



UK AIRPROX BOARD

Analysis of Airprox in UK Airspace

**Report Number 8
January 2002 - June 2002**

Report by the UK Airprox Board,
'Analysis of Airprox in UK Airspace'

(January 2002 to June 2002)

produced jointly for

The Chairman,
Civil Aviation Authority

and the

Chief of the Air Staff,
Royal Air Force

FOREWORD

This is the UKAB's eighth report on Airprox within UK airspace and the content is aimed squarely at pilots and air traffic controllers, both civil and military. The prime purpose of the document 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 2002. To that end, this book needs to be made freely available to pilots and controllers at their place of work – perhaps placed in crew rooms and rest areas as judged appropriate. If it is consigned to a shelf before others have had a chance to read it, then hard work by colleagues will be brought to naught.

During the period under review 92 incidents were reported, a decrease of 9 compared with the first half of 2001. Airprox can involve one or more of 3 airspace user groups - Commercial Air Transport (CAT) aircraft, General Aviation (GA) aircraft and/or Military aircraft. It is possible for these participants to meet (unexpectedly) in 6 separate ways as follows:

(CAT~CAT); (CAT~GA); (CAT~Military); (GA~GA); (GA~Military) and (Military~Military)

Reductions this time round were shared mainly by 2 groups; (CAT~CAT) were down by 6, as were (CAT~Military) meetings. All of the remaining combinations also enjoyed minor reductions with the exception of (Military~Military) encounters, which rose by 8. Overall results for 2002 revealed a shift in 'risk levels' when compared with the previous like period, as follows:

	2001	2002	
Risk Category A	16	7	(Collision risk)
Risk Category B	23	27	(Safety not assured)
Risk Category C	57	57	(No collision risk)
Risk Category D	5	1	(Insufficient information available)
Totals:	101	92	

Most obvious was a welcome reduction in the number of *collision risk* situations. These were halved. At first glance it seems that fewer Risk A returns then became manifest in more (4) *safety not assured* cases; so the risk situation had simply transposed one step down. But on closer scrutiny, results in 2001 included an unusually high number of Risk D cases and some of these may have been latent Risk B candidates, denied recognition only because of insufficient information. Such uncertainties were largely removed for the 2002 period, suggesting that the real Risk B situation may have remained largely unchanged. If so, and taking into account the stable Risk C figures (identical in both years) change for the better has taken place where it matters most - at the high-risk end of the scale.

Broad risk level figures are useful to a point, but for real insight much more detailed information is called for. This can be found in the Statistics Section for each of the 3 user groups and also on the UKAB web site at www.ukab.org.uk. Bear in mind, however, that full year figures are needed to identify meaningful trends. UKAB Report Number 9 will address these matters. Meanwhile, there are many lessons to be learned from the individual reports that make up the bulk of this volume, starting with Airprox 139/01. This was previously the subject of an AAIB investigation, which prevented its inclusion in Report Number 7, but is set out in full now. Fly safely.

Gordon McRobbie

Gordon McRobbie
Director, UKAB

CONTENTS

INTRODUCTION	Page
UKAB Composition	4
UKAB's Role	4
Status of UKAB Reports	4
Risk Categories	4
STATISTICS SECTION	
The UKAB Data Set	5
Half Year Comparisons	6
Who Met with Whom During 2001	7
Commercial Air Transport Section	
CAT Risk Results	8
CAT Causal Factors	8
General Aviation Section	
GA Risk Results	9
GA Causal Factors	9
Military Aviation Section	
Military Risk Results	10
Military Causal Factors	10
UKAB RECOMMENDATIONS	11
GLOSSARY OF ABBREVIATIONS	16
AIRPROX REPORTS	19
INDEX	292

INTRODUCTION

UKAB COMPOSITION

The UKAB acts as an independent organisation but is sponsored jointly by the Civil Aviation Authority (CAA) and the Ministry of Defence (MOD) to assess all Airprox reported within UK airspace. Eight civilian and six military members form the Board, which is Chaired by the Director UKAB; he reports directly to the Chairman CAA and Chief of the Air Staff, Royal Air Force. UKAB members are all 'unpaid volunteers' - pilots and air traffic controllers - who devote their expertise, experience and aviation 'know how' in a combined approach that covers the following disciplines:

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

UKAB's ROLE

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

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

STATUS OF UKAB REPORTS

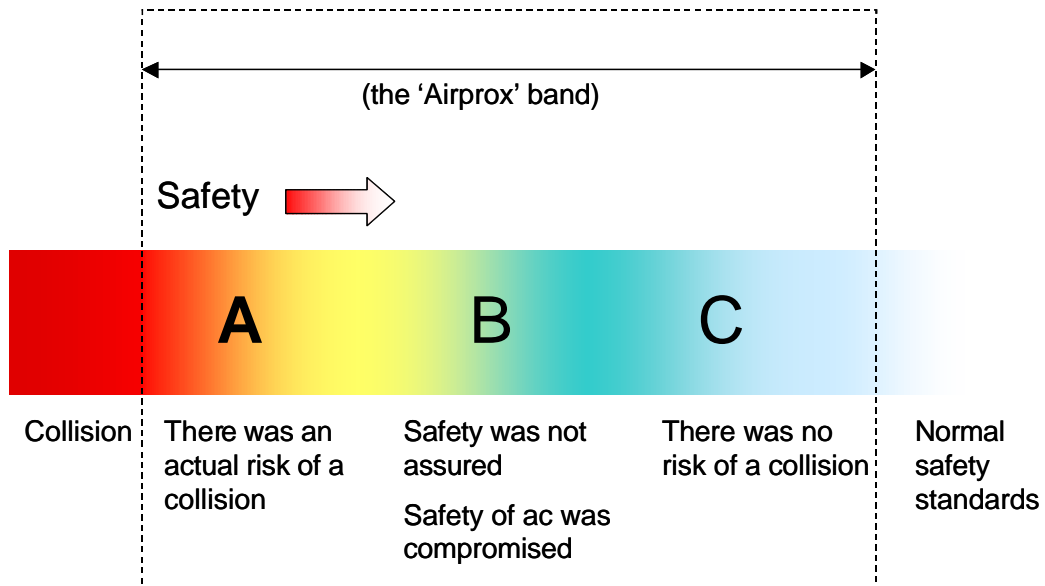
The sole objective of the United Kingdom Airprox Board shall be to assess reported Airprox in the interests of enhancing flight safety. It is not the purpose of the Board to apportion blame or liability. To encourage an open and honest reporting environment names of companies and individuals are not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

RISK CATEGORIES

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

- | | |
|-------------------------------|---|
| A Risk of collision | An actual risk of collision existed |
| B Safety not assured | The safety of the aircraft was compromised |
| C No risk of collision | No risk of collision existed |
| D Risk not determined | Insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination |

A pictorial representation of the Airprox band is shown below:



Airprox: 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.

STATISTICS

THE UKAB DATA SET

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

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

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

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

Notes:

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

(2) GA flying hours are based on aircraft with less than 5700 kg maximum take-off weight authorised; they include Microlights and Gliders, but exclude Gyroplanes and balloons. The British Gliding Association and the Registration Department of the CAA supply GA data.

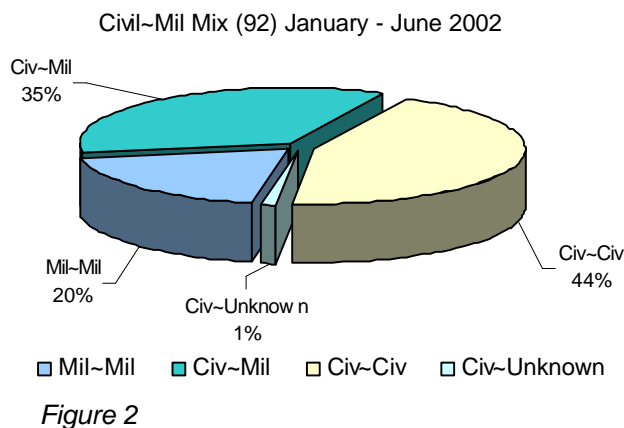
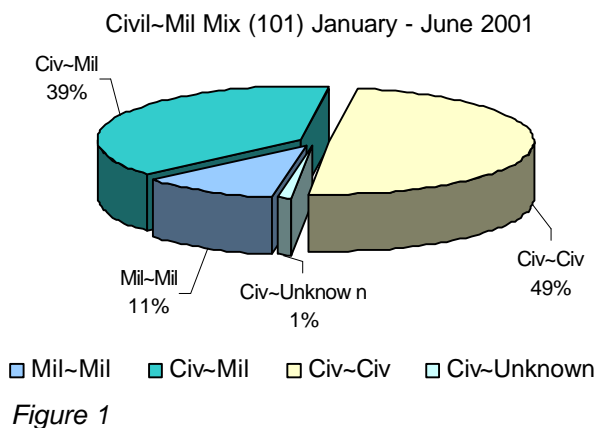
(3) Should figures be updated, new values are shown to promote the integrity of the information presented.

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

AIRPROX MIX - CIVIL AND MILITARY AIRCRAFT

HALF YEAR COMPARISONS 2001 AND 2002

There were 92 Airprox reported between January and June 2002, compared with 101 in the same six month period in 2001. A glance at the pie charts at *Fig 1* and *Fig 2* below shows where the broad changes occurred, while more detail is provided in *Tables 1 and 2*. What emerges is that Military pilots were involved in 55% of encounters last year (50% in 2001), while purely Civil~Civil meetings reduced from 49% in 2001 to 44% in 2002.



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

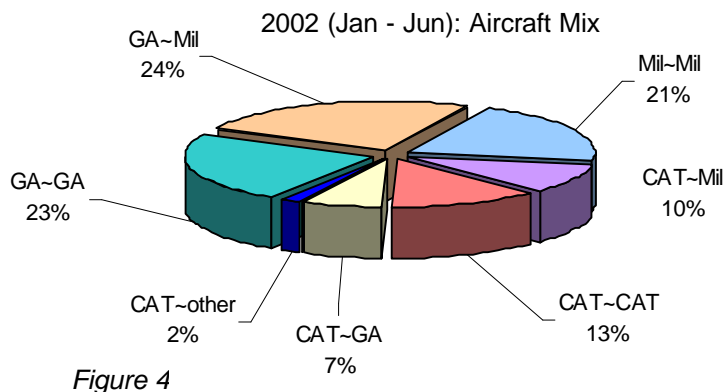
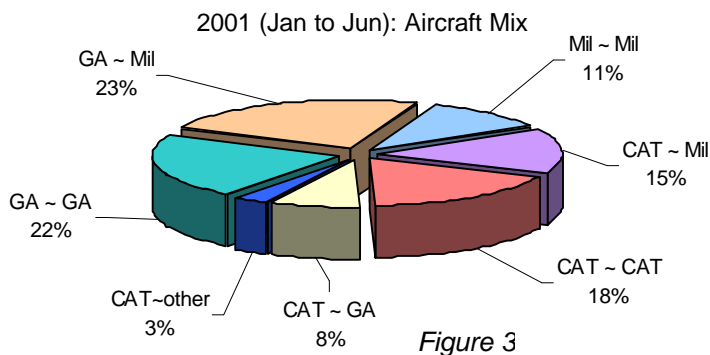
Table 1

2002	Jan	Feb	Mar	Apr	May	Jun	Totals
Mil-Mil	2	3	4	3	2	4	18
Civ-Mil	2	1	7	6	10	6	32
Civ-Civ	1	3	4	7	11	16	42
Unknown	0	0	0	0	0	0	0
Totals	5	7	15	16	23	26	92

Table 2

Breaking down the Civil-Military mix one further level begins to show a more precise picture on the interaction experienced between the airspace users (*Figs 3 and 4*).

CAT aircraft involvement in incidents came down from 44% to 32%, unlike the figures for GA pilots, which remained about the same for both periods.



Another large change can be detected in the number of purely Military conflicts; these went up from 11% in 2001 to 21% in 2002. Most of these can probably be attributed to more reporting, however, and the resulting 'Risk' figures (addressed later in this report) also need to be looked at before drawing any conclusions.

WHO MET WITH WHOM?

Fig 5 reveals just how often pilots met and in which of the 3 groups. Colour codes relate to 'like on like' groups - all other encounters being *mixed* in nature.

Military pilots in fixed wing aircraft met 32 times with pilots from the other two groups. Most were with GA pilots (23), leaving 9 occasions when they were involved in conflicts with airliners.

Of note, the number of Airprox that took place outside controlled airspace amounted to 70% of the total.

JANUARY TO JUNE 2002	AIRLINER - CARGO	AIRLINER - PASSENGER	GA (HIRE & REWARD)	GA - COMPANY Ac	GA - HELICOPTER	GA - PRIVATE OR CLUB	GA - TRAINING	MILITARY - FIXED WING	MILITARY - GLIDER	MILITARY - HELICOPTER	BALLOON	Totals
AIRLINER - CARGO	1											1
AIRLINER - PASSENGER		11	1	1		1	2	7	1	1	2	27
GA (HIRE & REWARD)			1			2	2	1		1		7
GA - COMPANY Ac										1		1
GA - GLIDER						4						4
GA - HELICOPTER								1				1
GA - PRIVATE OR CLUB			2		1	7		1				11
GA - TRAINING	1					2		1				4
MILITARY - FIXED WING					6	7	1	12		1		27
MILITARY - GLIDER						1						1
MILITARY - HELICOPTER						2		4	1	1		8
Totals	2	11	4	1	7	26	5	27	2	5	2	92

Figure 5

The final tally in percentage terms, where at least one aircraft from a user-group was involved in an Airprox, was as follows:

CAT = 32%; GA = 54%; Mil = 55%

CAT~CAT	12	GA~GA	21
CAT~GA	6	GA~Mil	23
CAT~Mil	9	Mil~Mil	19
CAT~other	2		

Actual numbers are tabled to the right.

AIRPROX OUTSIDE CONTROLLED AIRSPACE

January - June 2002 Airprox in Class G airspace	AIRLINER - CARGO	GA - HIRE & REWARD	GA - HELICOPTER	GA - PRIVATE OR CLUB	GA - TRAINING	MILITARY - FIXED WING	MILITARY - GLIDER	MILITARY - HELICOPTER	BALLOON	Totals
AIRLINER - PASSENGER						5		1	1	7
GA - HIRE & REWARD				1	2	1		1		5
GA - COMPANY Ac								1		1
GA - GLIDER				4						4
GA - HELICOPTER						1				1
GA - PRIVATE OR CLUB		2	1	7		1				11
GA - TRAINING	1			2		1				4
MILITARY - FIXED WING			5	5	1	11		1		23
MILITARY - GLIDER				1						1
MILITARY - HELICOPTER				2		4	1	1		8
Totals	1	2	6	22	3	24	1	5	1	65

Fig 6 (left) shows the breakdown of the 65 Airprox in Class G airspace during the first half of 2002. The same colour coding as in Fig 5 has been used to separate like-on-like groups from the mixed meetings.

What emerges from closer inspection is that that Mil~GA incidents featured most (20), followed closely by GA~GA (19). Next came Mil~Mil (18) and, to complete the picture, note the number of times airliners - away from regulated areas of sky - were involved in incidents (8).

Figure 6

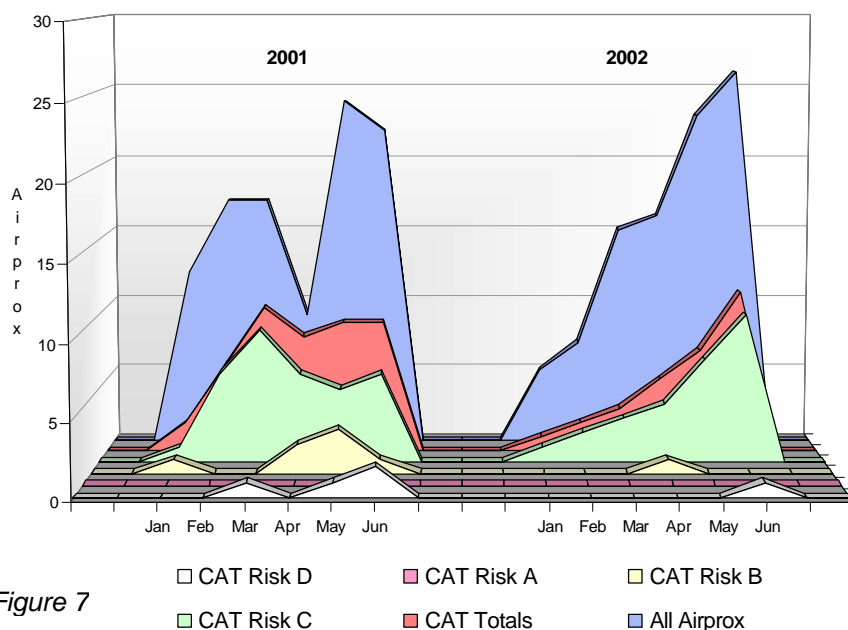
COMMERCIAL AIR TRANSPORT (CAT) SECTION

CAT: Risk Results

Snapshot 'risk' results for Airprox involving CAT aircraft during the first 6 months of 2001 and 2002 are shown at Fig 7 (right). Precise detail is set out in Tables 3 and 4 (below).

CAT Totals were down 25% in 2002, to 29 cases, most of which (27) turned out to be 'no collision risk'. Like the situation in 2001, there were no Risk A incidents, while Risk B results fell from 7 to a single example. Completing the picture, there was one Risk D situation.

CAT Involvement in Airprox: January - June in 2001 and 2002



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 3

2002	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	0	0	0	0	0
Risk B	0	0	0	1	0	0	1
Risk C	1	2	3	4	7	10	27
Risk D	0	0	0	0	0	1	1
Totals	1	2	3	5	7	11	29

Table 4

CAT: Causal Factors

The UKAB identified 52 separate causal factors behind the 29 encounters assessed. Not all of these factors were attributable to pilots or controllers and 17 were 'one-off' examples only. Those causes where the incidence was greater than one are listed below at Table 5. The top reason was unchanged from 2001, but the number of times it occurred nearly halved - down from 16 to 9.

Cause	Totals	Attributed to
DID NOT SEPARATE/POOR JUDGEMENT	9	CONTROLLER
INADEQUATE AVOIDING ACTION / FLEW TOO CLOSE	3	PILOT
MISINTERPRETATION OF ATC MESSAGE	3	PILOT
CLIMBED/DESCENDED THROUGH ASSIGNED LEVEL	2	PILOT
CONTROLLED AIRSPACE CONFLICT IN VMC	2	OTHER
CONTROLLER PERCEIVED CONFLICTION	2	OTHER
DID NOT ADHERE TO PRESCRIBED PROCEDURES	2	PILOT
FIR CONFLICT	2	OTHER
INADEQUATE SUPERVISION	2	CONTROLLER
INAPPROPRIATE ATC INSTRUCTIONS, USE OF INVALID FL	2	CONTROLLER
UNDETECTED READBACK ERROR	2	CONTROLLER
NOT OBEYING ORDERS/ FOLLOWING ADVICE FROM ATC	2	PILOT
LATE SIGHTING OF CONFLICTING TRAFFIC	2	PILOT

Table 5

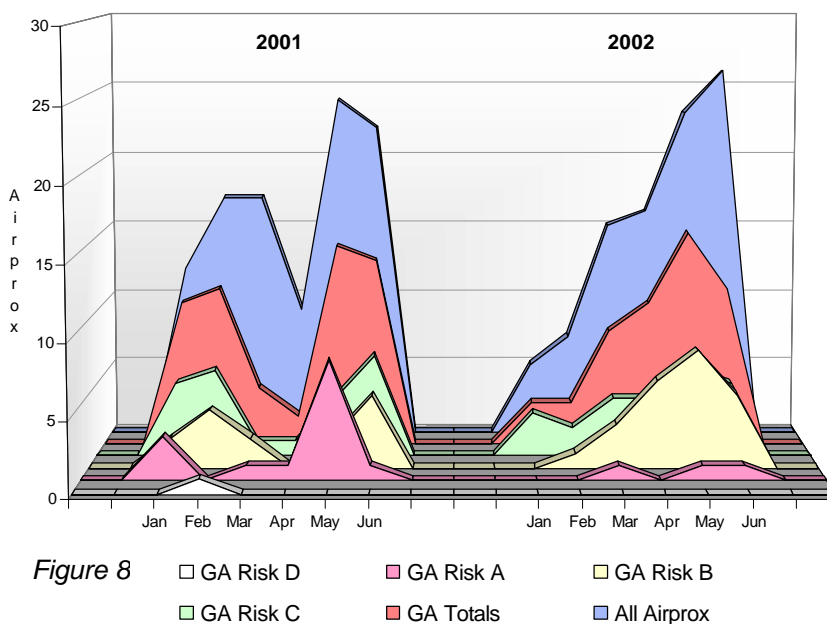
GENERAL AVIATION (GA) SECTION

GA: Risk Results

Fig 8 (right) compares GA Risk results. GA pilots took part in 54% of all Airprox in 2002; these figures correlate strongly with weather conditions. But other factors can also influence matters - e.g. the 'foot-and-mouth' restrictions during 2001.

