahead, R to L, by 150 ft. This was corroborated by another pilot behind him, who had witnessed the incident and judged that the two subject helicopters had been displaced by 100 ft horizontally. Helicopter members were critical of the AS350 pilot's airmanship in carrying out such a manoeuvre and questioned his judgement of what might be assessed as a safe displacement distance from the BH06. Pilot members agreed that an RT call would have been appropriate from the Squirrel pilot to warn the Jet Ranger pilot of his impending overtake on the RHS. There was also doubt whether the AS350 pilot would have been able to keep the Jet Ranger in sight throughout when he had banked L to cross ahead towards the Manor Freelane; some wondered if at some stage he would have lost sight of the Jet Ranger as he turned L. On these factors, members agreed that the AS350 pilot had flown close enough to cause the Jet Ranger pilot concern for the safety of his ac. Furthermore, carrying out this close manoeuvre without warning when the intentions of the other helicopter were not known led the Board to conclude that safety had not been assured.

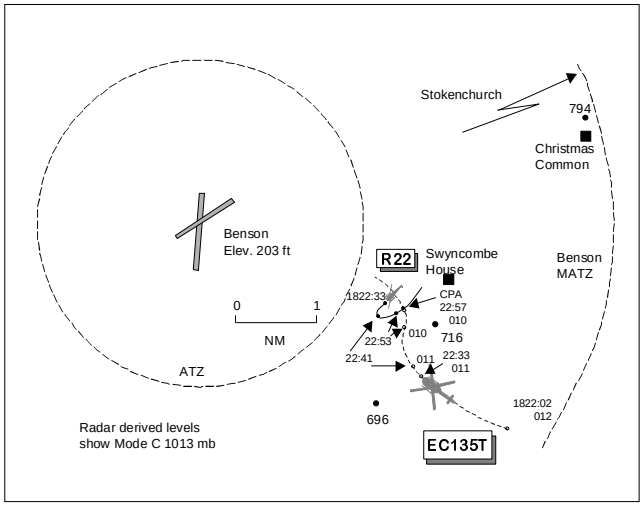
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The AS350 pilot flew close enough to cause the Jet Ranger pilot concern for the safety of his ac.

Degree of Risk: B

AIRPROX REPORT No 104/01

Date/Time:	28 Jun 1823	
Position:	5136 N 0102 W (2.5 NM ESE of Benson – elev. 203 ft)	
Airspace:	FIR/MATZ	(*Class:* G)
	Reporting Aircraft	*Reported Aircraft*
Type:	EC135T	R22
Operator:	Civ Comm	Civ Trg
Alt/FL:	1100 ft (QNH 1017 mb)	(QNH)
Weather	VMC CLNC	VMC NK
Visibility:	>20 km	>10 km
Reported Separation:	33 ft V 30 m H	not seen
Recorded Separation:		0 H NK V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EC135T PILOT reports flying on a local sortie from Benson, who were closed, but he was making blind transmissions on their published frequencies 120·9 and 127·15 MHz. The visibility was >20 km with no cloud in VMC and his helicopter was coloured blue/yellow with HISLs switched on. On recovery to Benson at 110 kt and 1100 ft QNH 1017 mb, he executed a R turn onto N near Swyncombe House to allow his passengers to observe a ground feature. As he commenced a L turn to point towards Benson once more, a white R22 appeared 40 m ahead, just L of the nose and slightly above tracking about 020°. He tightened his L turn and began a descent; the R22 passed 30 m clear on his RHS and 10 m (33 ft) above. He thought the R22 pilot had not seen him and he assessed the risk of collision as high. No other radio traffic had been heard during the period on either the Zone frequency (120·9 MHz) or Tower frequency (127·15 MHz) from 2 NM SE of the MATZ boundary until landing. TCAS equipment was fitted to the helicopter but no warnings or alerts were received.

THE R22 PILOT reports flying on a dual training sortie from Wycombe Air Park using various confined areas around Stokenchurch/Christmas Common to carry out practice approaches. The visibility was >10 km in VMC and the helicopter was coloured white overall, navigation and anti-collision lights were switched on. He was maintaining a listening watch on the Benson Zone frequency 120·9 MHz, who were not active, and did not hear any traffic reports or see any conflicting ac in the area. The helicopter was fitted with a transponder selected to 7000 with no Mode C.