Improved safety is indicated when Risk C results mimic the total profile - the closer the better. This did not happen in 2002, when Risk B results took over instead. However, there were fewer 'actual collision risk' cases (Risk A), which helped to redress the balance. Details are set out in

GA Involvement in Airprox: January - June in 2001 and 2002



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

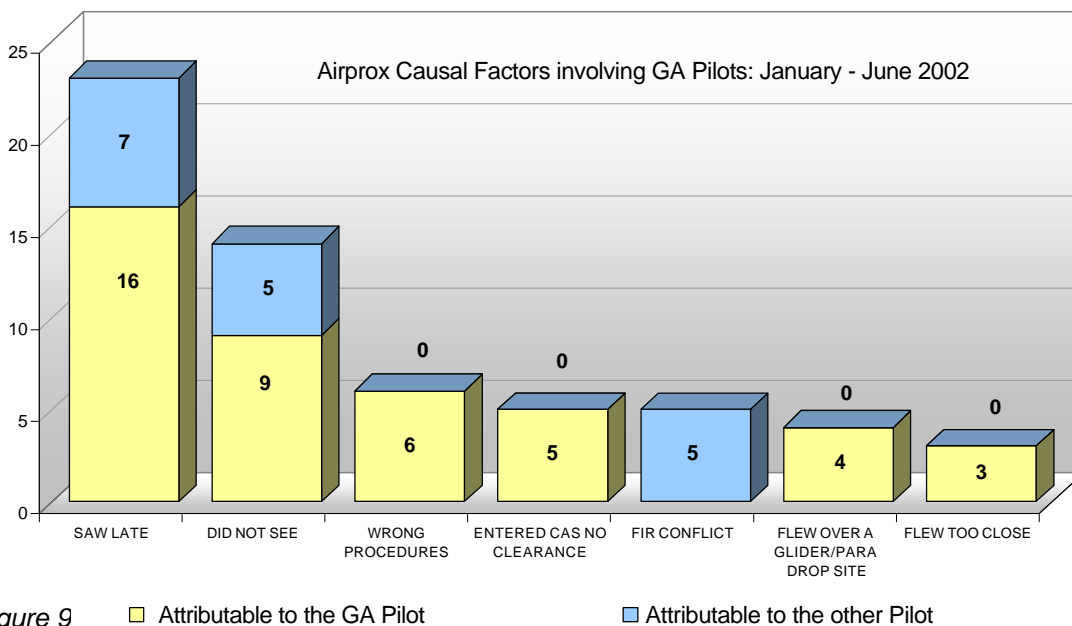
Table 6

2002	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	1	0	1	1	3
Risk B	0	1	3	6	8	5	23
Risk C	3	2	4	4	6	5	24
Risk D	0	0	0	0	0	0	0
Totals	3	3	8	10	15	11	50

Table 7

GA: Causal Factors

Fig 9 (below) shows the top reasons behind Airprox involving GA pilots - and who was attributable.



MILITARY SECTION

Military: Risk Results

Risk results for those Airprox involving Military pilots between January and June (2001 and 2002) can be compared by looking at Fig 10 (right). The overall count was virtually the same in both years, but the profiles show improvements in safety.

63% of the incidents in 2002 turned out to be 'no collision risk' while 23% of the situations were 'safety not assured' - just one more than in 2001. The most telling change for the better, however, comes in the 'actual collision risk' area; these fell from 22% in 2001 to 13% last year.

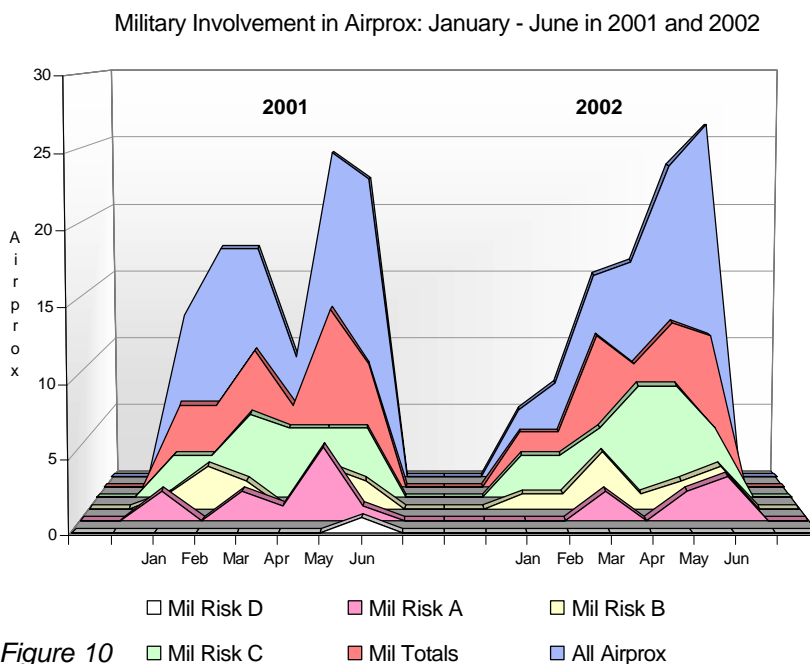


Figure 10

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

2002	Jan	Feb	Mar	Apr	May	Jun	Totals
Risk A	0	0	2	0	2	3	7
Risk B	1	1	4	1	2	3	12
Risk C	3	3	5	8	8	5	32
Risk D	0	0	0	0	0	0	0
Totals	4	4	11	9	12	11	51

Table 9

Military: Causal Factors

Fig 11 (below) shows the top reasons behind Airprox involving Military pilots - with attribution.

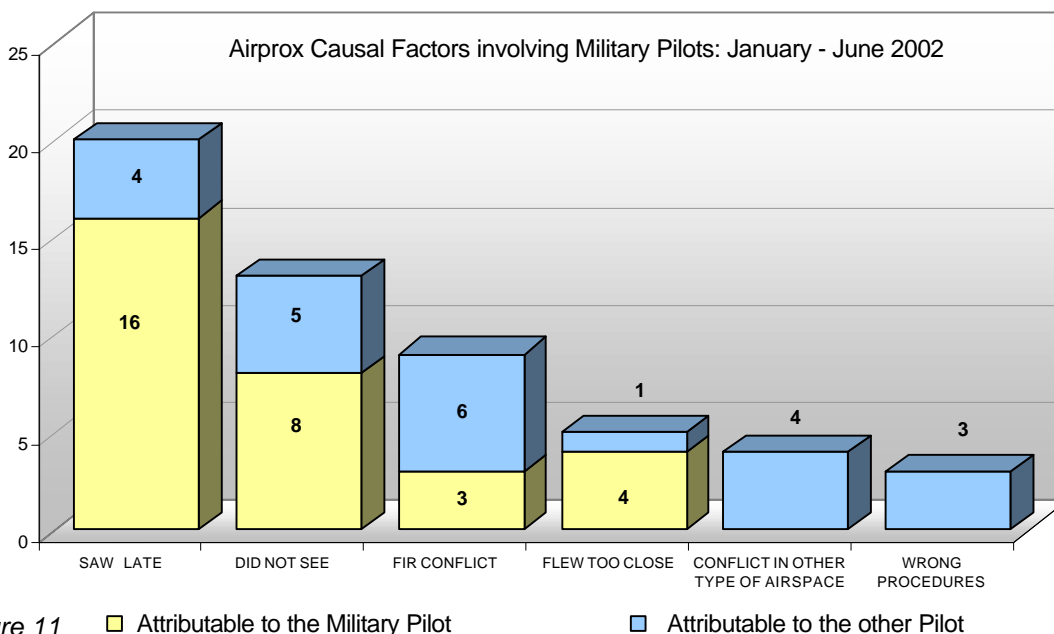


Figure 11

UKAB RECOMMENDATIONS

Recommendations are made when the Board believes that attention needs to be drawn to particular safety matters, e.g. where Risk A and/or Risk B 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 7 and lists new ones.

<p>119/01 14 Jul 01</p> <p>C152 Bell 222</p> <p>Risk: C</p>	<p>RECOMMENDATION: That MOD/HQ PTC review arrangements for providing an Air/Ground Service at government aerodromes where an ATZ is established, but where no formal ATC is provided.</p> <p>MOD Action: In the case of RAF Halton, which operates a mixture of civilian and military recreational flying clubs, we have been assured that the number of (civilian) licensed Air to Ground (A/G) Station operators has been increased sufficiently to cover its operating hours.</p> <p>However, there are a number of Air Cadet Volunteer Gliding Schools (VGS), which operate from RAF airfields having Military Airfield Traffic Zones that revert to ATZ status outside their main operating hours. These have discrete A/G Stations that are manned by a Duty Instructor (B Category) for supervisory purposes. HQ Personnel and Training Command has therefore suggested to HQ Air Cadets that it should establish a means of licensing its B Category Instructors to a standard comparable with the CAA A/G Station licensing system. This would be irrespective of the nature of the host airspace and would be common for all VGS. The Air Cadet Central Gliding School has agreed to extend its B Category training syllabus to encompass the relevant parts of CAP452 (Aeronautical Radio Station Operators' Guide). It is then envisaged that the Central Flying School should include A/G Station operations within its routine oversight of the VGS. HQ Strike Command has indicated (informally) that it would be willing to ensure compatibility of A/G procedures with mainstream military ATC standards. We believe this provides a pragmatic solution, in sympathy with civilian standards, which satisfies the need with minimal disruption and resource implications.</p> <p>Status - Accepted - Closed</p>
<p>147/01 21 Aug 01</p> <p>B737 F16 x 2</p> <p>Risk: C</p>	<p>RECOMMENDATION: That the MOD considers a review of supervisory arrangements attaching to mission planning by foreign military aircrews taking part in Exercises in UK airspace.</p> <p>MOD Action: HQ STC has circulated advice to subordinate units in the form of a brief (with inputs from the DASC and DAP/CAA) for visiting foreign military aircrews. The brief aims to ensure that foreign pilots are made aware of relevant local and national airspace issues and procedural differences in the UK, in order to improve flight safety for all airspace users.</p> <p>Status - Accepted - Closed</p>

<p>196/01</p> <p>10 Nov 01</p> <p>B747</p> <p>A330</p> <p>Risk: B</p>	<p>RECOMMENDATION: That the CAA considers:</p> <ul style="list-style-type: none"> a. A review of ATC and aircrew procedures and arrangements to eradicate errors in OCA entry estimates. b. Including a check of the entry clearance time as part of the OCA entry clearance message. c. A review of procedures and equipment used to transmit emergency messages immediately to aircraft in oceanic airspace. <p>CAA Action: The CAA accepts this Recommendation. NATS has already agreed to undertake the actions called for by this Recommendation, and the review process will be audited by the Safety Regulation Group's ATS Standards Department.</p> <p>Status on (a), (b) and (c) - Accepted - Open</p>
<p>2/02</p> <p>9 Jan 02</p> <p>B737</p> <p>Micro-light</p> <p>Risk: C</p>	<p>RECOMMENDATION: That the CAA considers a review of the provision of Radar Control Service in class E airspace.</p> <p>CAA Action: The CAA accepts this Recommendation. After reviewing the provision of Radar Control Service in Class E airspace, the CAA concluded that the rules governing the provision of a Radar Control Service in Class E airspace are clear and unambiguous and conform to ICAO requirements.</p> <p>However, whilst accepting that no rules were broken during the events leading to the filing of this Airprox report, the CAA does recognise that a Radar Control Service is better suited to a totally known environment. With this in mind, the Director of Airspace Policy has invited NATS to consider whether it wishes to review the airspace arrangements in question and propose a change in accordance with the nationally agreed airspace change process laid down in the Airspace Charter. The UKAB will be advised of the outcome of this invitation.</p> <p>Status - Accepted - Closed</p>
<p>3/02</p> <p>11 Jan 02</p> <p>Grob Tutor</p> <p>Tucano</p> <p>Risk: C</p>	<p>RECOMMENDATION: That the MOD, through CFS, reviews priorities and/or policy for situations where IFR and VFR traffic mix in the visual circuit.</p> <p>MOD Action: Central Flying School (CFS) perceived no requirement to change established procedures. However, at the suggestion of CFS, the Defence Aviation Safety Centre has agreed to initiate a campaign to remind aircrew of priorities in the visual circuit area. Furthermore, HQ STC ATC undertook a safety audit on extant Radar PFL/Visual PFL procedures and produced subsequently 'best practice guidelines'. These have been sent to all SATCOs.</p> <p>Status - Partial acceptance - Closed</p>

<p>15/02 26 Feb 02 Sea King Harrier Risk: C</p>	<p>RECOMMENDATION: That the MOD considers conducting a review on the use of GUARD, instead of the LFS frequency (300.8 MHz), for warning broadcasts by SAR helicopter crews penetrating the FW Region of the UKNLFS on operational sorties.</p> <p>MOD Action: The MOD accepts this Recommendation. A new instruction in the MIL AIP (effective 3 Oct 02) details that aircrew on operational and SAR night flights below 2,000ft, that have not been the subject of a NOTAM, are to ensure warning of their activity is broadcast on 243.0 MHz as appropriate. Additionally, procedures between ARCC~LFBC ensure that SAR units are made aware of night and out of hours LF activity.</p> <p>Status - Accepted - Closed</p>
<p>30/02 1 Apr 02 A320 PA34 Risk C</p>	<p>RECOMMENDATION: That the CAA asks NATS to review the efficacy of the London FIS as currently provided.</p> <p>CAA/NATS Action: The CAA accepts this Recommendation. NATS will conduct a review of the FIS operation at the London Control Centre and produce a report with any necessary recommendations by the end of January 2003. UKAB will be informed as to the outcome.</p> <p>Status - Accepted - Open</p>
<p>47/02 22 Apr 02 DHC8 SHAR Risk C</p>	<p>RECOMMENDATION:</p> <p>(1) The MOD considers a review of the rules for Visual Identification by military air defence ac in UK airspace.</p> <p>(2) The RN considers the feasibility of including an independent Air safety cell ashore for each RN AD exercise at sea, within UK airspace.</p> <p>MOD Action: The MOD is processing this Recommendation.</p> <p>Status - Open</p>
<p>67/02 28 May 02 Embraer 145 Islander Risk C</p>	<p>RECOMMENDATION: That the CAA considers publishing clarification on the meaning of "Radar Control" within Class D airspace for ac operating to different flight rules.</p> <p>CAA Action: The CAA is currently processing this Recommendation.</p> <p>Status - Open</p>

<p>97/02 22 June 02</p> <p>B737 Balloon Risk D</p>	<p>RECOMMENDATION: In light of 3 incidents during the months May - July 2002, involving encounters with untraced balloons, the UKAB recommends that CAA and the MOD should consider conducting a review of arrangements on:</p> <p>a. The notification and permission procedures for the release of balloons in UK airspace, particularly those with suspended payloads.</p> <p>b. Risk analysis for other airspace users.</p> <p>MOD Action:</p> <p>a. The MOD believes that the risk to the aviation community is minimal and sees no need to review their procedures. Balloons are released by 2 sources: responsible operators such as the Met office, who release balloons only from sites notified in the AIP; and the General Public. The majority of Airprox involving balloons fall into the latter category. The MOD has no control over when and where these balloons are released and attempts to trace the perpetrators more often than not prove fruitless.</p> <p>b. In addressing the risks associated with meteorological balloons, the suspended payload never exceeds 300 grams and the electronic components are packed in a frangible 'styrofoam' casing. Accordingly, any damage caused by the payload striking an aircraft is likely to be minimal and is considered to be less than that associated with a bird strike. Attempts to make balloons more visible to radar would likely entail adding a radar reflector which, in itself, might present a hazard. The "suspension cable" is made of thin cord and is unlikely to present a hazard to aircraft.</p> <p>CAA Action: The CAA is processing this Recommendation.</p> <p>Status on (a) - CAA - Open; MOD - Not accepted - Closed Status on (b) - CAA - Open; MOD - Accepted - Closed</p>
<p>102/02 2 Jul 02</p> <p>RJ85 Jaguar Risk A</p>	<p>RECOMMENDATION: The MOD should convey STC's advice to all military pilots operating in UK airspace and publicise the incident as widely as possible.</p> <p>MOD Action: The MOD is currently processing this Recommendation.</p> <p>Status - Open</p>
<p>105/02 3 Jul 02</p> <p>Emb 145 DHC8 Risk B</p>	<p>RECOMMENDATION: The CAA gives wide publicity to this incident and the lessons to be learned.</p> <p>CAA Action: The CAA is currently processing this Recommendation.</p> <p>Status - Open</p>

113/02 14 Jul 02 Emb 145 Paraglider Risk C	RECOMMENDATION: In light of this incident, the CAA should consider looking at arrangements surrounding unregulated flying activities in UK airspace. CAA Action: The CAA is currently processing this Recommendation. Status - Open
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GLOSSARY OF ABBREVIATIONS USED IN REPORTS

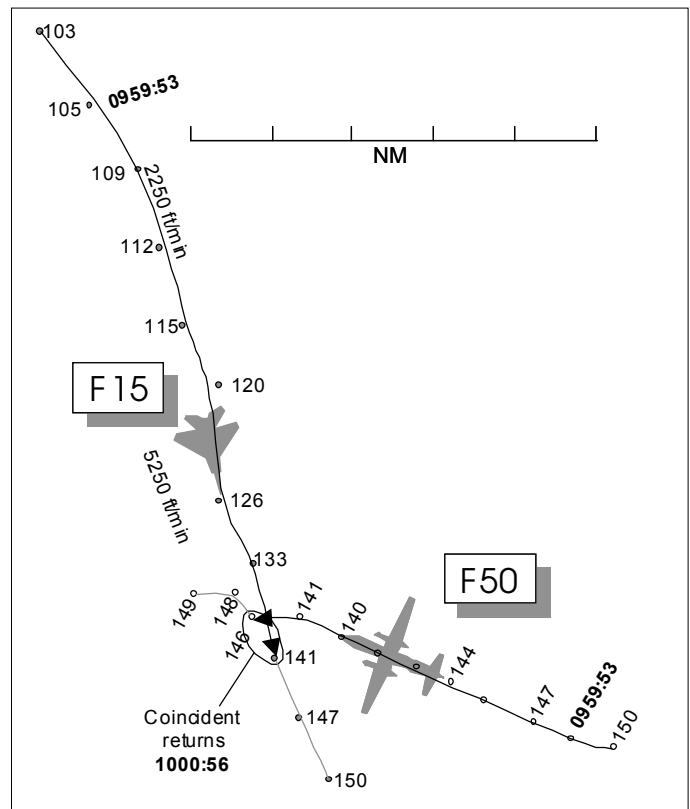
AAA	Airfield Avoidance Area	AWY	Airway
AAI	Angle of Approach Indicator	Bdry	Boundary
aal	Above aerodrome level	BGA	British Gliding Association
ac	Aircraft	BHAB	British Helicopter Advisory Board
ACAS	Airborne Collision Avoidance System	BHPA	British Hang Gliding and Paragliding Association
ACC	Area Control Centre	BINA ERS	British Isles/N America En Route Supplement
ACN	Airspace Co-ordination Notice	BMAA	British Microlight Aircraft Association
ACR	Aerodrome Control Radar	CAA	Civil Aviation Authority
A/D	Aerodrome	CALF	Chart Amendment - Low Flying
ADA	Advisory Area	CANP	Civil Air Notification Procedure
ADC	Aerodrome Control(ler)	CAS	Controlled Airspace
ADF	Automatic Direction Finding Equipment	CAT	Clear Air Turbulence
ADNC	Air Defence Notification Centre	CAVOK	Visibility, cloud and present weather better than prescribed values or conditions
ADR	Advisory Route	CFI	Chief Flying Instructor
AEF	Air Experience Flight	CinC Fleet	Commander in Chief Fleet, Royal Navy
AEW	Airborne Early Warning	CLAC	Clear Above Cloud
AFIS(O)	Aerodrome Flight Information Service (Officer)	CLAH	Clear Above Haze
agl	Above Ground Level	CLBC	Clear Below Cloud
AGI	Air Ground Incident	CLBL	Clear Between Layers
AIAA	Area of Intense Aerial Activity	CLOC	Clear of Cloud
AIC	Aeronautical Information Circular	CPA	Closes Point Of Approach
AIP	Aeronautical Information Publication	CMATZ	Combined MATZ
AIS	Aeronautical Information Services	CPA	Closest Point of Approach
amsl	Above mean sea level	C/S	Callsign
ALFENS	Automated Low Flying Enquiry & Notification System	CTA	Control Area
AOB	Angle of Bank	CTR/CTZ	Control Zone
A/P	Autopilot	CWS	Collision Warning System
APP	Approach Control(ler)	DAAvn	Director Army Aviation
ARA	Airspace Restricted Area	DAT	Defence Air Traffic
ARP	Aerodrome Reference Point	D & D	Distress & Diversion Cell
ASACS SSU	Air Surveillance and Control System Standards and Safety Unit	DF	Direction Finding (Finder)
ASR	Airfield Surveillance Radar	DFTI	Distance from Touchdown Indicator
ATC	Air Traffic Control	DH	Decision Height
ATCC	Air Traffic Control Centre	DI	Direction Indicator
ATCO	Air Traffic Control Officer	DME	Distance Measuring Equipment
ATCRU	Air Traffic Control Radar Unit	DFDR	Digital Flight Data Recorder
ATIS	Automatic Terminal Information Service	DUA	Dedicated User Area
ATM	Aerodrome Traffic Monitor	EAT	Expected Approach Time
ATS (U)	Air Traffic Service (Unit)	ERS	En Route Supplement
ATSA	Air Traffic Service Assistant	est	estimated
ATSOCAS	ATSs Outside Controlled Airspace	FIC	Flight Information Centre
ATSI	Air Traffic Services Investigations	FIR	Flight Information Region
ATZ	Aerodrome Traffic Zone	FIS	Flight Information Service
AWACS	Airborne Warning and Control System		
AWR	Air Weapons Range		

FISO	Flight Information Service Officer	MRSA	Mandatory Radar Service Area (Military Area)
FMS	Flight Management System	MSA	Minimum Safe Altitude
FO	First Officer	MSD	Minimum Separation Distance
fpm	Feet Per Minute	MTA	Military Training Area
FPS	Flight Progress Strip	MTRA	Military Temporary Reserved Airspace
GAT	General Air Traffic	NATS	National Air Traffic Services
GCA	Ground Controlled Approach	NDB	Non - Directional Beacon
GCI	Ground Controlled Interception	nm	Nautical Mile(s)
GMC	Ground Movement Controller	NK	Not Known
GP	Glide Path	NOTAM	Notice to Airmen
H	Horizontal	NR	Not Recorded
HISL	High Intensity Strobe Light	NVG	Night Vision Goggles
HLS	Helicopter Landing Site	OAC	Oceanic Area Control
HMR	Helicopter Main Route	OACC	Oceanic Area Control Centre
HPZ	Helicopter Protected Zone	OAT	Operational Air Traffic
HTZ	Helicopter Traffic Zone	ODL	Opposite Direction Level
HUD	Head Up Display	OHD	Overhead
iaw	In accordance with	OJTI	On-the-Job Training Instructor
ICF	Initial Contact Frequency	OLDI	On-Line Data Interchange
IFF	Identification Friend or Foe	PAR	Precision Approach Radar
IFR	Instrument Flight Rules	PFL	Practice Forced Landing
IICL	Intermittently In Cloud	PF	Pilot Flying
ILS	Instrument Landing System	PI	Practice Interception
IMC	Instrument Meteorological Conditions	PIC	Pilot in Command
JOI	Joint Operating Instruction	PINS	Pipeline Inspection Notification System
JSP	Joint Services Publication	PNF	Pilot Non-flying
KHz	Kilohertz	PTC	Personnel & Training Command
KLWD	In Cloud	QDM	Magnetic heading (zero wind)
kt	Knots	QFE	Atmospheric pressure at aerodrome airport elevation (or at runway threshold)
LACC	London Area Control Centre (Swanwick)	QFI	Qualified Flying Instructor
LARS	Lower Airspace Radar Service	QHI	Qualified Helicopter Instructor
LAS	Lower Airspace Service	QNH	Altimeter sub - scale setting to obtain elevation when on the ground
LATCC(Mil)	London Air Traffic Control Centre (Military) (West Drayton)	QSY	Frequency change
LFA	Low Flying Area	QTE	True bearing
LFBC	Low Flying Booking Cell	RA	Resolution Advisory (TCAS)
LFC	Low Flying Chart	RAF	Royal Air Force
LFS	Low Flying System	RAS	Radar Advisory Service
LLZ	Localizer	RHS	Right Hand Side
LJAO	London Joint Area Organisation (Swanwick (Mil))	RIS	Radar Information Service
LOA	Letter of Agreement	RNAS	Royal Naval Air Station
LTMA	London TMA	ROC	Rate of Climb
MACC	Manchester Area Control Centre	ROD	Rate of Descent
MATS	Manual of Air Traffic Services	RPS	Regional Pressure Setting
MATZ	Military Aerodrome Traffic Zone	RSO	Range Safety Officer
mb	Millibars	RT	Radio Telephony
MEDA	Military Emergency Diversion Airfield	RVSM	Reduced Vertical Separation Minimum
MHz	Megahertz		
MOD	Ministry of Defence		

RW	Runway	VDF	Very High Frequency Direction Finder
RVR	Runway Visual Range	VFR	Visual Flight Rules
SAP	Simulated Attack Profile	VHF	Very High Frequency
SC	Sector Controller	VMC	Visual Meteorological Conditions
ScATCC(Mil)	Scottish Air Traffic Control Centre (Military) (Prestwick)	VOR	Very High Frequency Omni Range
SCH	Set Clearance Height	VRP	Visual Reporting Point
ScOACC	Scottish and Oceanic Area Control Centre	WIP	Work in Progress
SOC	Sector Operations Centre		
SID	Standard Instrument Departure		
SIF	Selective Identification Feature		
SMF	Separation Monitoring Function		
SPS	Standard Pressure Setting (1013mb)		
SRA	Surveillance Radar Approach		
SRA	Special Rules Area		
SRE	Surveillance Radar Element of precision approach radar system		
SSR	Secondary Surveillance Radar		
STAR	Standard Instrument Arrival Route		
STC	Strike Command		
STCA	Short Term Conflict Alert		
SVFR	Special VFR		
TA	Traffic Advisory (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 Control Area		
TRUCE	Training in Unusual Circumstances and Emergencies		
UAR	Upper Air Route		
UDF	Ultra High Frequency Direction Finder		
UHF	Ultra High Frequency		
UIR	Upper Flight Information Region		
UKDLFS	United Kingdom Day Low Flying System		
UKNLFS	United Kingdom Night Low Flying System		
UNL	Unlimited		
USAF(E)	United States Air Force (Europe)		
USL	Underslung Load		
U/T	Under Training		
UTA	Upper Control Area		
UTC	Co-ordinated Universal Time		
V	Vertical		
VCR	Visual Control Room		

AIRPROX REPORT NO 139/01

Date/Time: 13 Aug 1001
Position: 5413 N 0025 W (3 NM S of Scarborough)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: F50 F15
Operator: CAT Foreign Mil
Alt/FL: FL 140 ↓ 2000 ft Alt/FL 100
Weather VMC CLOC VMC CLOC
Visibility: 10 km+
Reported Separation:
 300 ft V NR
Recorded Separation:
 <0.25 NM H

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE F50 PILOT reports heading 340° at 220 kt (track 294°) in a descent towards Teesside. He checked ATIS on box 2 and then came back to Pennine Radar to hear the controller asking if he was VMC. He replied 'affirmative' and was informed of fast moving pop up traffic in his 2 o'clock at 2 NM; he advised the controller he could not see it. There was a 2 second indication on TCAS which reappeared as the controller started to pass further information. TCAS issued a TA and while the FO (handling) attended to it he looked out in the 2 o'clock to locate the other ac, but advised the controller he could not see it. TCAS then issued a 'descend' RA and in response the FO increased the RoD from 1000 to 1500/1800 ft/min. Just as the VSI needle reached the green sector, TCAS reversed the RA to 'climb', demanding a RoC of about 1000 ft/min followed immediately by 'increase climb' and a demand of 2500 ft/min. He was monitoring the alarming closure rate of the other ac on TCAS; while the RoC was now 2500 ft/min, the intruder still appeared to be closing. Checking that there was

still some airspeed in hand, he pulled back to increase the RoC to 3000 ft/min while watching the ASI. TCAS then showed the other ac clearing into their 8 o'clock 300 ft below and gave 'clear of conflict'. He responded to a call from the cabin where everyone appeared to be OK but very shaken and then resumed descent while filing an Airprox. It took him a while to compose himself sufficiently to provide an explanatory PA.

THE AAIB chose to investigate the incident and ascertained from **THE F15 PILOT** that he had been operating between 2000 ft and FL 100 under a RIS from Leeming. Having completed his exercise he climbed on a southerly heading to RTB, leaving Leeming's frequency to free call London Mil, squawking 7000. The crew was unaware that an Airprox had been filed. Their mission recording at 1000:52 showed that they were climbing at 360 kt through 13600 ft with a RoC of 4000 ft/min, when the rear crew member said he could see an ac to the left, about 400 ft

above, which would pass behind them. The pilot did not see the F50.

Pennine Radar identified the F50 at FL 180 on its initial call at 0940:30. No ATS was defined either by controller or pilot. At about 0957, the Pennine controller asked Leeming for information on "0402 traffic" (the F15) and was told that it was operating between 2000 feet on the regional QNH and FL 100. When he asked if the traffic was staying "That side of Fylingdales" (ie to the north), the Leeming controller replied that he hoped so. The Pennine controller then asked him if he could see "6310 by Flamborough Head" (the F50). The traffic was south of the Leeming controller's normal area, however, when it had been identified and confirmed, the Pennine controller said that he would "bring him the other side of Fylingdales" (ie to the south).

Shortly after this there was a change of Pennine controller and it was the incoming controller who noticed the fast moving contact in potential conflict with the F50. (This controller also did not confirm the ATS although his report indicated he was providing a RAS.) Just before 1000 the controller asked the F50 pilot if he was "*good Victor Mike Charlie at the moment?*" The pilot replied at 1000 "*W-we have Mode Charlie c/s*" and the controller repeated the question: "*Yeah sorry, are you good Victor Mike Charlie at the moment?*" The pilot replied "*Affirm*" and at 1000:10 the controller continued "*Okay traffic information for you in your one o'clock range five miles it's fast moving traffic that just popped up and it's actually climbing through flight level one one three at the moment it's just decided to turn right onto a southerly heading, are you visual with that traffic?*" When the commander replied that he was not, the controller continued: "*Okay it's doing about four hundred and sixty knots it's now in your two o'clock range is two miles heading er climbing through flight level one two zero*". It is possible that he referred to the contact as a "pop up" because the squawk had just changed to 7000 and he hadn't associated it with the F15's previous squawk of 0402. The STCA was active when he informed the F50 about the conflict. At 1000:40 the F50 pilot advised "*We have a TCAS RA Climb*" and the controller replied "*Okay are you happy to continue on that I can't really give you much avoiding action, it's about to pass underneath you very shortly*". Normally under a RAS the controller would be expected to give the

action necessary to resolve the conflict either before the information if urgent or after if not. In this incident, the controller assessed that any action he could give the F50 may have aggravated rather than resolved the conflict.

The Manchester ACC investigation found that the Pennine Sector was operating in accordance with unit instructions and was correctly manned. Having observed the radar replay, they also considered that any turn given would have resulted in the F50 turning into the F15 or placing it directly in front with the F15 catching up rapidly, and ATSI concurred with this opinion. When, at 0959:30, the F15 crew told Leeming that they were changing to London Military, they were more than 15 NM NW of the F50, tracking south and climbing through FL 100. The Leeming controller had no reason to suspect that there would be a conflict and the onus for maintaining separation from other traffic had been transferred to the F15 crew.

MIL ATC OPS commented that the Leeming Zone controller, who was providing a limited RIS, had no information on the F15's intentions when advised by the pilot "*Switching to London Mil*" at 0959:37 without prior warning. He would have been concentrating on his traffic in the Vale of York, using a radar scale which would not have shown the F50 (he had had to change scales to see it when Pennine drew his attention to it). When the Leeming controller was passed Traffic Information (TI) on the F50 there was no conflict at that stage. Two minutes later, however, the F15 pilot went en route, climbing on a southerly heading. No TI was passed to the F15 pilot on the F50, which was once more outside the Leeming controller's displayed radar range. At no time did the Pennine Radar controller ask Leeming for co-ordination.

UKAB Note (1): JSP318A states "Once TI has been passed, it becomes dead information and no commitment to an agreed course of action is implied, nor is there any undertaking to update the information passed. The passing or receiving of TI does not in itself constitute Traffic Co-ordination.

UKAB Note: LATCC radar recordings are transcribed in the diagram. The F15 starts to head SE at 0959:40 in a shallow climb on a track to pass astern of the F50 but at 1000:20 it is

apparent that the F15 has turned right, into conflict with the F50. In addition to the averaged rates of climb shown for the F15, the radar recording shows a very small and brief increase in the F50's RoD before it pulls up into a climb at 3750 ft/min, passing 600 ft Mode C above the F15. The F15 passes ahead of the F50 by a very small distance (<0.25 NM); both separations (V and H) are the subject of interpolation as the CPA occurred between radar returns.

AAIB calculated that without the avoiding action the vertical separation would have been less than the minimum resolution of SSR. The F50's FDR shows that it was descending with a pitch angle of 4° which changed briefly to -5.5° before rising very quickly to +8°, achieving almost 2G in the process, and gaining about 1000 ft at the expense of 40 kt.

The AAIB discussed aspects of a RAS outside controlled airspace (CAS), also quoting Airprox 39/00, an 'A' risk encounter between a Shorts 360 and a Tornado F3 in which the controller was also unable to provide effective avoiding action due to the rapid changes in the fighter's flightpath. 2 safety recommendations had been made: 2000-57 invited the CAA and DAP to carry out a risk assessment of the collision risk for public transport operations outside CAS, and 2000-58 invited CAA and DAP to reassess the provision of CAS for public transport flights into airports not linked to airways. The former was partially accepted by the CAA because of the lack of statistical data required to conduct a quantitative risk assessment, but the MOD and CAA continue to work to improve safety in this airspace. The latter was also partially accepted; DAP is still studying the use of advisory routes and the incidents that occur in this airspace.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Although the F15 rear seater reported seeing the F50, he had assessed that there was no collision risk and did not inform his pilot of it. The radar

recordings showed that the only time during the encounter when there was not a risk of collision was after the F50 pilot had started his avoiding action and was pulling up at 2 g to avoid the F15. Members gained the impression that the F15 WSO had seen the F50 virtually as the military jet was passing it, and that this late sighting was the main part of the cause of the Airprox. The Board agreed that this was effectively a non-sighting in terms of the crew's ability to take avoiding action as a result of it. Members considered that the F15 crew could have helped themselves by advising Leeming of their intention to head south before doing so, or by calling London Radar before climbing. As it was, 'see and avoid' was their responsibility.

There followed a lengthy discussion about the RAS provided by Pennine Radar, which polarised into 2 opposing positions. One view was that by the time the Pennine controller became aware of the conflict, there was little he could do about it; this was supported by some controllers. Other controllers took a counter view. They said that, at that moment, the controller should have issued immediate avoiding action in the form of a hard right turn onto N - the first words - rather than repeatedly asking if the pilot was VMC. They did not accept the standpoint that avoiding action being negated by the manoeuvres of unknown traffic was a reason for not giving it; they would keep modifying it if necessary until a conflict had passed.

Opinion was also divided as to whether the Pennine controller's action was timely and accurate. The F15's angle-off from the F50 remained constant at 29° during the period shown in the diagram; almost exactly 1 o'clock rather than the 2 o'clock passed twice by the controller, which may have been partly why the F50 pilots never saw it. The expression 'pop-up' was taken to mean 'I have just noticed it' and it was observed from the radar recording that the F15 had become a threat to the F50 a little while before that. The Pennine Control position was usually very busy and certainly covered a very large area of responsibility. However, at the time, the F50 was the only ac on frequency. Opinions remained divided as to whether the Pennine controller could or should have seen the conflict earlier and issued avoiding action to the F50, but all agreed on part of the cause; by the time the conflict was perceived by Pennine

AIRPROX REPORT No 2/02.

Radar, it was too late to provide effective avoiding action.

Members discussed the conversation between the Pennine and Leeming controllers. It was not known to what extent the Pennine controller might have been left with the impression that some form of co-ordination had taken place. Certainly none had; the Leeming controller's "I hope so" was probably intended to convey this impression, but probably words like "I have no idea" would have been a more effective response regarding the F15, under a RIS. As it was, the conversation appeared to have been purposeless. The temporary drawing of the Leeming controller's attention to an ac outside his area of activity was valid at the moment it was done but was of no consequence once the Leeming controller had returned to his task, with the F50 no longer on his radar picture.

In discussing the risk level, members noted that the F50 pilot's robust response to his TCAS had produced about 600 ft of vertical separation.

Because at least some of this was as a result of the captain's additional input, and because the climb profile of the F15 was changing, members assessed that the safety of the ac had been compromised.

Board members additionally asked the Chairman to ascertain from DAP what progress had been made with the safety recommendations referred to by the AAIB.

PART C: ASSESSMENT OF CAUSE AND RISK

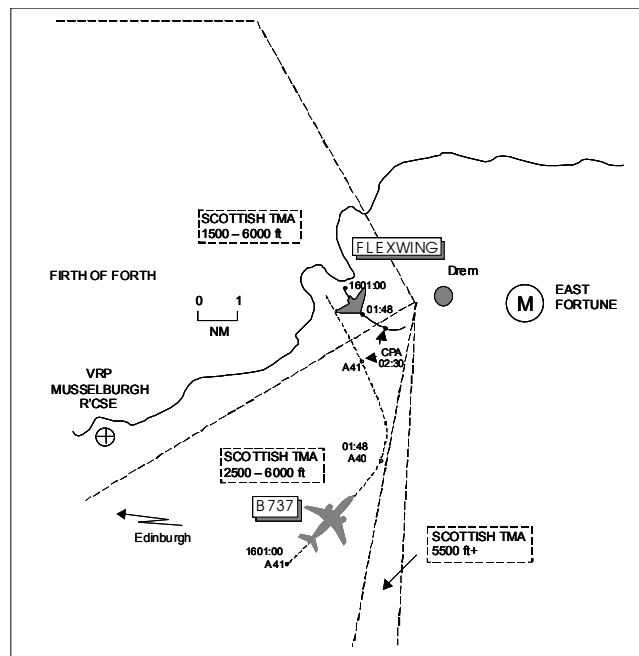
Cause:

- Non sighting of the F50 by the F15 pilot.
- By the time the conflict was perceived by Pennine Radar, it was too late to provide effective avoiding action.

Degree of Risk: B

AIRPROX REPORT NO 2/02

Date/Time: 9 Jan 1602 Twilight
Position: 5559 N 0250 W (17 NM E of Edinburgh)
Airspace: TMA (Class: E)
Reporting Aircraft Reported Aircraft
Type: B737-200 Pegasus Quantum
Flexwing M/L
Operator: CAT Civ Trg
Alt/FL: 4000 ft 4000 ft ↑
(QNH 1030 mb) (QNH 1030 mb)
Weather IMC IICL VMC CLOC
Visibility: >10 km >10 km
Reported Separation:
200 ft V 1 NM H 500 ft V 1 NM H
Recorded Separation:
NK V 1.0 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports flying inbound to Edinburgh at 4000 ft QNH 1030 mb and 230 kt in receipt of an ATC service from Edinburgh Approach on frequency 121.2 MHz. The visibility was >10 km, but he was flying in and out of the stratus cloud tops in IMC, strobe lights were switched on and he was squawking 4227 with Mode C. When approx 15 NM E of the aerodrome heading 360°, he thought, he saw a hang glider, possibly motorised, about 200 ft above on a relative bearing 070° at a range 1NM. It was only seen briefly as it passed down his RHS with no avoiding action required.

THE PEGASUS QUANTUM FLEXWING M/L PILOT reports flying a dual training flight from East Fortune and was in receipt of A/G service from East Fortune on frequency 129.85 MHz. The visibility was >10 km, 1000 ft vertically and 1.6 km horizontally from cloud, in VMC and the ac's wing was coloured blue with a white trike unit attached. His ac does not have a transponder fitted. He was climbing to get above cloud in order to obtain a good horizon to carry out a steep turns exercise. The cloud base was approx 2500 ft and he had found a large hole in the cloud cover about 1 NM W of Drem and he turned from a N heading onto S. He realised that he was now 1 NM inside TMA Class E airspace and that Edinburgh ATC would be vectoring ac further to the E during a known busy traffic period. He turned onto heading 110° at 50 kt to vacate the TMA, whilst continuing his climb, clearing the cloud tops at 3500 ft QNH 1030 mb. Passing 4000 ft he saw an ac, a dark coloured twin engined passenger jet, 4 NM to his SW descending on a Northerly heading. He continued climbing maintaining a steady heading as he realised that their tracks were diverging and he had no concern as to the other ac's proximity; by now he was climbing through 4500 ft with the other ac descending, passing 500 ft below and 1 NM behind to his starboard rear quarter. He went on to explain that although the cloud was generally broken, he had climbed at Drem in a large hole so as to maintain VMC minima. With hindsight, he should have contacted Edinburgh ATC but at the time he felt it would have been difficult for the student to change the radio frequency with a gloved hand. In future, although it is not a

requirement, he will recommend all club pilots to contact Edinburgh ATC when operating near CAS and to keep clear of the TMA boundary at busy times.