AIS MIL reports that the R22 was airborne from Wycombe between 1745 and 1845 UTC; the primary only response seen during the Airprox continues on a generally E track and disappears overhead Wycombe at 1829 UTC.

UKAB Note: Analysis of the Heathrow radar recording at 1822:02 shows only the EC135T 4·5 NM SE of Benson tracking 300° indicating FL 012 (altitude 1300 ft Benson QNH 1017 mb). At 1822:33 the EC135T, now at FL 011 (1200 ft QNH), has a pop up primary only return, believed to be the R22, in his 1 o'clock range 1·1 NM tracking SSW. 8 seconds later, the R22 is seen turning L through about 150° having executed a L turn with the EC135T 0·7 NM to its SE in a R turn passing 330°. At 1822:53 the EC135T is steady tracking N, now at FL 010 (1100 ft QNH) with the R22 in his 11 o'clock range 0·2 NM now tracking 045°. CPA occurs 4 seconds later (1422:57) as the radar returns merge, with no discernible horizontal displacement. The EC135T emerges in a L turn steadying on a NW track towards Benson whilst the R22 continues to diverge on a NE track.

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 surprised that both pilots had reported either making blind transmissions and/or listening out on the published Benson frequencies but neither had heard each other. That aside, the Board were clear that this incident had been a close encounter in Class G airspace. Looking at the geometry involved, the EC135T pilot had manoeuvred his helicopter to allow his passengers to observe a ground feature and had probably been momentarily distracted from keeping up his look-out scan for traffic. As he commenced his L turn back onto track he saw the R22 very late and very close. The recorded radar had shown the R22 to the NW of the EC135T for about 25 seconds immediately prior to the incident during which time the Robinson had turned L from a SW track onto a NE track putting it into confliction with the EC135T approaching from the SE. Unfortunately the R22 pilot saw nothing during his change of direction. The EC135T pilot was already in a L turn when he saw the R22 ahead, just L of the nose and slightly above. By rolling his ac further L, tightening the turn and descending all in rapid succession he was successful in altering his ac's flight path to avoid an actual collision. However, as the R22 pilot had not seen the EC135T at all, combined with the very late sighting by the EC135T pilot, the Board concluded that the safety of the ac had been compromised.

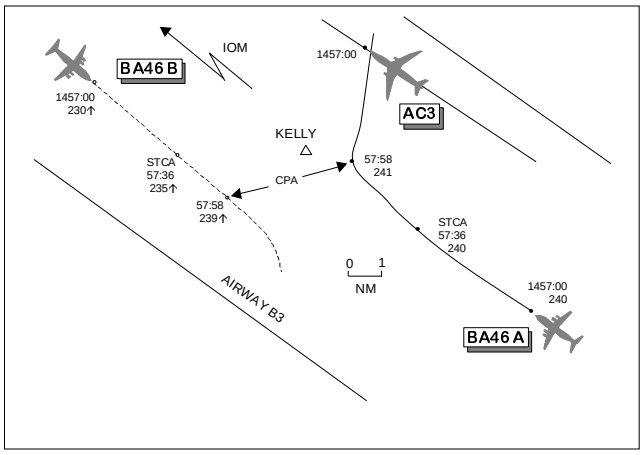
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the EC135T pilot and a non sighting by the R22 pilot.

Degree of Risk: B

AIRPROX REPORT No 108/01

Date/Time:	26 Jun 1458	
Position:	5354 N 0422 W (17 NM SE IOM)	
Airspace:	CTA/AIRWAY B3 (*Class:* A)	
	Reporting Aircraft	*Reported Aircraft*
Type:	BA46 (A)	BA46 (B)
Operator:	CAT	CAT
Alt/FL:	FL 240	↑FL 250
Weather Visibility:	IMC KLWD	NK NK
Reported Separation:	0 V 3 NM H	NK
Recorded Separation:		200 ft V 3.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BA46 (A) PILOT reports heading 305° at 420 kt and FL 240 en route to Belfast. The weather was IMC and he was receiving a radar control service from ScACC on 123·77 MHz. When 17 NM SE of IOM he received a TCAS TA on traffic at the same level heading towards him whilst simultaneously ATC told him to turn R 90° for avoiding

action. When the other traffic had passed behind he resumed his heading towards the IOM; the ATCO confirmed that both ac had passed within 3 NM of each other. He didn't see the other ac visually and he assessed the risk of collision as high. He opined that if both ac were travelling at approx. 6 NM/min, he had been within 15 sec of collision.