UKAB Note (1): The Edinburgh special METAR shows EGPB 1601Z 24008KT 5000 HZ BKN024 03/01 Q1030=

ATSI comments that this Airprox has no apparent ATC causal factors. The incident took place 16NM E of Edinburgh Airport in Class E CAS of the Scottish TMA. The radar source that the Edinburgh APR was using at the time is not recorded, however, the Lowther Hill radar recording does indicate the presence of a slow moving unknown primary target in the area concerned. The MATS Part 1, 1-51, para 14, which relates to action to be taken by controllers in respect of *'Unknown Aircraft'* within Class E airspace, states that (subject to limitations) they should *"Pass traffic information followed by advice on avoiding action or traffic avoidance"*. In his written report the Edinburgh APR states that he does not recall the unknown subject traffic appearing on his radar until it was about 1 NM to the E of the B737 and coincident with a sighting report by the latter's pilot. By this time there was little that the APR could have been expected to do. Operating under VFR the microlight was permitted to fly in Class E airspace without the requirement either to obtain an ATC clearance or establish communications with the relevant controlling authority. That said, the UK AIP (ref: ENR 1-4-6, 2.5) does advise that *"...pilots are encouraged to contact ATC and comply with instructions"*.

UKAB Note (2): Analysis of the Lowther Hill recorded radar at 1601:00 shows the B737 16 NM E of Edinburgh tracking 045° with a primary only response, believed to be the Pegasus Quantum M/L, in its 1030 position range 6.9 NM tracking SSE. At 1601:48 the B737 is seen to commence a L turn with the M/L 3.6 NM to the N. CPA occurs at 1602:30, the B737 steady tracking 335° as the M/L passes 1 NM to its NE tracking approx 120°.

UKAB Note (3): The RT transcript reveals the Edinburgh APR passing the B737 pilot a radar

heading of 360° followed by, shortly before 1602, a further L turn heading 340° onto L base. Immediately after an acknowledgement of an ATC speed reduction instruction at 1602:30, the B737 pilot transmits *"Er yeah we have a helicopter on our right hand side er B737 c/s er can you tell me what he's at"*. The APR replies *"B737 c/s er no known traffic in that area"*. The B737 pilot responds *"er he's either that or a hang glider he's about er he was about a mile passed by about a mile on our right hand side we're in and out of cloud and er looked to be about the same level"*.

PART B: SUMMARY OF THE BOARD'S DISCUSSION

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 reviewed the weather minima applicable to VMC and the ATC service that applied within the Scottish TMA Class E airspace. The Pegasus pilot had knowingly climbed into the TMA, in a hole clear of cloud to maintain VMC, and had then manoeuvred, when on top of the cloud layer, to vacate the Class E airspace to the E. None of this had broken any rules and he had been fully aware of his responsibilities within CAS but had decided not to contact Edinburgh ATC, as recommended in the UK AIP. The B737 had been under a radar control service from the Edinburgh APR who had unwittingly vectored the ac into conflict with the microlight which was not showing on his radar display system; the M/L pilot had not called on his frequency to announce his presence and intentions so there was no way the controller could have known he was there. Normally, an ac only 16 NM from a radar head above 3000 ft would be expected to show on an airfield terminal radar but a M/L is another matter. It is known to be a poor target whose detection would be very much dependent, amongst other factors, on the target aspect presented to the radar head. The Lowther Hill recorded radar had shown the M/L but this primary radar source was not available to the APR. Members agreed the anomaly of the situation that within Class E airspace, a radar control service had vectored the B737 into conflict with undetected traffic (that

had every right to be where it was) and it was this that had caused the Airprox. They felt there was nothing to prevent this situation from being repeated and so it should be looked at to see what could be done.

The B737 pilot was understandably surprised when an ac passed about 1 NM away unannounced, whilst being radar vectored and flying in and out of the cloud tops, with no TI from ATC and no TCAS alert. However, the onus was on the airliner pilot to be aware of the type of airspace in which he was flying and his attaching responsibilities for maintaining a lookout for VFR traffic in such circumstances. Pilots reminded all members that the classification of airspace was not shown on en route and terminal charts. The Director UKAB agreed that he would write to DAP and request that airspace Class labels and boundaries are shown on the appropriate charts. The B737 pilot may have been used to TI/separation from other traffic in a known traffic environment (Classes A to D) but members believed that pilots knowingly flying into Class E airspace should be aware of the different ATC service that would then apply i.e. separation from other IFR ac and TI normally passed on VFR flights when practical. In Class E airspace no separation distances are specified between IFR and VFR flights leaving instead pilots with the responsibility to see and avoid one another by a safe margin. In this case, the M/L pilot had seen the B737 and had considered that his actions had been sufficient to pass clear of the airliner by a safe distance. Some members believed that his options to avoid the B737 flying at 230 kt were limited, particularly in the lateral plane, owing to his slow forward speed and that the safety of his ac had been compromised. This view was not shared by the majority of the Board who concluded that the M/L pilot had seen the B737 in good time and had taken appropriate action, whilst maintaining visual contact, to ensure that any risk of collision was effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

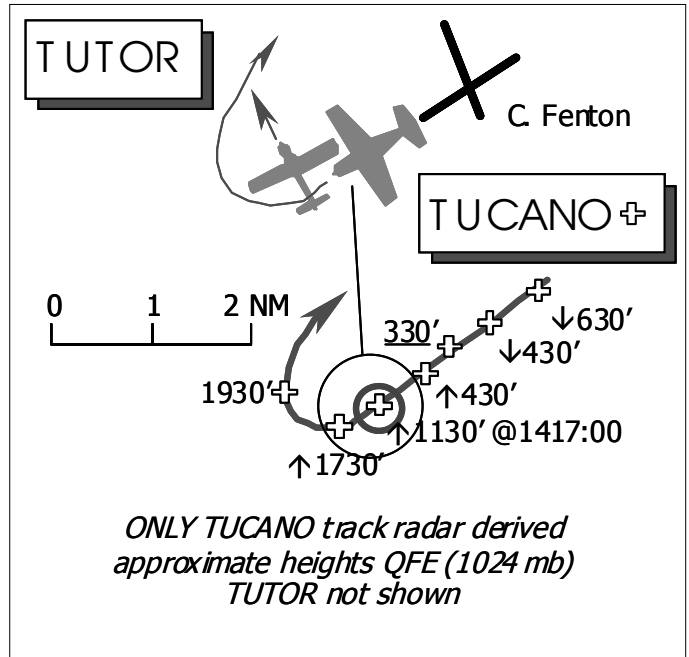
Cause: In Class E airspace, the B737 was vectored under a Radar Control Service and conflicted with undetected VFR traffic.

Degree of Risk: C

Recommendation: The CAA considers a review of the provision of Radar Control Service in Class E airspace.

AIRPROX REPORT NO 03/02

Date/Time: 11 Jan 1417
Position: 5350 N 0111 W (Church Fenton - elev 29 ft)
Airspace: MATZ (Class: G)
Reporting Aircraft Reported Aircraft
Type: Grob Tutor Tucano T1
Operator: HQ PTC HQ PTC
Alt/FL: 1800 ft 1800 ft
 (QFE 1024 mb) (QFE 1024 mb)
Weather VMC VMC HAZE
Visibility: 5000 m 5000 m
Reported Separation:
 100 ft V 100 m H Nil H, <300 ft V
Recorded Separation:
 Not Recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GROB TUTOR PILOT, reports that he was flying the ac from the RHS on an Air Experience Flight at Church Fenton, with a pupil in the LHS. HISLs were on and he was flying in VMC, with a visibility of 5000 m down sun, between layers and in communication with Church Fenton TOWER. Whilst flying a PFL in the RHD Cct to RW24 he was aware of a Tucano inbound to RW24 RHC on an IFR approach and wrongly assumed that it would pass astern. Whilst crosswind, heading 330° at 75 kt, between HIGH KEY and LOW KEY, descending through 1800 ft QFE (1024 mb), he saw the Tucano turn gently R toward his ac. Because of the Tucano's RoC, he lowered the port wing to avoid it and descended below the turbo-prop, which passed 100 ft above and 100 m astern. It appeared to him that the Tucano crew had remained on instruments throughout. He assessed that because he had been in the RHS and seen the other ac there had been a "very minor" risk of a collision. However, he added that

if it had been a solo student in his situation, or the instructor had been in the LHS, the Tucano would have been extremely difficult to see and the risk would have been "very high".

THE TUCANO T1 PILOT, a QFI based at Linton-on-Ouse, reports his ac has a 'high-conspicuity' black PTC colour scheme and he was instructing from the rear seat with a student flying the ac from the front. They were flying the published TAC/ILS procedure to RW24 RHC (RHD Cct) at Church Fenton with the intention of overshooting at 200 ft and carrying out, he reports, a Missed Approach Procedure (M/App). He believed that the 'clearance' given by ATC was: "once clear of the visual circuit clear R turn and own navigation". At 3 NM on the approach, he was cleared to overshoot with 2 ac in the visual Cct. At 200 ft QFE (1024 mb) his student initiated the overshoot and cleaned up the ac. Climbing at 10° nose up at 150 kt, with his student on instruments he took

control of the ac passing 1000 ft and continued the climb - under IFR but looking out - straight ahead still on the runway heading of 234°. At about 1700 ft he felt the student make a physical input to the controls and the ac rolled L. When he questioned the student why he had done that, he was told that they had just missed a Grob, which had just flown directly underneath their ac about 150 – 300 ft below them. He had not seen the other ac at all.

MIL ATC OPS reports that the Tucano crew was receiving a RIS from Church Fenton APPROACH (APP) whilst positioning for a TACAN to ILS approach to RW24 RHC at Church Fenton. When asked about their DH and intentions from the approach the Tucano crew reported *"..200 to overshoot"*, and when APP queried their further intentions after the overshoot the Tucano crew replied *"..once we've overshot, we'll level off at about 1500 feet in a north-westerly direction and then, clear of the circuit, we'd like to do a low level abort onto a north-easterly heading"*; APP replied *"C/S, roger after departure once clear of the visual circuit right turn own navigation maintain squawk and continue with Linton Departures..."*, which was acknowledged. The Tucano was then handed over to Church Fenton TALKDOWN (PAR) who monitored the ILS approach. At about 1412:15, in accordance with local regulations, PAR passed Church Fenton TOWER (TWR) the Tucano's position - 7 NM finals - and the crew's intentions to allow TWR time to assess the position and plan the priorities of the visual Cct traffic. At 1414:52, PAR requested a clearance from TWR for the Tucano, *"Three miles, (C/S) to overshoot"*; TWR replied, *"C/S, cleared to overshoot, two in"*, which was repeated verbatim by PAR and acknowledged by the Tucano crew. As they passed their decision height of 200 ft at 1416:34, the Tucano crew commenced their overshoot and passed brief details of some unserviceable approach lighting to PAR, whom at 1417:32, instructed the crew to contact Departures (DEPS) for their climbout. As far as DEPs was concerned, the Tucano crew made an uneventful departure from Fenton and left the frequency without indicating that any incident had occurred.

The crew of the Tutor took off at 1402:28, to conduct Cct training at Church Fenton. At 1412:20, TWR made a broadcast to Fenton Cct traffic, *"Tucano 7 miles overshoot"*; shortly

afterwards, at 1412:40, the Tutor crew reported, *"(C/S) climbing HIGH KEY (for a PFL)"*. At 1415:00, as the Tutor climbed to 2500 ft QFE (1024 mb), TWR broadcast, *"Tucano 3 miles overshoot"* to the Fenton Cct ac. When the Tutor reported reaching HIGH KEY at 1415:42, TWR stated *"C/S, one ahead – radar traffic inside 3 (miles) – surface wind 210 - 5 knots"*, which was acknowledged. As the subject Tutor descended from HIGH KEY (2500 ft on the deadside) towards LOW KEY (1500 ft on the liveside) – the location of which is obscured from TWR's view by the roof of the control tower – another Tutor joined ahead on the RHD downwind leg. Therefore, TWR updated his earlier 'circuit traffic information' stating *"C/S, two ahead"*, (including the Tucano) which was acknowledged by the crew of the subject Tutor. The reporting Tutor crew completed their PFL, rolled and completed one further Cct before landing; they switched from TWR's frequency at 1423:30, with no indication that an incident might have occurred. The captain of the Grob Tutor later contacted ATC and filed an Airprox report.

From an ATC perspective, there does not appear to be any contributory factors in either the ATC procedures or individual controller technique employed during the period of this occurrence. All clearances and broadcasts were accurate and delivered in a timely manner, and all were acknowledged by the relevant aircrews. Moreover, the information provided by TWR proved to be sufficient for the Tutor crew to spot the Tucano early in their PFL procedure.

UKAB Note (1): A review of the LATCC Claxby and Great Dun Fell radar recordings reveals that this Airprox is not recorded. Only the Tucano is shown with Mode C, on the TAC/ILS final approach to RW24 RHC and during the M/App. The Tucano is shown executing the M/App climbing from about 330 ft QFE (1024 mb), at the Missed Approach Point (MAP - the Middle Marker 0.7 NM from touchdown) and climbing through 1130 ft QFE on runway heading overhead the aerodrome. The Tucano passes about 1730 ft QFE and then commences a R turn outbound, this was probably when the Airprox occurred, but the non-squawking Grob Tutor is not shown at all.

UKAB Note (2): As a result of this Airprox a slight revision has been made to Church Fenton Cct procedures. When executing a PFL a pilot may

initiate, or TOWER may require, ac to orbit at HIGH KEY when IFR approaches are inside 3 NM from touchdown; this facilitates better integration of VFR Cct traffic with IFR approaches. To help pilots assess their position in the pattern, but not as a direct result of this Airprox, Church Fenton TWR now gives an additional 5 NM range broadcast to circuiting pilots about IFR approaches, in addition to the standard 7 and 3 NM calls.

THE REPORTING GROB PILOT'S UNIT

comments that this report is submitted to highlight the potential dangers of ac, with greatly differing levels of performance, carrying out instrument approaches to a busy visual Cct. There is a possible confliction between ac overshooting and ac flying a PFL, especially if the former has a high RoC. Prior to this incident, it was not greatly appreciated who had right of way in such a situation. This incident brought the matter to the attention of all users and a similar occurrence is unlikely to happen again.

HQ PTC comments that this encounter is redolent [suggestive] of so many which have occurred over time in the Cct and perhaps - in the past - have been regarded as a training hazard and gone unreported. A pilot sees another ac in unexpectedly close proximity and avoids it; the other does not because he is "head-in". ATC made all the right standard calls but they didn't work. Are they constrained too much from passing more specific warnings?

There is a now much healthier willingness to highlight flaws in visual Cct procedures by filing an Airprox. This one, and others, perhaps points to a less than clear-cut division of responsibilities where IFR and VFR traffic impinge. There must, surely, be an incumbency on instrument traffic to temporarily "go VFR" while passing through the visual circuit, ie look out. APP clearly thought so - by saying "once clear of the visual circuit" - but where is it written?

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 appeared to the Board that this Airprox followed from a misconception and differing interpretation by one of the pilots of these two ac as to his relative priority within the visual Cct. In essence what had occurred was a conflict in the aerodrome Cct area between flights operating under the differing flight rules - VFR and IFR. While the Grob pilot was flying a PFL, VFR in the visual Cct, the Tucano pilot was climbing out through the Cct area flying the M/App under IFR but in VMC - and keeping an eye out of the cockpit for other ac. The Grob pilot was aware of the Tucano from the broadcasts by the ADC over the TOWER frequency at 7 and 3 NM, which included the intentions of the Tucano - to 'overshoot'. Moreover, the Grob pilot had seen the Tucano from some distance out as it started to climb through the Cct area from the MAP at 0.7 NM from touchdown. Here, members believed, is where the confusion arose as to what the Grob pilot expected the Tucano to do next. In accordance with normal practice the ADC had broadcast the intentions as an 'overshoot' and the Grob pilot thought the Tucano QFI would do just that. Military ATC procedures make no distinction with advisory TOWER broadcasts between an overshoot from a PAR/ILS to clear, or to join the Cct and a M/App. However, the Tucano QFI knew he would be executing a M/App - but had told ATC he would overshoot and climb to 1500 ft. What was then conveyed to the Cct traffic was that the Tucano would (simply) overshoot. It seemed that this should be sufficient for pilots established in the Cct to think that the Tucano would climb out on the RW track. Military instructor pilot members understood the scope for some uncertainty in this situation insofar as the 'overshoot' is a **visual** procedure (after applying power and initiating a climb), the ac is first 'cleaned up' then flown onto the deadside (where one exists), with due regard to other Cct traffic, which the pilot must give way to if joining the Cct. In this instance, the Tucano was overshooting into the M/App which involved climbing straight ahead over the RW. Military controller members saw no difference or distinction. They thought that once cleared at 3 NM to 'overshoot', the runway was effectively the Tucano pilot's at that point. This view was made in full knowledge of the Tucano pilot's intentions after the overshoot, knowledge that had not been

shared in as many words with pilots in the Cct. There appeared to be scant detail available on these issues in the various books of reference – a point that PTC had alluded to in their apposite comments. Members assumed such information was contained in various Unit FOB, ATC Controllers' Order Book and Air Staff instructions, but some thought this general Cct information should be explained in references that were more accessible – for use by pilot and controller alike - because this Airprox had highlighted a differing interpretation between the two.

The M/App is an **instrument** procedure, initiated at the MAP – here for an exercise. A member observed that any IFR approach has the potential to end with a 'missed approach' with the pilot 'on instruments' as he flies through the visual Cct area - as the Tucano QFI here. In IMC, no problems attach with Cct traffic because none would normally exist. However, flying these IFR procedures in VMC is a different matter and a safety pilot – for lookout – is the best way to ensure safety standards are maintained. That said, IFR traffic is accorded priority and when not countermanded by specific promulgated local orders where necessary, all other Cct traffic will give way to IFR ac. Here the Tucano crew had been given the Cct state – as is normal practice - "2 in", but no further indication of where these ac were in the Cct. Some civilian controller members decried military procedures and thought this information was too vague. Indeed some commercial pilot members queried if between 'HIGH & LOW KEY' was actually considered part of the aerodrome Cct because there was no indication to the Tucano pilot that the Grob was actually above the normal Cct height of 1000 ft. The Board was briefed that discussions between UKAB staff and the Tucano QFI had revealed that he was cognisant of the first Grob downwind in the Cct but was not aware of the subject Grob's position – neither was he unduly concerned. He believed, correctly, that both Grob pilots should remain clear and 'give way' to his ac as he climbed through the Cct area on his M/App. Some suggested that pilots should be given more specific information, but military controller members explained that more detailed positions at this point it would be superfluous, because by the time the IFR ac had flown into the Cct area the information would be redundant. The ADC was correct with his Cct state and furthermore by specifying to the subject Grob pilot that there

were "two ahead" was emphasising the number ahead in the sequence of traffic for the runway. This broadcast to Cct traffic was to help pilots assess their position relative to the approaching IFR ac and allow them to integrate accordingly. Consequently, members viewed the Grob pilot's report that *"It appeared to him that the Tucano crew had remained on instruments throughout"* with concern, because that is exactly what the Tucano QFI was doing during his IFR M/App. This revealed a significant misunderstanding of priorities within the Cct as to who will give way to whom – as commented on by the Grob pilot's Unit, which in the Board's opinion was a contributory factor. VFR traffic in the visual Cct will 'give way' to IFR traffic flying through the Cct area and here the Grob pilot should have 'given way' to the Tucano which he had seen from a long way off but he apparently did not do so until a late stage, seemingly caught out by the Tucano's unexpected high RoC. It appeared to the Board that the Grob pilot had flown on, in the erroneous belief that the Tucano pilot could see his ac and would avoid it. Hence, surprised by the other ac's high RoC the Grob pilot suddenly realised he was not going to do so and had to get out of its way quickly. With this in mind the Board agreed that part of the cause behind this incident was that the VFR Grob Tutor pilot had flown into conflict with the Tucano executing an IFR procedure. In the other ac the Tucano QFI was unaware of the Grob until his student – acting as the safety pilot - took evasive action of his own volition. The QFI had commented later to UKAB staff that the view from the Tucano rear seat in a nose-up climbing attitude was somewhat limited. Notwithstanding the poor conspicuity of the white Grob – a known problem - the student 'safety pilot' should have been able to see the Grob (as he was VMC) earlier than he did and it was apparent that the QFI had been somewhat surprised by his student's unexpected input on the controls. This led members to conclude that a late sighting by the Tucano crew was also a causal factor in this Airprox.

A GA member thought that the student's intervention was indicative of the severity of the situation, insofar as it is unusual for a student unexpectedly to exercise overriding control of an ac – not a thing to do lightly – but this view did not gain wide support. Others thought this demonstrated sound awareness by the student and a good example of CRM working as it should

do. In all assessments of risk only the actual circumstances are considered by the Board - not the 'what ifs'. Whilst noting the Grob pilot's understandable concern if he had been in the LHS, or a solo student had been flying, here he had himself assessed the risk as "*very minor*". Whilst watching the Tucano, he had always been able to move out of its way, which he did albeit somewhat belatedly. The student in the Tucano had also taken limited avoiding action, but it was unclear whether this produced sufficient change in the ac's flightpath to have had a significant effect. The separation could not be determined with any certainty as the Grob was not shown on the radar recording and both pilots' estimates of the minimum separation were different. However, the outcome was that the Grob passed between 100 and 300 ft beneath the Tucano according to the respective pilots' reports. Consequently, as pilots in both ac had seen each other's ac and taken action to remain clear, in the Board's view, no risk of a collision had existed.

The differing perception, between controllers and pilots of what pilots actually do under certain procedures and the priorities within the Cct caused members some surprise. Here, the Tucano QFI had advised he would overshoot, but carried out a MAP to a lower height than called for on the procedure – just to where the Grob was descending to between HIGH & LOW KEY, with no indication that the latter was there. This was not communicated to Cct traffic and there was no specified requirement for it, but many members thought HQ PTC's observation on this point was valid. It would appear this was a case of confusion resulting from lack of clarity and/or knowledge in the application of IFR and VFR procedures, which nonetheless have worked successfully for many years. However, applicable

procedures and the reasons they work the way they do appeared either to be poorly defined or well hidden away in numerous documents which is unhelpful to those who need to be absolutely clear about them. Most importantly, there needed to be a clear understanding of priorities within the Cct and who fits in with whom especially by instructors when teaching students. Members felt these should be laid out clearly – in detail – and preferably in one document and that a lack of clearly promulgated definitions and explanation of procedures to differentiate between a visual overshoot (VFR) and a Missed Approach Procedure (IFR) was contributory. On the basis of this Airprox members recommended that the MOD, through Central Flying School, reviews priorities and/or policy for situations where IFR and VFR traffic mix in the visual circuit.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Grob Tutor pilot flew into conflict with the Tucano. Compounded by a late sighting by the Tucano crew.

Degree of Risk: C.

Contributory Factors: Lack of clearly promulgated definition and explanation of procedures to differentiate between a visual overshoot (VFR) and a Missed Approach Procedure (IFR).

Recommendation That the MOD, through Central Flying School, reviews priorities and/or policy for situations where IFR and VFR traffic mix in the visual circuit.

AIRPROX REPORT NO 4/02

Date/Time: 16 Jan 1218

Position: 5231 N 0232 W (3.5 NM WSW of Bridgnorth)

Airspace: LFS (Class: G)

Reporting Aircraft Reported Aircraft

Type: Harrier Squirrel

Operator: HQ STC HQ PTC

Alt/FL: 340 ft 220 ft
(Rad Alt) (Rad Alt)

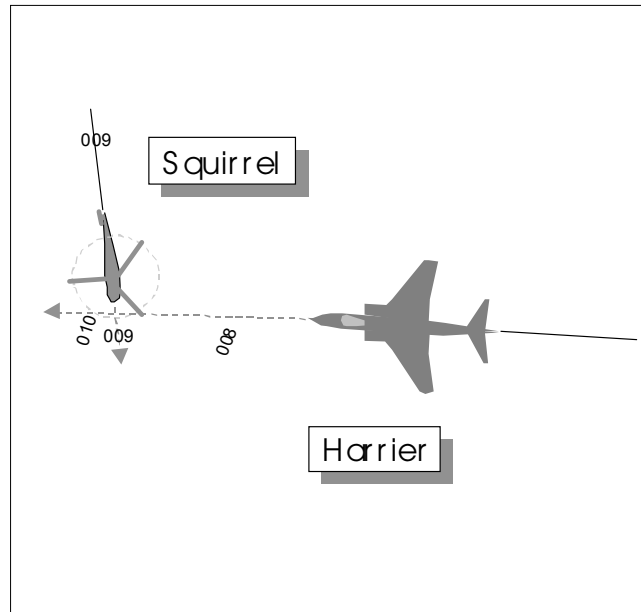
Weather VMC CLBC VMC CLBC

Visibility: 10 km 10-15 km

Reported Separation:

200 ft V 200 ft V, 100 ft H

Recorded Separation: 100 ft Mode C



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HARRIER PILOT reports heading 270° at 420 kt on a LL SAP sortie. After glancing into the cockpit twice for periods of about 1 second each he looked up to become immediately aware of a black and yellow helicopter in his 12:30, very close, crossing R to L. He instinctively pulled up achieving 5.3 g to avoid the helicopter, although it was about 100 ft below his level. He reckoned he would have passed no more than 200 ft over the helicopter; if he had been flying at his MSD (250 ft) there would have been a very real risk of collision. After passing it he looked back to see the helicopter continuing on track.

THE SQUIRREL PILOT reports heading 180° at 100 kt on a crewman navigation training sortie. An 'airblast' noise was heard and he saw a fast jet departing into his 3 o'clock. It had passed before he could react and he estimated it had passed within 200 ft above and within 100 ft horizontally. It appeared to be on its own and the risk of collision was high.

MIL ATC OPS reports that the Squirrel was receiving a FIS from Shawbury Zone. The ac was not identified and no mention was made of an Airprox on RT. Zone did not see any conflicting traffic in the area of Bridgnorth.

UKAB Note: The Clee Hill Radar recording shows the ac converging as described by the pilots. The Harrier is following rising ground which may have shielded the Squirrel from an earlier sighting; it shows 100 ft below the Squirrel just before the returns merge and 100 ft Mode C above the Squirrel just after the cross.

HQ STC comments that this incident once again highlights the particular vigilance required by pilots to acquire slow-moving ac and the potential for distraction that routine in-cockpit management tasks pose. Although the Harrier pilot's prompt avoiding action removed the risk of a collision, the effect of jet wash on a rotor disk is well known. Applying high 'G' to increase the miss distance, and unloading to reduce the jet wake as the ac passed over the rotor disk was probably the most appropriate course of action in the circumstances.

In the continued absence of a technology-based collision warning system for military aircraft, this incident stands as a reminder to all operators that the risk can only be mitigated by good lookout, efficient cockpit management and uncluttered fields of view in ac.

HQ PTC comments that this was clearly a random encounter in the LFS where both ac were operating within the rules. The Harrier pilot saw the Squirrel early enough to be able to increase separation, which was fortunate as the latter did not see the other ac in time. We are, together with DHFS and the contractor, exploring the options for increasing the conspicuity of their ac. However, this is another case where a CWS could have unambiguously and safely resolved the confliction.

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 Board was advised that the helicopter pilot would have been in the RHS with a student crew member in the jump seat so his view across the cockpit towards the approaching Harrier would have been restricted. Members agreed that the

cause of the Airprox was that the Harrier pilot saw the helicopter too late to give it a wider berth, and that the helicopter crew did not see the Harrier until after the event. While the Mode C showed the Harrier was actually below the Squirrel a few seconds before they passed, it had been climbing gently, following rising terrain, and its flightpath could have been angled above that of the Squirrel. This would account for the Harrier pilot's perception that the Squirrel was below him when he saw it. While some members considered that there had been a risk of collision in the encounter, a majority considered that the ac probably would not have collided without the Harrier pilot's avoiding action. However, with one crew unsighted, the Board agreed that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

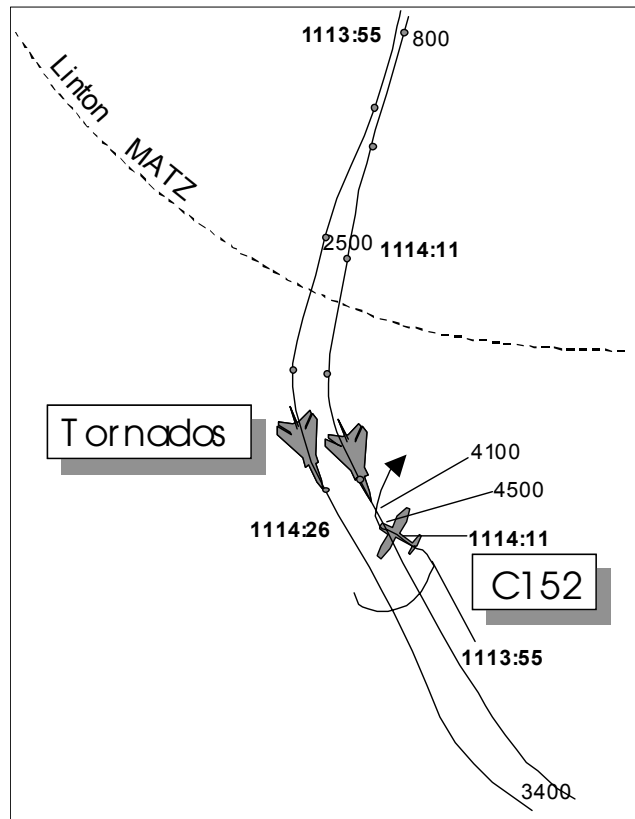
Cause: Late sighting by the Harrier pilot, and a non-sighting by the Squirrel crew.

Degree of Risk: B

AIRPROX REPORT NO 5/02

Date/Time: 18 Jan 1114
Position: 5358 N 0118 W (6 NM SSW of Linton on Ouse)
Airspace: AIAA (Class: G)
Reporting Aircraft Reported Aircraft
Type: C152 Tornado GR
Operator: Civ Trg HQ STC
Alt/FL: 3500 ft 3000 ft ↑
(RPS 1006 mb) (QFE 1012 mb)
Weather VMC CLBC VMC CLOC
Visibility: Unltd 20 km

Reported Separation:
2-300 ft V <1000 ft V
Recorded Separation:
NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C152 PILOT reports flying an instructor training sortie covering spinning. He was receiving a VHF FIS from Linton on Ouse whose controller he had advised he would be operating between 2-4000 ft RPS and who had agreed that the Wetherby area would be suitable, bearing in mind flypast activity at Linton. Having performed several spins between 4000 ft and about 3500 ft, during which period he had received traffic information from Linton, he performed a 360° lookout turn and entered a spin to the left from West. After about 1 turn he saw an ac passing very quickly almost directly below by 2-300 ft. Being in a spin he had no opportunity for avoiding action; the risk of collision was moderate to high. He filed an Airprox with the controller. In a later discussion with ATC he was told there were 2 ac; the Tornado pilots apparently had considered they were safe at 3000 ft. He had hoped, however, that they had been told he was operating between 2000 and 4000 ft, which could be traversed quickly in a spin, and that in future, consideration should be given to lateral avoidance.

THE TORNADO PILOT reports leading a pair in battle formation at 450 kt, turning left onto 125° after departing the Linton overhead, and receiving a FIS from Linton Approach on UHF. He saw a light ac in his 11:30 about 1000 ft above his height of 3000 ft QFE, apparently in straight and level flight. He took a second look and saw it in plan view descending towards him; both ac broke right to avoid it. It passed less than 1000 ft above and he considered the miss distance was less than ideal.

UKAB Note: ATC radar recordings show the C152 in a left turn at 4500 ft Mode C as the Tornados climb out from Linton, widening into battle formation and turning gently left. The Tornados tighten their turn on leaving the Linton MATZ and pass under the C152 just as its Mode C changes from 4500 to 4100 ft on the next return. The Tornados' Mode C is intermittent commensurate with a moderate rate of change (4800 ft/min up to 2500 ft) and shows 3400 ft about 25 sec after the ac pass. Vertical separation cannot be determined from the recording.

MIL ATC OPS reports that the Cessna pilot called Linton Zone (ZONE) at 1053:13 requesting a FIS for general handling. The pilot was aware of the graduation ceremony taking place at Linton and requested a quiet area to work *"preferably between Wetherby and York"*. ZONE confirmed that *"the Wetherby area would be okay"* and the pilot advised at 1054:04 he would be *"manoeuvring in the Wetherby area 4000 to 2000" on the RPS*. At 1115:11 the Cessna pilot informed ZONE of an Airprox with *"a military fast jet going south"*. Subsequently, the service was upgraded to RIS, limited from the N due to the proximity of the radar overhead, and continued without further incident until the pilot departed ZONE's frequency at 1124:14.

Linton Approach was co-ordinating ac arriving and departing for the graduation ceremony. The Tornado pair called Linton Approach (APP) at 1105:25 to the east of Linton for a *"flypast at minute 09"*. They were placed under a FIS, given the QFE (1012 mb) and asked to position to the E; to this they advised APP that they were approaching the NE. A squawk of 4511 was allocated and traffic information given on a single Tornado holding *"approximately 15 miles north east of the field this time."* The single Tornado was cleared at 1111:12 to fly through and the pair at 1111:25 *"one ahead"*. At 1113:17 the single Tornado called departing. At 1114:02 the pair called departing to the SE, APP acknowledged this at 1114:07 however, at 1114:08 he called conflicting traffic to the single Tornado before returning his attention to the pair advising them of the Barnsley RPS (1006) at 1114:17. The pair informed APP at 1114:19 that they were *"climbing to 3000 ft to cross Church Fenton MATZ"*. At 1114:44, APP transmitted *"C/S traffic, south, one mile, um, west bound indicating 500 ft above"*, this is believed to be the Cessna. Twenty five seconds later (1115:09), the Tornado pair advised APP that *"you've got a Firefly doing aerobatics it would appear, just as all the aircraft are coming off the Linton Area"*. It is believed they were referring to the Cessna. The pair left the frequency at 1116:55.

The incident took place in Class G airspace, in VFR, under a FIS and it appears from the Cessna pilot's report that, up until the incident, there had been a good flow of information between him and ZONE. Linton SATCO reported traffic levels as medium, occasionally high. APP appears to have

worked hard to ensure his aircraft were aware of each other as well as unknown traffic subsequently believed to be the Cessna. At the time of the incident the SATCO's investigation reveals that ZONE was working both UHF and VHF frequencies, as published, and was in the processes of identifying a Jaguar climbing out from low level to the NW of Linton for a radar service and MATZ crossing. Undoubtedly, it would have been advantageous if ZONE had managed to call the departing traffic to the Cessna however, whilst JSP318A 235.125.1 states that a FIS is to provide information *"useful to the safe and efficient conduct of flight"*, the priority on this occasion appears to have been the Jaguar against the graduation flypast. In hindsight, a manoeuvring position more towards York may have been prudent and would have placed the Cessna in a position nearer to 90 degrees off the runway in use at Linton. This may have afforded more reaction time against departing traffic, however, had the Tornados departed to the SE as declared, a similar situation may still have arisen.

HQ STC comments that under a FIS, pilots need to be aware that they should not reduce their lookout just because ATC have not called a potential conflict.

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 discussion centred on what a pilot should expect from a FIS. Clearly the Cessna pilot thought that at least the Tornados should have been given enough information to enable them to avoid him. But the jets were also under a FIS. Ideally, the traffic information passed to the Tornado pair would have included the height block being used by the Cessna, whose identity should have been readily available from its squawk, but it was unknown if this information was marked on a FPS where APP could see it. However, under a FIS, the TI that was passed was a bonus, and unfortunately at the critical moment Zone was distracted by a higher priority task. The Airprox was an untidy affair which members felt

AIRPROX REPORT No 6/02.

might well have been avoided if one or both of the participants had asked for a RIS.

Members were aware that pilots would sometimes receive radar derived traffic information while under a FIS and that this might lead some to expect it as a matter of course. The name of the service was felt to be misleading and many members considered that something like a 'Flight Watch Service' might better express what pilots should expect.

Members noted that the Cessna pilot's pre-spin clearing turn had not disclosed the approaching Tornados to him, but were not particularly surprised since a camouflaged Tornado below the skyline, at some distance, with very little angular motion was not likely to be seen early. Similarly a white Cessna, well above, against the sky was not the most conspicuous thing from a Tornado cockpit. Members considered that the pilots' sightings were about as early as could be

expected in the circumstances and that the incident was a conflict of flightpaths which was resolved by the Tornado pilots.

In discussing the risk level, members observed that the Cessna pilot, while spinning, had no opportunity to take avoiding action. However, the Tornados had been given traffic information and, while the leader had seen the Cessna late and had not immediately recognised its descending flightpath, the Board assessed that the pilots had had time to ensure they did not collide with it.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict of flightpaths resolved by the Tornado pilots.

Degree of Risk: C

AIRPROX REPORT NO 6/02

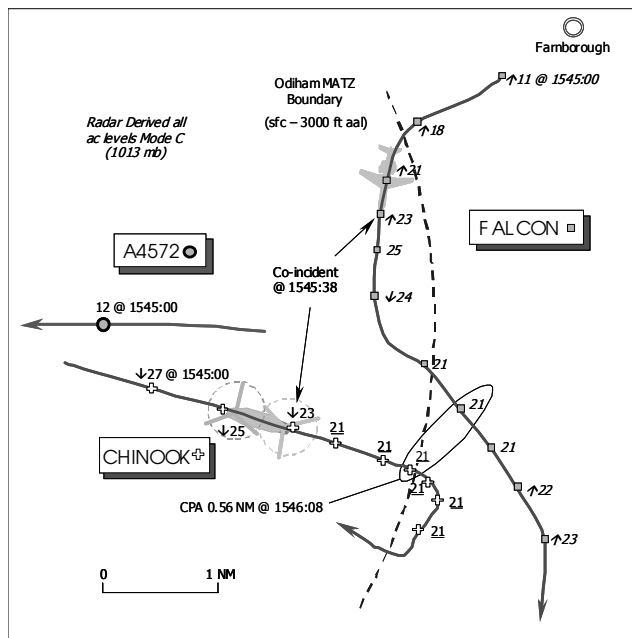
Date/Time: 21 Jan 1546
Position: 5113 N 0050 W (4 NM ESE of Odiham - elev 405 ft)
Airspace: Odiham MATZ (Class: G)
Reporter: Farnborough ATC

	<u>First Aircraft</u>	<u>Second Aircraft</u>
<u>Type:</u>	Falcon 50	Chinook
<u>Operator:</u>	Civ Comm	HQ JHC
<u>Alt/FL:</u>	↑ 2000ft (QNH 1006 mb)	↓ 1500 ft (QFE 992 mb)
<u>Weather</u>	IMC IIC	IMC IIC
<u>Visibility:</u>	5km	Not reported

Reported Separation:

<u>APR</u>	1/4 NM H, 200 ft V. 300 ft V (TCAS)	1/4-1/2 NM H nil V
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Recorded Separation: 0.56 NM H nil V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE FARNBOROUGH APPROACH RADAR CONTROLLER (APR) provided a very comprehensive report, stating that she was notified by the Farnborough ADC that the Falcon was taxiing for departure from RW24 to join CAS at GOODWOOD (GWC). A 'release' was obtained from the LTCC SC and the ADC advised of the assigned squawk - A0337. Shortly afterwards she called Odiham to pass them traffic information on the departing Falcon, advising that the jet would depart behind their traffic, which she had observed squawking A4572 in their RW28 instrument pattern. A few minutes later Odiham DIRECTOR (DIR) rang to pass traffic information on another ac about 1 NM W of Odiham, squawking A4570 – the Chinook helicopter – then at 3000 ft ALT carrying out an instrument procedure into Odiham. She advised that the Falcon would be departing in about 2 min time to route behind the A4572 squawk and then direct to the GWC, climbing to 2000 ft ALT and asked if they would maintain 3000 ft ALT with the Chinook, which DIR agreed to do until clear of the Falcon. Just as the jet took off, DIR rang to advise that the Chinook which was now about 2 NM SE of Odiham was descending. The helicopter's Mode C indicated about 2700 ft and she advised DIR that the Falcon was now airborne and asked for confirmation that the Chinook was descending to 2000 ft, which DIR said it was. Immediately, she rang the Farnborough ADC to pass avoiding action and at the same time selected the TOWER frequency and heard the ADC instructing the Falcon pilot to contact her on APPROACH. She called the Falcon pilot but there was no response; after a second call the pilot responded and she passed an avoiding action R turn onto 275° and gave traffic information about the Chinook. There was no response from the Falcon pilots so she queried if they were turning R, but the pilot then reported that he had turned L in response to a TCAS RA (sic). She instructed the Falcon crew to climb to 3400 ft ALT, whereupon DIR rang to ask if she could climb the Falcon further, but advised them that she was taking horizontal avoiding action and turning the jet onto 275°. Odiham then rang again to say that their Chinook pilot was visual with the Falcon. During the TCAS RA, the Falcon pilots reported an ac in the base of the cloud at 2000 ft in close proximity and tracking

towards them. She advised the crew of the circumstances and they said that they had taken the TCAS RA rather than the avoiding action turn as it appeared the better resolution at the time. During the Falcon crew's avoiding action against the Chinook she assessed the minimum separation was about 0.25 NM and 200 ft.

After the Falcon crew had resumed their track toward GWC at 3400 ft ALT, she rang LTCC to coordinate a climb to 6000 ft into CAS, which was agreed, before she transferred the ac to London CONTROL.

THE FALCON 50 PILOT reports that all available lighting was on, including flashing landing lights and HISLs, whilst departing from Farnborough at 250 kt, heading 190° to join CAS at GWC under an "IFR" service from Farnborough ATC. He was flying in cloud, IMC, at 2000 ft Farnborough QNH (1006 mb) when they received a TCAS RA with which he complied. The other ac was not seen but according to the TCAS display, it passed 300 ft below and 1 NM astern of his ac. He assessed the risk of a collision as "*moderate*".