THE BA46 (B) PILOT reports that he had no recollection of the incident. He did not receive a TCAS warning which would normally lead to the filing of a report. This reply was received almost 4 months after the incident, despite numerous UKAB requests, through the BA46's Flight Operations Dept.

ATSI reports that the ScACC ANTRIM SC described his workload as moderate at the time of the incident. Initially, he had been carrying out both the Tactical and Support roles but just prior to the incident he had requested the presence of another controller to perform the Support function. He could not recollect when this controller had taken over the position but said that it had been before the Airprox had occurred. He explained that the traffic situation on Airway B3 had been complex, with a number of flights, including the subject ac, interacting, whereby they were having to be climbed/descended through each other's levels. This had led to a resultant increase in co-ordination. Additionally, the workload had risen because of a RW change at Belfast International Airport, necessitating changes of routeings for inbound and outbound ac.

BA46 (B) established communication with the Antrim Sector at 1445, climbing to FL 110, in accordance with the Standing Agreement between Belfast Airport and the Antrim Sector, on a heading of 130°. It was tracking on the north-side of Airway B3, again in accordance with the Standing Agreement. The flight was identified and cleared to climb to FL 250, the Agreed Level for handover to the next sector (LATCC-AC-Sector 7). Approx. 4 min later, BA46 (B) was instructed to turn R heading 145°, to position it towards the southern part of the airway, in accordance with standard operating procedures, prior to being handed over to Sector 7.

At 1455, BA46 (A) made its initial call on the Antrim Sector frequency, reporting heading 305° and maintaining FL 240. The radar at 1455:01 shows the ac on the centre line of Airway B3, with BA46 (B) passing FL 208 in its 12 o'clock, 41 NM away. The MACC Isle of Man/West Sector Co-ordinator reported that the Traffic Orientation Scheme, whereby westbound flights are positioned to the north-side of the airway had been temporarily suspended by the Antrim Sector due to adverse weather. It had been agreed that it would be reinstated at 1500. Accordingly, he had co-ordinated with the Antrim Sector for BA46 (A) to be transferred at the agreed level of FL 240 on the centre line of the airway. Additionally, an Oceanic departure (AC3) from Manchester Airport would be positioned on a parallel heading on the north-side of the airway, climbing to the same level. The Antrim SC confirmed that he had agreed this co-ordination, while commenting that both AC3 and BA46 (A) had contacted him at an earlier position than normal, i.e. well before the Antrim Sector boundary at KELLY. To enable him to see these flights, he had increased the displayed range of his radar display but could not recall whether he had re-selected the original range subsequently.

BA46 (A) was instructed to continue on its heading and to expect vectors for landing RW 04 at Belfast City. As BA46 (B) was still below the level of BA46 (A), the Antrim Controller said that he had used the 5 minute 'predict vectors', establishing that the subject ac should, on their respective tracks, pass about 6 NM apart. His intention was to monitor the progress of the two flights although, he admitted, he had been distracted from this task by the traffic situation elsewhere in the sector. Subsequently, he instructed BA46 (B) to turn L 5°, to ensure that it remained within the airway and transferred the flight to LATCC. At the time that he transferred the ac he did not realise that separation would be compromised with BA46 (A). However, having dealt with calls to two other flights he noticed from a routine scan of his radar display that BA46 (B) and BA46 (A) were in potential confliction.

UKAB Note (1): The Lowther Hill radar recording at 1457:36, shows BA46 (A) at FL 240, with BA46 (B), passing FL 235, in its 11 o'clock, at a range of 7.6 NM; STCA had activated a few sec earlier.