THE CHINOOK PILOT's comprehensive report states his ac is camouflage green but HISLs were on, whilst inbound to Odiham for a 'COPTER TACAN to ILS approach for RW 28, under a RIS from DIR at 3000 ft Farnborough QNH. After reporting 'beacon outbound' tracking 107° at 120 kt, he was "cleared" to descend on the procedure to 2000 ft Odiham QFE (992 mb) initially, because of opposite direction traffic inbound for a PAR to Odiham at 1500 ft QFE, he was also advised of traffic departing Farnborough towards the GWC. At about 3 NM outbound, DIR advised that he had passed the PAR traffic, and was "cleared" to descend to 1500 ft. Flying IMC at about 4.5 NM outbound, but with intermittent gaps in the cloud, DIR advised of another ac – the Falcon - at 11 o'clock - 1 NM, crossing L - R at 1500 ft. UKAB Note (1): 2000 ft QNH (1006 mb) equates to about 1580 ft QFE (992 mb). Seconds later he received an avoiding action instruction from DIR to turn R immediately onto 190°. As he rolled his helicopter into the R turn, an executive jet appeared out of the cloud at 10 o'clock about - 0.5 NM away at the same height. The jet was in

a gentle R turn, banked towards his helicopter and for a few seconds both ac flew turning arcs parallel with each other. He was then directed to continue the R turn onto 230°; as they tightened the turn the Falcon started to roll L and disappeared in a bank of cloud. He was then offered vectors for the ILS, which he accepted, to an uneventful final approach and landing.

He assessed the minimum separation as 0.25 - 0.5 NM horizontally at the same height, but opined that if DIR had not issued the avoiding action instruction, the Falcon would have passed very much closer than it actually did. In his opinion, DIR's call was the correct and safest course of action, which made the risk of a collision unlikely. Nevertheless, they could have passed dangerously close if avoiding action had not been taken.

UKAB Note (2): The applicable Odiham weather was reported as RW 28 CC GREEN surface wind: 190/18; 6 oktas 1400 ft; QFE 992 mb.

MIL ATC OPS reports that the crew of the Chinook was flying a TACAN to ILS into Odiham whilst receiving a RIS – *"limited from all around due to poor radar performance"* - from DIR and squawking 3/A 4570. DIR's traffic loading was 'light', with one other helicopter executing a PAR; the controller had been instructing a trainee on DIR for 90 mins beforehand, but was now operating the position herself.

At 1537, the Farnborough APR prenoted Odiham with information about the Falcon 50, *"...Got traffic taxiing for departure off runway 24 towards Goodwood – (Falcon 50 C/S) he'll be behind your 4572 (the PAR traffic)".* At 1541, when the Chinook was about 5 NM W of Odiham homing towards the overhead, DIR contacted the APR stating *"4570 (squawk) west of the field five (miles)...vectoring it for an ILS for (RW) 28"*; the APR replied *"OK, I've got one that's going to be going probably in about 2 minutes time off runway 24...(to) go behind the 4572, go up to 2 (thousand) if you're happy to stay at 3 (thousand) with the 70 (4570 squawk)".* The co-ordination (UKAB Note 3: though it was not termed as such on the landline) concluded with DIR stating at 1541:58, *"Right, I'll stay at 3 (thousand) until you're out of my way"*. The Chinook flew through the Odiham overhead, reporting *"...beacon*

outbound..." at 1544:28, on 107 for the 'downwind' leg of their approach. At 1544:39, when the Chinook was about 1 NM ESE of the aerodrome, DIR passed the Odiham QFE (992 mb) and instructed the helicopter crew to *"...descend report level 2000 ft"*, which was readback correctly. Fifteen seconds later at 1545:00, DIR instructed the Chinook crew to *"...descend report level 1500 feet now the PAR traffic is well below"*, which the crew acknowledged *"cleared all the way to 1500 (C/S)"*, before the APR called DIR on the landline:

DIR: *"Odiham mines going down now...keep out of your way."*

APR: *"..Mine's just airborne and turning left for Goodwood climbing to 2 (thousand)."*

DIR: *"...I'll expedite his (the Chinook's) descent, don't worry he'll be down."*

APR: *I'm going to 2 (thousand) – left turn to Goodwood...so are you coming down to 2000 ft as well?"*

DIR: *"Yeah, he's on his way down'cos he's gone through the procedure, he didn't want to maintain. I'll tell him about yours...he'll be out of your way don't worry"*.

Meanwhile, at 1545:47 DIR gave traffic information to the Chinook crew, *"..traffic left, 10 o'clock, 3 miles, crossing left-right...outbound to Goodwood"* and asked the APR if they wished to climb *"..all the way up"*. The APR did not reply to this question but advised that she would turn the Falcon R onto W. DIR updated the traffic information to the Chinook reporting that the Falcon *"...is at a similar level, avoiding action turn hard right heading 150, correction 220"*, which was acknowledged. At 1546:43, the Chinook crew reported visual with the Falcon on the beam at the *"..same level"*, which DIR conveyed to the APR. DIR then instructed the Chinook crew, who were intermittent IMC, to continue their R turn all the way round onto 030. Meanwhile, the Falcon crew had responded to a TCAS RA and had initiated a L turn onto E, rather than the westerly heading suggested by the APR, and had climbed to 3400 ft. The remainder of the Chinook's approach was uneventful. Farnborough filed an Airprox report later that day.

Although a course of action to vertically separate the Chinook and Falcon had been agreed it appears that DIR presumed, erroneously, that the Falcon had already departed prior to issuing a descent instruction to the Chinook crew. Under a misconception that there was no longer any traffic to effect the Chinook's approach - as a result of a lapse in concentration - DIR descended the Chinook in accordance with the procedure and broke co-ordination against the Falcon. Once she realised her error, DIR made every effort to provide both accurate traffic information - which enabled the Chinook crew to sight the Falcon 50 - and effective avoiding action to resolve the confliction.

ATSI reports that there are no apparent civilian ATC causal factors. The Falcon crew was being provided with a RAS by the Farnborough APR. Following the unexpected announcement by the Odiham DIR that the Chinook had commenced a descent below 3000 ft on the TACAN to ILS procedure, the APR acted with commendable speed to resolve the conflict now developing. Anticipating the Falcon's imminent transfer to her frequency from TOWER, the APR called the flight twice, obtaining a reply on the second occasion. She then immediately issued the flight with an 'avoiding action' R turn onto a heading of 275° at 1545:30, and provided traffic information on the conflicting helicopter. Initially the Falcon pilot did not respond but then declared that "" *we've decided to make a left turn to avoid*". The APR acknowledged the reply and then instructed the flight to climb to 3400 ft QNH - the base of the LTMA here is an altitude of 3500 ft - in a further attempt to resolve the conflict. This was readback by the pilot who added that the conflicting traffic was in cloud. There was little more that the APR could have done under the circumstances except, maybe, provide additional traffic information to the Falcon crew as it appeared not to have commenced a climb above 2000 ft, the level it now shared with the Chinook. The Falcon pilot's L turn initially brought it on to a converging track with that of the helicopter, later adopting a track parallel to it for a short while. At 1546:08, the CPA was reached with the two ac 0.56 NM apart and both indicating at 2100 ft Mode C (1013 mb). During a subsequent discussion with the APR on the RT, the Falcon pilot stated, "*...that was a TCAS avoidance and er based on our TCAS er right turn would have taken us towards the traffic er sorry we had to disagree*

there but it just looked better to us". This statement would suggest that the pilot had determined an avoidance manoeuvre based on azimuth information derived from the TCAS cockpit display equipment. The UK CAA document CAP579, ACAS Guidance Material, para 3.2, Limited Capability (of ACAS Equipment) states "*ACAS equipments are not capable of resolving the bearing, heading or vertical rates of intruders accurately. For this reason, pilots should not attempt to manoeuvre solely on the basis of TA information.*" In addition, an extract from a UK operator's TCAS II training and guidance document states "*Avoidance manoeuvres using TCAS II are in the VERTICAL PLANE only. Bearing information produced by TCAS II does not possess the accuracy necessary for determining horizontal avoidance manoeuvres.*"

THE CHINOOK PILOT'S UNIT queried whether the division of responsibilities between Odiham and Farnborough ATC, and the level of co-ordination necessary to achieve an effective radar service, were appropriate.

HQ JHC comments that this incident occurred in congested airspace, with 2 airfields in very close proximity, but having 2 separate radar controllers. Whilst recognised procedures should have prevented this occurrence, a regrettable lapse in concentration by the Odiham DIRECTOR, probably caused by a low state of arousal, led to the erosion of separation. The Odiham controller's subsequent actions, however, were appropriate. Following this Airprox, procedures have been revised to reduce the potential for a recurrence. Furthermore, the Station has been recommended to actively seek additional, compatible traffic to enhance controller training.

UKAB Note (4): A change to fps notation is to be instigated within ATC at Odiham, whereby traffic subject to co-ordination will be annotated appropriately on the individual fps. A comprehensive Memorandum of Understanding exists between Odiham and Farnborough ATC.

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 comprehensive Mil ATC Ops and ATSI reports had revealed that the DIR had negotiated a plan with the Farnborough APR to keep the Chinook vertically separated above the Falcon, until the latter had cleared to the S sufficiently to enable the helicopter to be descended on the procedure with safety. Notwithstanding the RIS that pertained, this was a sound plan. However, DIR negated this safety net by instructing the Chinook crew to descend to 1500 ft Odiham QFE – about 1920 ft ALT Farnborough QNH - thus descending the helicopter through the Falcon's assigned altitude, merely 3 min after the co-ordination agreement was struck. This was not at the helicopter crew's instigation as suggested by the DIR on the landline to APR. It would appear that in the intervening period the DIR had erroneously presumed that the jet had departed unseen – it was suggested that in her mind she thought a much longer time period had elapsed since the landline call – but otherwise could not account for this error. There was little to suggest this was anything other than a mental aberration or lapse in concentration by DIR as concluded in the Mil ATC Ops report. The Board noted the improved fps marking protocol, similar to civilian ATC practice, which will probably be a useful 'aide memoire'. Some members suggested that the period spent screening the trainee before this Airprox occurred might have had a detrimental impact on the controller's alertness. A 90 min period spent 'on the tube' - as here - was not abnormal; the Board was briefed that there is no stipulated maximum period within military 'terminal' ATC, unlike the military 'area' world and civilian ATC regulatory maximum of 2 hours controlling without a break. Whatever the reason for this mistake, the members agreed unanimously it was the basic cause of the Airprox, insofar as DIR had broken the co-ordination agreed with the Farnborough APR by descending the Chinook below 3000 ft ALT and thereby bringing it into conflict with the departing Falcon climbing to 2000 ft. Apparently, DIR did not realise her mistake until the APR called on the landline to query her intentions with the helicopter about 20 sec later.

The alert APR had quickly realised subsequently what had occurred and had attempted to correct the situation by passing avoiding action to the Falcon crew. Discussion then focused on the Falcon pilot's departure from Farnborough, where he reports he had received a TCAS RA whilst IMC. The radar recording revealed that the jet had climbed to 2500 ft (1013 mb) - about 290 ft above the flight's assigned altitude of 2000 ft Farnborough QNH (1006mb) – but this did not seem to tally with an RA. The NATS advisor briefed the Board that during a simulation of this event the NATS model could only reproduce a TA - not an RA. The response from the Falcon pilot to the R turn avoiding action advice from the APR "*...based on our TCAS...right turn would have taken us towards the traffic...had to disagree there*", did not equate with indications for a conventional TCAS conflict resolution, which is always in the vertical plane only. Members could not understand why, if the Falcon's TCAS had generated an RA, its pilot had stopped climbing at about 2290 ft QNH. Moreover, a descent was then initiated to the same level as the Chinook, as evinced by the radar recording. This was not to say that an RA was not enunciated to the Falcon pilot, but it seemed implausible to many commercial pilot members on the face of the information provided. Commercial pilot members emphasised that TCAS does not provide conflict resolution in the horizontal plane – only the vertical – by advising crews to climb, descend or achieve a recommended vertical speed. From the RT recording it appeared to pilot members that the Falcon pilot had turned L, whilst using TCAS information to avoid the Chinook in azimuth – they felt this was not a sensible use of TCAS (if he had done so) for reasons highlighted in the ATSI report. Consequently, members felt that the L turn had exacerbated the situation, whereas compliance with either the APR's advice to turn R, or with TCAS RA indications would probably have taken the Falcon safely clear of the helicopter. A pilot is at liberty to decline ATC instructions – which here in Class G airspace under a RAS were advisory only - if the safety of the ac is in doubt, but here the Board was not convinced that the Falcon pilot had acted wisely by turning L. This turn had prolonged the conflict, which was not resolved until the Chinook crew acted on the DIR's avoiding action instruction and turned R and the APR instructed the Falcon to climb further after co-ordination with LTCC. The members agreed that by electing not to follow ATC advisory

avoiding action instructions the Falcon pilot's actions had formed a part cause of this Airprox.

Fortunately, when the APR called on the landline, DIR realised that a conflict had arisen with the Falcon and had worked hard to resolve it with appropriate avoiding action instructions - promptly followed by the helicopter pilot. Traffic information had also enabled the Chinook crew - flying without the benefit of TCAS - to spot the Falcon through a gap in the clouds as they turned away from it, although in the Falcon cockpit the helicopter was only shown on TCAS. Despite the horizontal separation being eroded to about 0.56 NM at the CPA, each crew was aware of each other's ac and the combined effect of the avoiding action taken, the Board agreed, had removed the risk of a collision

With regard to the query by the Chinooks pilot's unit, it appeared to the Board that this breach of co-ordination was not indicative of a break down in overall co-ordination arrangements or established procedures between the two ATSU's. This was a singular human error, notoriously

difficult to prevent and the station had already initiated measures to reduce the potential for a recurrence. The Board understood that such human errors couldn't be eradicated entirely, but it appeared that arrangements for the provision of the disparate radar services by the two units were drawn along sensible lines and the investigation of this Airprox had not suggested that any systemic changes were warranted.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

- Odiham DIRECTOR broke the co-ordination agreement by descending the Chinook below its altitude of 3000 ft QNH.
- The Falcon pilot did not follow ATC advisory avoiding action instructions.

Degree of Risk: C.

AIRPROX REPORT NO 8/02

Date/Time: 7 Feb 1424

Position: 5134 N 0000 W (4 NM NW London City - elev. 17 ft)

Airspace: TMA (Class: A)

Reporting Aircraft Reported Aircraft

Type: B757 C525

Operator: CAT Civ Exec

Alt/FL: ↓4000 ft ↑FL 60

(QNH 1015 mb)

Weather IMC IICL VMC CLOC

Visibility: NK NK

Reported Separation:

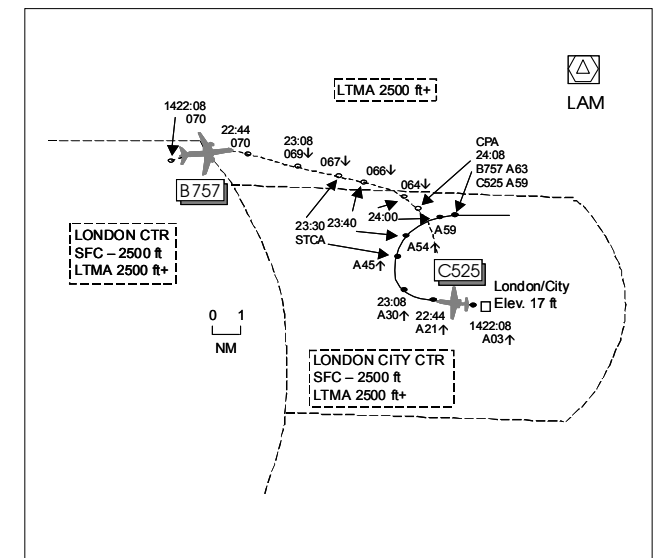
300 ft V 0.5 NM H not seen

Recorded Separation:

400 ft V 1.4 NM H

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B757 PILOT reports descending into Heathrow in IMC cleared to 4000 ft QNH 1015



mb, at 180 kt. Passing approx. 7000 ft he became aware of traffic on TCAS in his 2 o'clock range 5

NM climbing through 4500 ft; a TA alert was then received. He reduced his ROD to 300 ft/min. finally levelling-off at 6300 ft as the target crossed ahead, at a range of 0.5 NM, level at 6000 ft. He had been given a R turn of 40° and an instruction to stop his descent at 5000 ft, he thought, as the traffic passed his 1230 position 800 ft below. He thought that this 'avoiding action' had been insufficient and his use of 30° bank angle and levelling-off had aided his avoidance/deconfliction. He assessed the risk of collision as medium.

THE C525 CITATION PILOT reports flying an IFR departure from London City routeing to Germany on a London ATC clearance heading 035° climbing, in VMC, to level at FL 60, he thought, at 230 kt. The ac was not fitted with TCAS. He had read this clearance back and executed the manoeuvre accordingly. Post flight he was informed that he had been involved in an incident but he was unable to provide any further information towards the investigation.

UKAB Note (1): The London/City METAR shows EGLC 1420Z 22015G25KT 9999 SCT020 BKN026 09/04 Q1015=

ATCI LTCC reports that the C525 had departed London City for Essen, while the B757 was inbound to land on RW 27L at Heathrow from Glasgow.

The C525 was airborne from London City RW 28 on a CLN 5T SID at 1422 and prior to departure had been instructed to climb initially to an altitude of 3000 ft. The London City ADC reported that the ac, once airborne, had left his frequency without acknowledging his instruction to contact Thames Radar on frequency 132.7 MHz. The Thames Radar controller reported that he observed the C525 depart from London City, squawk ident and continue climbing to 6000 ft without establishing contact.

UKAB Note (2): The C525 was using a numeric c/s ABC3377.

It would appear that the C525 contacted TC NW on frequency 121.27 MHz for a short transmission is heard at 1422:43. This transmission interrupted an exchange between London and another ac (c/s XYZ47) and is incomplete. However 'good morning to you, passing two

thousand feet' can be heard. The SC, who was working a busy sector, completed his instructions to XYZ47 and then turned his attention to the ac that had called. He was not expecting the C525 on his frequency, but he was expecting a UVW437, that had just departed from Luton. The SC called UVW437, instructing the ac to squawk ident and to climb to 6000 ft and removed the ATC speed restriction.

The UVW437 crew, which had yet to establish contact on the frequency but was listening out for an appropriate moment to make its call, acknowledged the instruction to climb. This acknowledgement was clear and concise and there is no evidence that an additional ac replied to the instruction. However, it appears that the C525 may also have acted on this instruction for it is observed squawking ident, at the same time as UVW437, and continuing its climb.

As the C525 continued its climb through 3000 ft, it came into conflict with the B757 RH DW for RW 27L at Heathrow. The B757 was descending to 4000 ft on a heading of 125° and had established contact with Heathrow FIN DIR at 1423, when it was 8 NM NW of London City. STCA activated between the climbing C525 and the descending B757 at 1423:30. The FIN DIR, observing the activation of STCA and unsure of the intentions of the C525, instructed the B757 to turn R on to 160° and to stop its descent at 6000 ft. TI on the C525 was not passed to the B757 at this stage, but the intention was to turn the B757 behind the climbing C525. Within 15 seconds the B757 was instructed to turn further R on to heading 190° and TI was issued; the term 'avoiding action' was not used. The B757 pilot replied that he had contact with the other ac on TCAS and subsequently described the event as "*a little adjacent*".

Minimum separation occurred at 1424:08 as the B757 turned behind the C525. Lateral separation had fallen to 1.4 NM combined with 400 ft vertical separation; standard separation was restored within 30 seconds. The reduction in descent rate by the B757 crew contributed to the vertical separation, but the R turn by the SC could have been initiated more quickly. A greater urgency in the delivery of the avoiding action turn issued by FIN DIR together with the use of the phrase 'avoiding action' could have contributed to a faster resolution of this situation.

The B757 completed a successful approach to land and subsequently filed an Airprox report.

The C525 continued NE bound at 6000 ft and at 1429:18, when it was approx 10 NM N of Southend, called TC NW asking if there was '*any chance of any higher*'. The NW SC, unaware that the ac was on his frequency instructed the C525 to contact TC NE on 118.82 MHz. In the intervening period TC NE, who had been awaiting a call from the ac and observing its track and level, had taken appropriate measures to keep other traffic clear of it. Calls to the C525 on 118.82 MHz had been fruitless.

ATSI endorsed the LTCC ATCI report.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was clear that several factors had contributed to the Airprox. Firstly, after acknowledging the outbound SID clearance with an altitude restriction of 3000 ft with the London City ADC, the C525 crew had left the frequency without permission once airborne. Secondly, they had then selected the wrong frequency after departure, TC NW instead of Thames Radar. Thirdly, the Citation crew had then called on this incorrect frequency (without listening out first) during another ac's transmission and did not establish satisfactory communications; the NW SC was not expecting the Citation and had called another ac, UVW437 which he believed had

caused the crossed transmission. Finally, the C525 crew acted on instructions that were clearly addressed to another ac and had climbed into conflict with the B757. The sum of all these points had caused the encounter.

Turning to risk, members commended the ATCOs at three different ATSUs for their actions in trying to resolve the situation. Some members agreed with the ATCI comment that the timely use of the instruction "*avoiding action*" could have given a quicker resolution to the confliction. Also noteworthy were the actions by the B757 crew. They had noticed the impending confliction with the C525 on TCAS, had reduced their RoD and finally levelled off at 400 ft above the crossing Citation ahead; the increased AoB had also aided deconfliction. Although the ATC "*avoiding action*" was thought to have been slightly tardy and lacking impetus, the Board were persuaded that the actions of the B757 crew had been sufficient in removing any risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The C525 crew:

- a. Left London City's ADC frequency without permission.
- b. Selected the wrong frequency.
- c. Did not establish satisfactory communications.
- d. Acted on instructions that were clearly addressed to another ac.

Degree of Risk: C

AIRPROX REPORT NO 9/02

Date/Time: 8 Feb 1111

Position: 5527 N 0132 W (6 NM NE of Alnwick)

<u>Airspace:</u>	FIR/LFS	(Class: G)
	<u>Reporting Aircraft</u>	<u>Reporting Aircraft</u>
<u>Type:</u>	Sea King	Tornado GR
<u>Operator:</u>	HQ STC	HQ STC
<u>Alt/FL:</u>	250 ft ↓	245 ft
	(Rad Alt)	(Rad Alt)
<u>Weather</u>	VMC HZBC	VMC HZBC
<u>Visibility:</u>	20 km	7-8 km

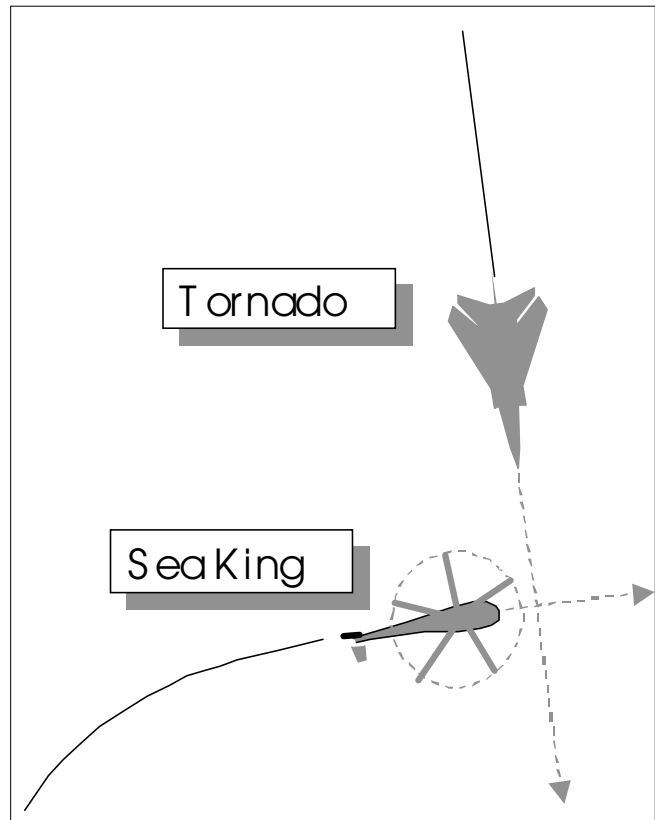
<u>Reported Separation:</u>	
100 ft V	100 ft V
<u>Recorded Separation:</u>	
NK	

BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SEA KING PILOT reports heading 080° at 90 kt in a gentle descent over the sea to carry out role training. While descending from 300 ft to deploy a drum, the winchman called an ac at 9:00, half a mile, same level and closing. The handling pilot initiated a rapid descent and a Tornado, heading S, passed 100 ft overhead. The risk of collision was high; if avoiding action had not been taken there would almost certainly have been a collision.

THE TORNADO PILOT reports heading 170° at 407 kt carrying out a low level transit over the sea towards Wainfleet range when he noticed a Sea King very close to and just below the nose of his ac. He pulled up and banked left to clear it and check that it was unharmed. He estimated that it passed 100 ft below. Mission recordings showed the helicopter in the HUD from about 3 seconds to go and a thermal cue from the Sea King, generated by the FLIR which was not in use at the



time, from about 20 seconds to go to CPA. The yellow paint scheme of the Sea King did not provide the conspicuity that might be expected. The risk of collision was high.

The Gt Dun Fell Radar recording shows the ac approaching each other as described by the pilots; the Sea King shows NMC and has rolled out of a gentle turn from a NNE track. The Tornado shows 003 Mode C until the 2 returns merge, followed by a 100 ft increase.

HQ STC comments that as both ac were operating at low level in Class G airspace, without the benefit of air-to-air radar, 'see and avoid' was the only mechanism for deconfliction. Although both pilots reacted, it seems extremely fortunate that the helicopter winchman happened to be standing on the flightdeck at the time and was able to alert his ac captain to the immediate danger.

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 assessed that the cause of the Airprox was a very late sighting of the other ac by both crews and agreed that it was fortunate that the Sea King crewman was in a position to make what was undoubtedly a 'good spot'. Both crews had reacted in time to remove the risk of them actually colliding but the Board agreed that the safety of the ac had been compromised.

One member observed that since the FLIR had detected the Sea King at some distance, perhaps (at least over the sea where there would be few hot spots) it would be advantageous to use it for conflict warning. Other members observed that attention to the HUD for this purpose might distract from all round lookout and that an ac on a collision course could approach from virtually on the beam, out of view of the FLIR. The HQ STC member undertook to pass this suggestion to the appropriate staffs.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Very late sighting by both crews.

Degree of Risk: B

AIRPROX REPORT NO 10/02

Date/Time: 17 Feb 2010 (Sunday) NIGHT

Position: 5216 N 0049 W (2 NM NNE WELIN)

Airspace: CTA/A2 (Class: A)

	<u>Reporting Aircraft</u>	<u>Reported Aircraft</u>
<u>Type:</u>	CRJ2	FK70
<u>Operator:</u>	CAT	CAT
<u>Alt/FL:</u>	FL 170	↓FL 80

Weather: IMC IICL NK CLOC

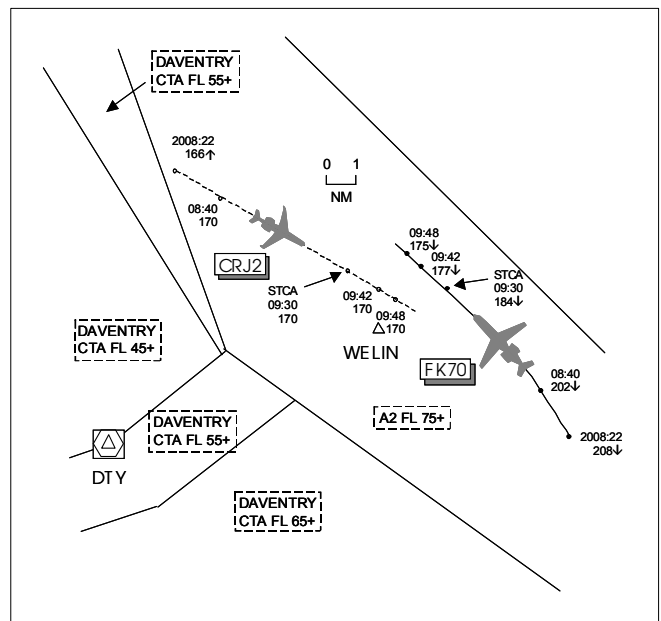
Visibility: NK NK

Reported Separation:

400 ft V, 1.2 NM H 500 ft V, 2 NM H

Recorded Separation:

600 ft V, 1.6 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CRJ2 PILOT reports heading 105° at 290 kt level at FL 170 and awaiting further climb clearance from London ATC on 130.92 MHz. The FK70 was first seen on TCAS and then visually by acquiring the other ac's lights, even though he was intermittently in cloud in IMC, to pass about

1.2 NM down their LHS on a reciprocal heading and 400 ft above which resulted in a TCAS TA; no avoiding action was taken. RT exchanges between London ATC and the FK70 crew revealed a discrepancy regarding the FK70's cleared level. He assessed the risk of collision as medium.

THE FK70 PILOT reports flying inbound to East Midlands at 290 kt descending to FL 80. On passing FL 190, he received a TCAS TA on conflicting traffic 2000 ft below. He instructed the FO, PF, to level off, and visually acquired the other ac as it passed about 2 NM clear on his LHS side, 500 ft below. ATC then queried why he had not levelled at FL 180. He replied that he had been descending to FL 80 as originally cleared and read back.

UKAB Note (1): The radar recording shows the FK70 established in a 3000 ft/min RoD passing FL190.

ATSI reports that the subject ac were both under the control of the TC Midlands SC. The COWLY and WELIN sectors had been bandboxed and the primary frequency in use was 130.925 MHz, which was cross-coupled with 133.075 MHz. The SC reported that his workload was 'moderate' and the traffic loading 'light to moderate'.

The CRJ2 had departed from Birmingham en route to Copenhagen and contacted the Midlands SC at 2003:30, whereupon the pilot reported level at FL 60. The SC removed the ATC speed restriction and then issued progressive climb instructions to FL 170. The ac was also vectored towards the eastern side of the sector which was, tactically, the most suitable position for such outbound traffic requiring climb.

The FK70 was en route from Brussels to East Midlands and contacted the SC at 2008:25 reporting "*just levelling two zero zero radar heading of three three zero.*" At that time, the FK70 was 17 NM SE of the CRJ2 and on a converging track. The SC recognised the potential conflict and it was his intention to obtain a quick cross of the acs' tracks, which would facilitate further climb for the CRJ2 and descent for the FK70.

The SC instructed the FK70 to "*turn left heading three one five degrees and descend flight level one eight zero.*" This was intended to speed the cross of the tracks of the two ac. The SC's plan was sound, as the CRJ2 was climbing to FL 170 and the FK70 should be descending to FL 180. However, the readback of the instruction, by the pilot of the FK70, was "*Heading three one five descend flight level eight zero FK70 c/s*".

Although both the SC's instruction and the pilot's readback are very clear on the RT recording, the SC did not detect the readback of the wrong level. MATS Part 1, page E-8, requires controllers to correct any errors in messages read back by pilots until an accurate readback is obtained. This process completes the 'Feedback Loop', which encompasses the transmission – readback – verification cycle. The SC reported that he had been confident that the correct level had been read back.

Analysis of the RT recording reveals a telephone starting to ring in the background at the time the SC gives the descent instruction to the FK70. A replay of the desk-side recording indicates that the SC answered the telephone almost immediately after the pilot had read back the heading, prior to the readback of the level. He then became engaged in a conversation on the telephone concerning higher levels for two other ac. It would, therefore, seem probable that, as the SC was busy with this co-ordination, he did not pay full attention to the complete readback given by the pilot of the FK70.

At 2009:34, STCA activated and was noted by the SC. This did not trouble him unduly, as the FK70 was passing FL 184 and in the CRJ2's 11 o'clock at a range of 3.6 NM. The SC was of the opinion that the FK70 would be levelling at FL 180, so the warning was disregarded as a 'nuisance alert'. Very shortly afterwards, the SC stopped transmitting to another ac and asked the FK70 "*..just confirm you're maintaining flight level one eight zero ?*" A warning from a nearby colleague in the Operations Room, together with the SC's own observation of the Mode C of the FK70 indicating FL177, prompted this call.

The pilot of the FK70 replied "*..we're just passing one seven five and we're visual with the traffic that's passed down our left.*". The SC then stated that they had only been cleared to FL 180. The FK70 pilot replied to the SC saying: "*er we read back eight zero FK70 c/s.*" The SC instructed the FK70 to stop descent at FL 160, which was correctly read back; this was to ensure vertical separation against another Birmingham outbound. The pilot of the CRJ2 advised that he would be making a note of the incident as the traffic passed within two miles whilst descending through his level.

UKAB Note (2): CPA is estimated to occur at 2009:45 between two of the Debden recorded radar sweeps at 09:42 and 09:48. The minimum separation occurred as the FK70 descended through FL176 with the CRJ2 in its 9 o'clock at a range of 1.6 NM and 600 ft below.

Neither TI nor avoiding action was passed as, by the time the error had been detected, the subject ac had passed each other and no avoiding action was appropriate. The crew of the FK70 reported visual with the other ac while it is evident from their report that the crew of the CRJ2 had been monitoring the FK70 on their TCAS and saw its lights even though they were in IMC.

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 from the ATSI report that the TC MID SC had missed the level readback from the FK70 crew while distracted by a telephone call. ATCOs agreed that although the FK70 crew were expected to read back ATC instructions correctly, having checked it beforehand, the onus was on the SC to detect the pilot's readback error; the SC should have given his full attention to the pilot's

response before engaging in a telephone conversation.

After STCA had activated but was disregarded by the SC as a nuisance alert, the SC was quick to interrupt his transmission to another ac to query the FK70's cleared level. However, this occurred as the subject ac were passing abeam so that it was too late to pass either TI or avoiding action. In the meantime, both crews had been monitoring the situation on TCAS. The CRJ2 crew had levelled at FL 170, whilst awaiting further ATC climb clearance; they had seen the FK70 approaching, acquiring its lights visually even though intermittently in IMC, and had watched it pass about 400 ft above and clear on their LHS. As it did so, a TA alert was generated. For their part, the FK70 crew were alerted to the confliction by a TCAS TA passing FL 190, presumably owing to the 3000 ft/min RoD, and had commenced levelling off. At that stage the CRJ2 was seen visually passing down their LHS, estimated 2 NM clear and 500 ft below. The proactive actions by the FK70 crew combined with the visual sightings by both crews led the Board to conclude that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Undetected readback error by the TC MID SC, while distracted by a telephone call.

Degree of Risk: C

AIRPROX REPORT NO 11/02

Date/Time: 14 Feb 1349

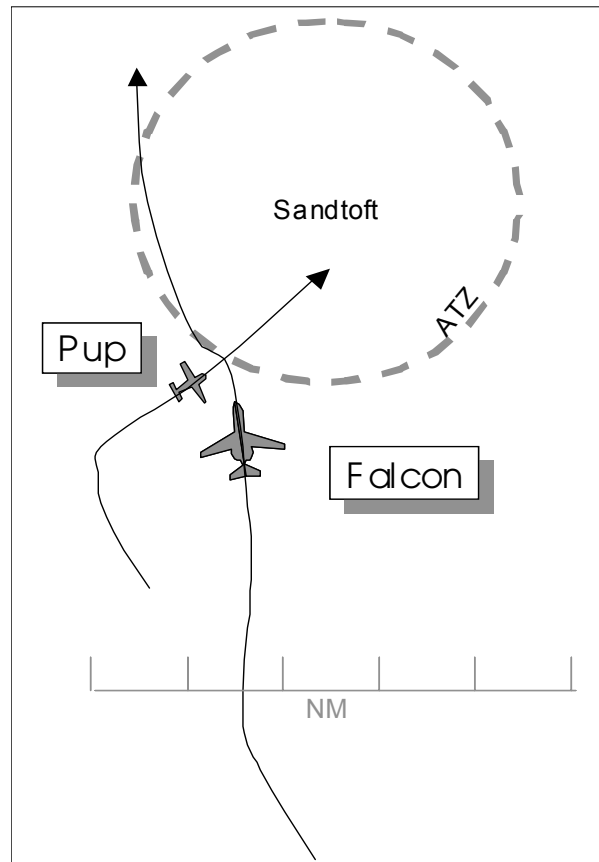
Position: 5332 N 0153 W (2 NM SW of Sandtoft - elev 11 ft)

Airspace: FIR (Class: G)

	<u>Reporting Aircraft</u>	<u>Reported Aircraft</u>
<u>Type:</u>	Beagle Pup	Falcon 20
<u>Operator:</u>	Civ Pte	Civ Comm
<u>Alt/FL:</u>	1100 ft ↓ (QNH 1033 mb)	850 ft (agl)
<u>Weather</u>	VMC CLBC	VMC CLBC
<u>Visibility:</u>	60 NM	10 km+

Reported Separation:
50 m H, 200 ft V 400 ft H

Recorded Separation:
NK



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BEAGLE PUP PILOT reports heading 045° at 70 kt on a straight-in final to RW 05 at Sandtoft, in communication with Sandtoft Radio. He was squawking 7000 with no Mode C fitted. At 1.5 NM from the threshold, passing about 1000 ft, a jet appeared in his 1 o'clock about 100 m in front and crossed R to L about 50 m away and some 200 ft below. He went around from the approach. The jet was on a northerly track and had approached him from his 4 o'clock; if he had been on a 3° glidepath, the jet would have hit him. He considered the ac had been inside the ATZ. After landing he found that Sandtoft had been notified of the Falcon, a 'met survey' ac. A map was attached to the notification showing that Sandtoft was outside the area of the survey; the activity was not on the daily NOTAMS.

THE FALCON 20 PILOT reports heading 360° at 200 kt on a Met research flight at 850 ft agl. He had completed a southerly track and turned left to

regain it for a northerly run, during which he passed 2 NM W of Sandtoft. As he passed, he saw a light ac about 500 ft away, probably descending on long final to Sandtoft. It passed 400 ft away and slightly above him. He thought the risk of collision was low and described his task as involving a high workload.

UKAB Note: ATC radar recordings show the ac tracking as described by the pilots. The CPA occurs when the Pup is a few yards outside the ATZ and the Falcon is tracking exactly along the edge of it. After the Airprox the Falcon's track passes inside the W edge of the ATZ by a small margin as shown in the diagram. The Pup is NMC and the Falcon shows 400 ft Mode C, 940 ft on the local QNH of 1033 mb.

MIL ATC OPS reports that the Falcon 20 crew was conducting a meteorological research flight at 5000 ft RPS (1029 mb) in the Vale of York

whilst receiving a RIS from Linton Zone (ZONE). Soon after making initial contact with ZONE, the Falcon pilot requested a descent first to 1000 ft, and then to 800 ft RPS. ZONE reminded the crew of their responsibility for terrain clearance and provided TI on a contact in the Falcon's 11 o'clock. The Falcon crew acknowledged the call, adding later that they would be maintaining a track to the S of Linton for approximately 20 NM before reversing their track. At 1345:47, ZONE transmitted "*C/S, beneath radar cover, Flight Information Service*", which was acknowledged. The Falcon crew made a call confirming that they had turned onto north at 1348.

At 1352:11, ZONE re-identified the Falcon and placed it under a limited RIS, as the ac transited close to the base of radar cover, and called "*traffic south, 2 miles, similar heading, no height information*", which was acknowledged. At 1527:20, the Falcon crew notified ZONE that they had finished their sortie and wished to climb to 3500 ft and transit to Leeds. Linton ATC were notified 11 days later that an Airprox with the Falcon had been filed by the Pup pilot.

Radar recordings show the incident at 1349. Assuming the timings on the LATC recordings agree with those on the Linton RT recordings, the Falcon was operating under FIS and beneath radar coverage to the south of Linton. Under such circumstance, it would have been impossible for ZONE to predict the Falcon's position or indeed that the ac's track would take it close to the Sandtoft ATZ.

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 observed that when passing as close to an ATZ as the Falcon pilot did, it is sensible not to fly at the height ac could be expected to be entering it on an approach to the airfield. The Falcon's track appeared to indicate a late realisation of the proximity of the ATZ and the Board agreed that whatever the Falcon pilot's workload, a lookout for traffic should have been at the top of his priorities at the point of the Airprox. He was approaching the Pup from well behind its beam at much greater speed and members considered it was his responsibility to see and avoid it. His late sighting, on the boundary of the ATZ, was considered to be the cause of the Airprox.

The Board considered the choice of track and height by the Falcon crew was unfortunate; a track further from Sandtoft, possibly with a right turn at the end of the southbound leg, would have been a better choice.

Because the Pup pilot did not see the Falcon in time to take avoiding action, and the Falcon pilot only saw the Pup as he was passing it, the Board assessed that the safety of the ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: On the boundary of the Sandtoft ATZ, the Falcon pilot flew into conflict with the Pup which he saw late.

Degree of Risk: B

AIRPROX REPORT NO 12/02

Date/Time: 21 Feb 1157

Position: 5108 N 0149 W (3 NM W of
Boscombe Down - elev 407 ft)

Airspace: MATZ (Class: G)

Reporting Aircraft Reported Aircraft

Type: C130J Andover

Operator: MOD DPA DPA

Alt/FL: 2000 ft 2400 ft ↑

(QFE) (QFE)

Weather VMC CLOC VMC CLOC

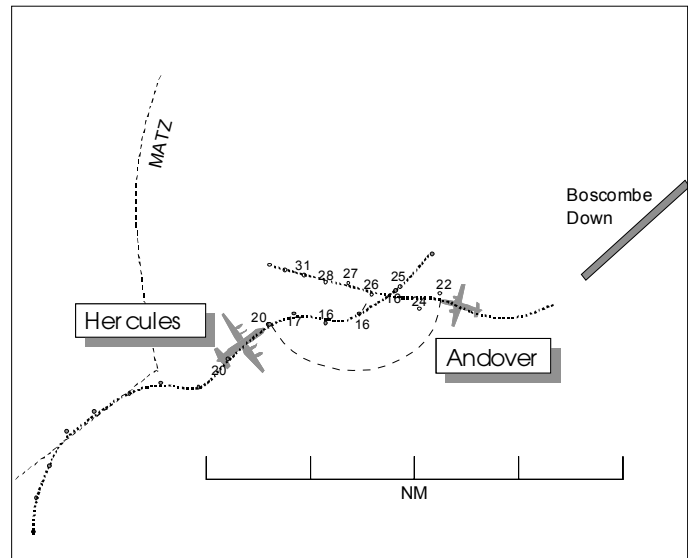
Visibility: 20 km+ 10 km

Reported Separation:

500 ft V 400 ft V

Recorded Separation:

< ¼ NM, 1000 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HERCULES PILOT reports heading 085° at 170 kt in the instrument pattern at Boscombe Down, at 2000 ft. He saw an Andover in his 1 o'clock slightly low but climbing; after a short while he realised it was on or close to a collision course so he began a descent. ATC had called other traffic to him, but not the Andover until he began the descent, receiving a TCAS TA at the same time, closely followed by an RA. He told ATC he was descending to 1500 ft and the Andover appeared to pass 500 ft directly overhead. In the CAVOK conditions, the risk of collision was low.