The SC's first thought was to stop BA46 (B)'s climb and although he started a transmission to this ac, at 1457:30, he recalled, virtually instantaneously, that the ac had been transferred. Accordingly, he immediately instructed BA46 (A) to make an avoiding action 90° R turn and passed TI on a *"ac company One Four Six in your left ten o'clock range three miles just passing through your level".* The pilot read back the instruction as a *"maximum right turn onto zero nine zero"* although in his report he later stated that he had received an instruction to turn R 90°. The Antrim SC said that he telephoned Sector 7 to inform them of the action he had taken. He commented that STCA did activate but only after he had noticed the confliction and had taken remedial action. He could not reconcile the discrepancy between the distance he had perceived and had reported between the two ac and that recorded. He could only surmise that, possibly, he had not returned the displayed range to his usual setting, following its previous change, and, therefore, this had created a false impression of the distance.

UKAB Note (2): The radar recording at 1457:58 shows that the minimum distance between the subject ac did not reduce below 3·9 NM, at which time BA46 (A) was in its R turn indicating FL 241, with BA46 (B), on its L, passing FL 239.

The LATCC Sector 7 Controller reported that, when BA46 (B) established communication with his sector, the STCA was 'flashing' against BA46 (A), which he could see was turning sharply away from BA46 (B). He instructed BA46 (B) to turn R heading 170°, for a short while, before clearing it back onto its original heading.

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 remarked that this region of airspace was usually 'bitty' in nature and that it was not uncommon to have ac three abreast within the tight confines of the airway. It was noted also that the situation had been complicated by various other factors that had increased the controller's workload – weather avoidance, suspension of the TOS and RW changes at Belfast. The ANTRIM SC had placed the subject ac on opposite direction headings, intending to monitor the situation knowing that BA46 (B) had to climb through the level of BA46 (A) in the opposite direction. He had then become distracted. ATCO members felt that in this busy traffic period it would have been more prudent/fail-safe to have climbed BA46 (B) to FL 230, 1000 ft below BA46 (A) cruising at FL 240, and to have then reassessed the situation as they got closer. However, these suggestions enjoyed the benefit of hindsight and at the end of the day, it was clear that the ANTRIM SC had climbed BA46 (B) through the level occupied by BA46 (A) without ensuring horizontal separation.

Once the SC noticed the confliction he had passed the BA46 (A) crew an avoiding action R turn to avoid BA46 (B) which was perceived as only 3 NM away; this misconception resulted presumably, because the SC had changed his display range earlier to see the subject traffic and had not changed it back to the normal range setting. The BA46 (A) crew had received a TCAS TA alert simultaneously with the ATC avoiding action R turn and commendably they executed a max rate turn to the R which led them rapidly to diverge from the conflicting BA46 (B) towards the N side of the airway. The Board concluded that these actions had been timely enough to remove any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The ScACC ANTRIM SC climbed BA46 (B) through the level occupied by BA46 (A) without ensuring horizontal separation.

Degree of Risk: C

AIRPROX REPORT No 113/01

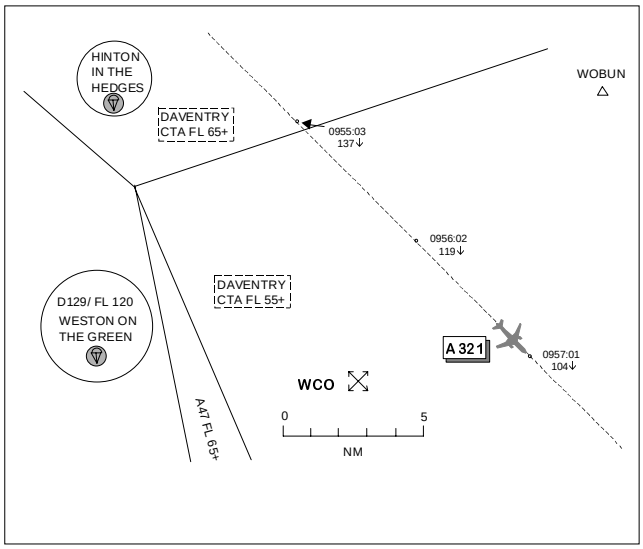
Date/Time: 23 Jun 0957 (Saturday)
Position: 5152 N 0048 W (6 NM E of WCO)
Airspace: CTA (*Class:* A)

	Reporting Aircraft	*Reported Aircraft*
Type:	A321	Parachutist
Operator:	CAT	NK
Alt/FL:	↓ FL 80	

Weather VMC CLOC
Visibility: >10 km

Reported Separation: 100 m H

Recorded Separation: not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A321 PILOT reports flying inbound to Heathrow and was receiving a radar control service from Heathrow Director on 119·72 MHz. The visibility was >10 km in VMC and his anti-collision, landing and strobe lights were switched on. When passing abeam WCO descending through FL 90, he thought, on a radar vector, he sighted a free-falling parachutist in his 12 o'clock at very close range. The parachutist passed 100 m clear on his RHS, close enough to obtain a description of the clothing.

ATSI reports that the A321 passed at least 8 NM from Weston-on-the-Green (WotG) parachuting area, which was active, the parachuting ac had remained within the designated area. The A321 had already passed well clear of WotG when the pilot reported the incident.

AIS MIL reports that comprehensive tracing action was carried out, initially looking at the parachuting activity at WotG. The drop ac had remained within the specified lateral activity limits and was dropping from FL 120. The A321 crew had contacted AIS Mil and described the parachutist
as wearing blue/black jump-suit with red trim and a yellow helmet; this description did not match WotG attire. Hinton-in-the-Hedges had also been active with parachuting but only up to 6000 ft and they had ceased operations at 0945 UTC. The RT transcript reveals the A321 pilot reporting the incident at 0957:10 with the radar recording showing the A321 passing 6 NM E of WCO descending through FL 104. Analysis of LATCC radars concentrated on the plotted position commencing at 0953 UTC. A primary only return was seen at 0955 UTC 8 NM NNE of WCO tracking NE, 40 seconds ahead of the A321, who was descending through FL 132 in the same position. This ac was traced to have departed Wycombe Air Park on a local sortie and, although not positively identified from the Wycombe movement log, was believed to be a Chipmunk. A Brize Norton Mode A squawk is seen to cross the area but was found to be a PA28 at 2000 ft. A 7000 squawk SE bound at 1500 ft that flew through the area was traced to Denham, a C152, but the pilot did not see any parachuting activity during the flight.

Procedural tracing began with the British Parachute Association but they had no notification of drops in the area and were unable to throw any light on the clothing description given. The Buckingham Police were contacted for assistance but their records indicated that there had been no reported parachute drops, balloon activity or local shows in the area. A similar nil return was received from three local Tourist Offices and the District Council after referring to event guides and notified logged

events. Further tracing through adjacent airfields also drew negative returns.

UKAB Note: The RT transcript at 0957:20 shows the A321 pilot saying *"Okay, we just passed er what looked like a parachute there and he looked very close to me"*. Also, at 0959:20, his response to a request from the Heathrow Director for an assessment of the proximity of the parachutist was *"it was certainly less than a mile we guess it was about er maybe half a mile"*. Further radar analysis by UKAB of the LATCC recorded radars could not shed any further light on the incident and the conflicting object, which was believed to be a parachutist, remains untraced.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the A321 pilot, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

There was very little information available to members on which to assess this incident. It was thought that if the object seen had been a parachutist, there must have been a 'launch vehicle' in the immediate area at the time of the incident. Possible contenders seen on radar were 'identified' through tracing action and eliminated one by one, leaving no unknown returns. The only pieces of positive information were the initial report on RT at 0957:20 by the A321 pilot who mentioned seeing something that "*looked like a parachute"* and his transmission 2 minutes later saying the object had been "*less than one mile.....maybe half a mile"*. Afterwards, when he had subsequently completed a CA1094 form, he then said he had seen a free fall parachutist pass within 100 m of his ac. The A321 had passed well to the E and above the parachuting activity from FL 120 at Weston-on-the-Green and this persuaded members to discount the latter as a credible factor. From the facts that were known and without any hard evidence that whatever was seen was a parachutist, discussion moved on to consider what other possibilities remained. One possibility, sometimes encountered in the air, might have been ambiguous perspective. Large objects seen clearly, but at some distance, can also appear to be a smaller one that is closer at hand; the lack of any intervening depth of field denies the viewer normal vision cues on which to judge range. If this had been the case here a further possible suggestion was that what was seen might have been something like a breakaway advertising balloon whose automatic deflation device had failed or partially failed to operate. But all this was conjecture and at the end of the day, members were unable to add any further credence to this incident; all that could be said was that the A321 had come into confliction with an unknown object. Owing to insufficient information available, the Board were unable to make an assessment on the risk.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: An encounter in Class A airspace with an unknown object.

Degree of Risk: D

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