THE ANDOVER PILOT reports heading 270° at 130 kt after departure when ATC informed him of the Hercules which he saw. He thought it was heading away but he realised late that it had turned towards him. Manoeuvre options were limited at 130 kt so he maximised his climb, passing about 400 ft above the Hercules. The risk of collision was low because the other ac was in sight throughout.

MIL ATC OPS reports that the C130 crew was receiving a RIS from Boscombe Director (DIR) in the Radar Training Circuit (RTC) after overshooting from PAR for a further approach. After climbing on RW (23) heading to 2000 ft

QFE, DIR instructed the C130 crew to turn right onto a downwind heading of 090°. The RTC is normally a fairly standard RH pattern to RW 23; however, an area known as The Barracks - where D125 infringes Boscombe's MATZ - had become activated with live-firing, meaning RTC ac had to be tear-dropped towards the overhead before passing about 1-1.5 NM NW of the airfield on a tight downwind leg. At 1156:00, DIR instructed the C130 crew to stop turn heading 070°, which was acknowledged, before passing traffic information on a Tutor ac 4 NM NE westbound at 800 ft. At 1156:38, DIR transmitted to the C130 crew "c/s, an Andover just airborne departing west, climbing" and at 1156:47 continued "c/s, that unknown 12 o'clock, 1.5 miles, reciprocal, climbing". At 1156:50, the C130 transmitted "c/s is descending 1500 ft" and shortly after "c/s, err, were just directly under that ac 500 ft clear - confirm what the radar situation is please?"; DIR replied, "The aircraft is departing just to the west, climbing". The C130 crew climbed back to 2000 ft and confirmed the radar heading of 070°. At 1158:16, the C130 crew stated to DIR "we don't know what happened there but, err, we need to talk about it later on". The Supervisor, who was attending to a complicated situation in the VCR, was immediately apprised of the details by DIR. The C130 crew filed a report after landing.

Approach (APP) prenoted Boscombe Radar (RADAR) of the impending departure of the Andover and passed on a flight strip outlining the crew's departure details; despite the C130's projected track, APP had not implemented a climb out restriction on RADAR's behalf. The Andover crew was to conduct a SID, climbing on RW heading until 2 DME, then turning right onto west and continue climb. Aware that DIR's traffic – west of Boscombe and turning onto an easterly heading for downwind – would conflict with the Andover crew's westerly departure, RADAR immediately passed traffic information to DIR. RADAR listened in on Tower's frequency to ascertain whether there was time to enforce a climb out restriction on the Andover against the C130; however, as she did so, RADAR saw a radar return departing on RW heading and beginning a right turn onto west. At 1156:33, the Andover crew called RADAR stating *"c/s is departing to the west"*, RADAR replied *"c/s, Boscombe Radar, identified, traffic in your 12 o'clock range of (unreadable), left-right, C130 at 2000 ft"*. At 1156:46, the Andover crew transmitted *"Roger, we are now climbing through 2000 ft, we have him in sight, c/s"*. With her ac visual with the C130, RADAR cleared the Andover crew to climb into its requested block of FL 40-100. The sortie continued as planned and there was no other mention of the incident with the C130.

The Pease Radar recording shows the C130 squawking 2631 and turning right onto an easterly track. At 1156:15, the time of DIR's traffic information call on the Tutor, an ac squawking 2620 and indicating FL 46 can be seen about 0.75 NM SW of Boscombe. The C130 then settles onto a north-easterly track at a position 4 NM south-west of Boscombe. At 1156:52, after DIR's 2 traffic information calls informing the C130 crew of the departing traffic, the C130 is 3 NM south-west of Boscombe at 2000 ft when the Andover appears in its 12 o'clock at 1 NM squawking 2607, indicating 2200 ft and tracking WNW. The C130 begins a descent soon after and is seen passing 1700 ft at 1156:58, whilst the Andover is 0.5 NM east climbing through 2400 ft. As the 2 ac close, the C130 can be seen descending through 1600 ft whilst the Andover climbs through 2500 ft. As the 2 ac pass, now on near reciprocal E/W headings, the C130 appears to have levelled at 1600 ft whilst the Andover is passing 1000 ft above. As the contacts diverge, the Andover continues its climb to the west of

Boscombe, whilst the C130 steadies onto a north-easterly track and climbs back to 2000 ft.

The Boscombe FOB stipulates that crews executing SIDs in BLU or WHT weather conditions will automatically receive RIS from Boscombe ATC. Under RIS, aircrew would normally expect to receive timely and accurate information regarding conflicting traffic although, ultimately, the pilot remains responsible for maintaining separation from other ac whether or not the controller has passed traffic information. In this incident, there appears to have been a disconnect between APP, DIR and RADAR. It is not clear when Tower (TWR) first informed APP of the Andover's IFR departure, but if it was whilst the C130 was airborne in the RTC, APP may well have missed an opportunity to deconflict the tracks. If this was the case, then with hindsight, APP could have predicted the C130's routeing downwind, realised the potential for conflict and applied a vertical/horizontal climb out restriction or advised RADAR to do something similar. For whatever reason, this did not transpire and an opportunity to de-conflict seems to have been lost. For their parts, RADAR and DIR appear to have provided accurate traffic information iaw the conditions of RIS, which eventually led to the Andover crew becoming visual with the C130; however, as SATCO Boscombe points out in his report, it was regrettable that nothing more positive was done to resolve the situation. With hindsight, a slightly more proactive stance by any one of the controllers may have simplified matters and resulted in the 2 ac being co-ordinated or de-conflicted. It is important to note that, as a result of this incident, the 'call for release' system used at Boscombe for IFR departures has been extended to cover all departures. The controllers concerned are also considering submitting an HFOR with regard to the Team Resource Management element of this Airprox. In summary, whilst the conditions of service for RIS were fulfilled by APP, DIR and RADAR, more could have been done to prevent an easily avoidable incident from occurring.

DPA comments that the unit has conducted a detailed investigation into this Airprox and is to be applauded for the frank way they have assessed any potential shortcomings in procedures or operations. The points raised by the Unit are well made; that good weather and a relatively low level of activity should not lull ATC or aircrew into

a false sense of security, and that 'crew resource management' and 'cross cockpit authority gradient' are also factors relevant to an ATC Approach room.

This Airprox could be an ATC object lesson in the integration of traffic operating in the vicinity of an airfield. At the heart of the incident is the belief, by some, that ac operating under VFR do not require some ATC intervention to ensure separation. In this case the Hercules, although technically operating under VFR, was being vectored within the instrument pattern as if it were IFR. This is perfectly acceptable provided due cognisance is taken of other traffic and, if that traffic has the potential to conflict, the 'system' recognises this and deals with it accordingly. In this case the departing VFR traffic should have been given more than just a clearance to the West VFR. That the Hercules was turned into the outbound track of the departing Andover (albeit having turned early) in the hope that traffic information would resolve any problems, seems naive.

The introduction of the 'call for release' for all departures is an eminently sensible idea, given the unique nature of operations at Boscombe Down, and will go a long way towards minimising this type of incident in future. This incident will feature in the next DPA Flight Safety Newsletter in the hope of educating the wider audience of this type of 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, and reports from the appropriate ATC and operating authority.

Members recognised the significance of the TCAS RA in this Airprox, possibly uncommon from the Military ATCO's perspective, but controllers should note that the increased fitment of ACAS devices to military ac would increase the potential for RAs in the narrow confines of the RTC where 500 ft separation is the norm.

It was appreciated that DIR had been constrained by activities in the surrounding Danger Areas,

which meant the C130 had to be vectored in close proximity to the climb-out. To many experienced ATCO members this suggested immediately that careful handling was needed to prevent just what had happened. A minority view was that the ATSU had discharged its responsibility to the pilots concerned having given traffic information to each under the RIS - albeit late - and they should then have avoided each other's ac under VFR. However, this view did not engender widespread support and most felt that ATC should have done more to prevent this occurrence. The C130 pilot was following ATC instructions, which had apparently led him into conflict with departing traffic - that ATC was aware of. Discussion ensued about the relative merits of vectoring VFR ac under a RIS in an instrument pattern; to some members vectoring under a RIS seemed contradictory, but was nonetheless common practice at military units. Similarly, treating the Andover as VFR when following a SID profile seemed odd to civilian pilots who would fly 'Preferred Departure Routes' under similar circumstances. It was suggested that if the Andover crew were actually flying the SID they should have requested an IFR departure, whereupon ATC would have obtained a positive release requiring the imposition of a climb-out restriction. However, the departure procedures in use at Boscombe Down, whilst seemingly robust, required the application of common sense in this convoluted mix and members concurred with the sage advice from DPA. The Board noted that the revisions to departure procedures - whilst more prescriptive - should minimise the potential for a recurrence. Although the RT transcript revealed that the DIR had passed traffic information to the C130 pilot, some members wondered what the controller expected the pilot to do with it, since he was following ATC instructions at that juncture. A TCAS RA under these circumstances seemed to members to be inevitable. APP was aware that the Andover would depart - seemingly treating it as VFR and therefore not subject to a release - and prenoted RADAR. The Board agreed that, notwithstanding the RIS that pertained, with prior knowledge of the Andover's departure, APP and RADAR could have resolved this encounter (which should have been self evident) before the Andover took off. The Board was unanimous in its view that ATC could have done more to prevent the conflict from developing in the first instance and, notwithstanding the requirements promulgated in the FOB, the controllers should

have done more than the bare minimum of passing traffic information. In effect, Boscombe Down ATC allowed the Andover to depart into conflict with the C130, which the Board concluded was the cause of this Airprox.

Whilst a climb-out restriction here could have prevented this incident at the outset, evidently RADAR warned DIR and passed traffic information to the Andover crew as soon as they called. Meanwhile, the Andover was probably climbing through the C130's level as the ac's TCAS was entreating the crew to descend to avoid the Andover, which they saw pass above them. With

both ac in sight by the respective pilots, both crews' avoiding action resulted in a separation of 1000 ft at the CPA. On this basis, the members agreed that no risk of a collision had existed.

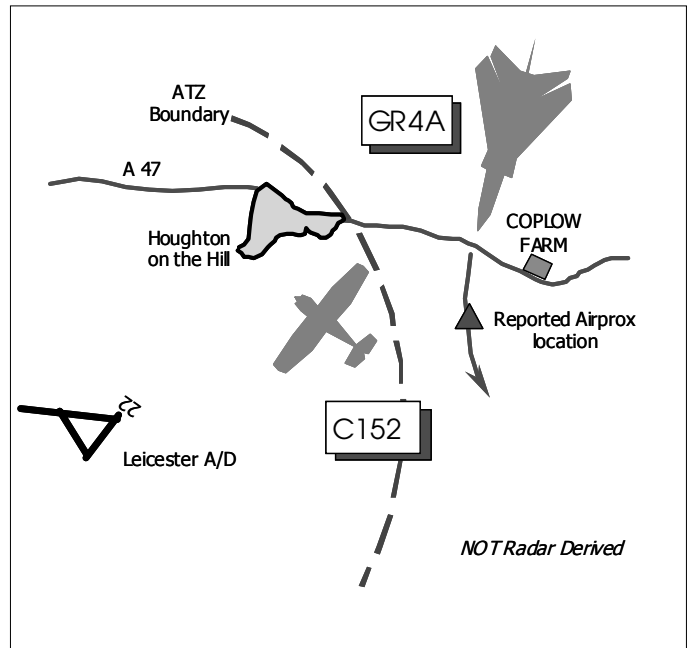
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Boscombe Down ATC allowed the Andover to depart into conflict with the C130.

Degree of Risk: C

AIRPROX REPORT NO 14/02

Date/Time: 27 Feb 1134
Position: 5237 N 0058 W (2.6 NM ENE Leicester A/D - elev 469 ft)
Airspace: UKDLFS - LFA6 (*Class: G*)
Reporting Aircraft Reported Aircraft
Type: Tornado GR4A C152
Operator: HQ STC Civ Club
Alt/FL: 520 ft 700 ft
 Rad Alt agl
Weather VMC CLBC VMC NR
Visibility: 10 Km + NR
Reported Separation:
 3-400 yards Not seen
Recorded Separation:
 Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4A PILOT reports his ac is camouflaged grey, HISLs were on and they were squawking 3/A 7001 with Mode C when operating as the bounce ac for a pair of GR4s on a low-level sortie. Whilst in a slight L turn through 190°, climbing through 520 ft Rad Alt, he thought about 4 NM E of Leicester, (but reported a Lat. & Long. 2.6 NM ENE of the A/D) setting up an intercept on the other jets at 380 kt, his navigator spotted a white, high-wing monoplane, just L of the nose at

11:30 about 1 – 200 ft above them, and told him to stay low. Unsighted initially because of the canopy arch, he complied with his navigator's call and flew about 2-300 ft below and 3-400 yd to the E of the other ac which appeared to be in a L turn.

His navigator spotted the other ac about 5 sec before the closest point, which had enabled him to manoeuvre low to avoid a potential collision. He assessed the risk would have been "high" if his

navigator had not seen it and had submitted this report to highlight, once again, the problem of the Tornado canopy arch masking ac from the pilot's view.

He reported the location of the Airprox as 52° 37' N 000°57'·5 W, 2·6 NM ENE of Leicester A/D at 1134. This was confirmed from the ac's HUD video recording, which showed their jet had crossed the A47 road by Coplow Farm.

THE C152 PILOT reports his ac is predominantly white with a red upper nose cowling; the transponder was switched off. He was conducting a circuit training detail with a student to RW22 at Leicester aerodrome, within the ATZ and operating at the normal circuit height of 1000 ft QFE, whilst in communication with LEICESTER RADIO A/G Stn on 122·125 MHz.

At the time of the reported Airprox, he estimated he was on base leg heading 300°, close to, but just S of the village of Houghton on the Hill, shortly before turning final at about 700 ft agl. Neither he nor his student saw the Tornado flown by the reporting pilot at all.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

UKAB Note (2): The UK AIP at AD 2-EGBG -1-2, promulgates Leicester ATZ as a circle radius 2 NM, centred on RW10/28, from the surface to 2000 ft above the aerodrome elevation of 469 ft and active in Winter from 0900 – 1700. It includes the notation "*Circuits variable*".

UKAB Note (3): The UK MIL Aeronautical Planning Document at Vol. 3 Pg 1-2-6-5 promulgates a mandatory avoidance of 2 NM around Leicester Aerodrome (CA04) by military crews, 0900 – 1745, when flying below 2000 ft msd.

HQ STC comments that this Airprox occurred 2·2 NM from the threshold of Leicester RW28. Whilst this was a late sighting of the C152 by the GR4A crew, due to their L turn manoeuvre, to conduct tactical manoeuvring so close to a known aerodrome was a poor airmanship decision. HQ STC will liaise with the joint service Defence Air Safety Centre (DASC) to publicise advice to military crews to avoid all aerodromes by sensible rather than just legal margins and that when flying close to an aerodrome Cct, straight and

level flight will give the best chance of sighting Cct traffic.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members noted the advice given by STC in advocating "sensible" rather than "just legal" margins to be accorded to aerodromes/ATZs. There was a balance to be struck here and one controller member was curious to know what a "sensible margin" was. Unfortunately, the STC member was unable to attend the meeting. However, other military pilot members explained for the benefit of civilian members that whilst flying at 380 kt, the distances here were less than ideal. In plain language this was a bit too close for fast jets to be manoeuvring near a civil aerodrome, where in all certainty civilian ac would be encountered. Recognising the limited amount of airspace available to all aviators in the lower levels of the FIR, wider margins should be afforded where practicable using common sense and airmanship. The point being made was that this Airprox might have been avoided by more circumspect flight planning. In essence, a military pilot member opined, this was not a good place to set-up for the bounce. Nevertheless, it was acknowledged that the Tornado was apparently outside the mandatory avoidance area around Leicester, and flying where the crew was legitimately allowed to do so.

The GA pilot member explained that Leicester aerodrome is a relatively large one in GA terms and with 6 runways plus the grass to choose from the circuit pattern can be quite "variable" - hence the notation in the UK AIP. Some pilot members questioned whether the C152 could have been circuiting wide and inadvertently outside the ATZ. The absence of any recorded radar evidence did not allow this to be ruled out with certainty, but a GA member thought this unlikely, especially whilst instructing, as there was nothing to be gained by executing wide patterns outside the 'sanctuary' of the ATZ – and in this instance, the basis of the military low flying avoidance area around Leicester. However, members thought it was perfectly feasible for the C152 to be near the edge

of the ATZ – the C152 pilot suggested just S of Houghton on the Hill – and some 3 – 400 yd from the Tornado whilst the jet was outside the ATZ at the reported position after passing over the A47 near Coplow Farm. Unfortunately, the HUD recording was not available to the Board, so the jet's position could not be confirmed either. Though neither the C152 instructor nor his student saw the jet at all, in the other cockpit the navigator had spotted the light ac and warned his pilot to avoid it. Therefore, members concurred that this Airprox was the result of a conflict near the Boundary of the ATZ.

Turning to risk, it was not so surprising that the C152 pilot, engrossed in his Cct patter, would not see the jet. He would naturally be biasing his look-out toward the aerodrome and any other traffic in the Cct - perhaps looking to judge the student's performance of the base-leg turn from the downwind leg - so a camouflaged fast-jet head-on might be difficult to spot in these circumstances. Thus, the C152 pilot was oblivious to the potential danger, which lurked unseen just outside the ATZ. There was no

suggestion, however, that the Tornado would enter the ATZ and the alert navigator had spotted the Cessna and warned his pilot. This occurred whilst established in a slight climb and allowed the pilot to level off, 2 – 300 ft below the other ac. To some members the lack of sighting by the C152 pilot, the late spot by the Tornado pilot and the separation reported suggested that safety had been compromised. To others - though a close call - it seemed that both ac were never going to conflict and the Tornado was always going to pass clear astern of the Cessna such that there was no inherent risk. The Board was evenly divided on this issue, but the chairman's casting vote concluded that no risk of a collision had existed in the circumstances that pertained.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict near the boundary of the Aerodrome Traffic Zone.

Degree of Risk: C

AIRPROX REPORT NO 15/02

Date/Time: 26 Feb 2007 NIGHT

Position: 5454 N 00240 W (5 NM ESE of Carlisle Aerodrome - elev 190 ft)

Airspace: UKNLFS-Spadeadam ROA(Class: G)

Reporting Aircraft Reported Aircraft

Type: Sea King Harrier GR7

Operator: HQ STC HQ STC

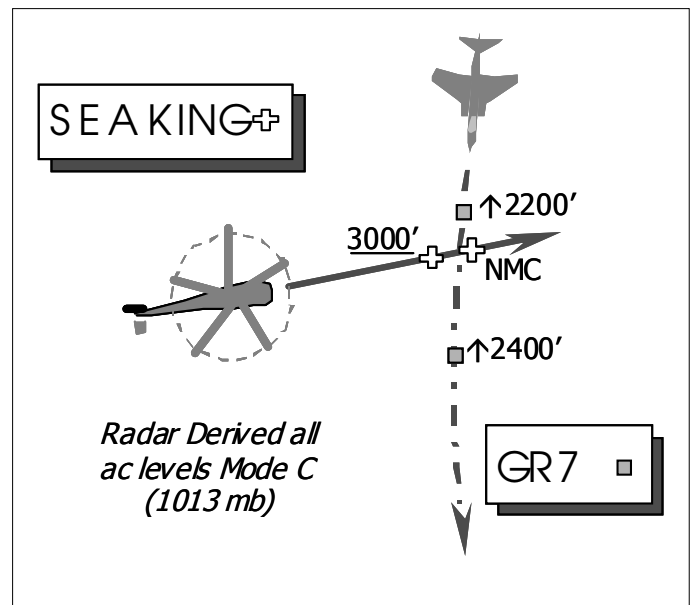
Alt/FL: 1500 ft↓ 250 ft
(agl) (agl)

Weather: VMC VMC CAVOK

Visibility: NR 30KM

Reported Separation:
300 ft V 5-600 ft V

Recorded Separation:
6-800 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SEA KING SAR HELICOPTER PILOT provided a comprehensive report stating he was en route from Belfast to Newcastle Hospital on a night SAR mission, with a crew of 4; the patient in the rear cabin was suffering from collapsed lungs and attended by 3 medical personnel. Red anti-collision beacons, together with forward and port side spotlights were all on; the crew was also using Night Vision Goggles (NVG). A SAR operational mission squawk of A0023 was selected with Mode C.

During the transit across the Irish Sea and the Solway Firth, he was forced to fly below 1000 ft amsl due to heavy rain, cloud and CBs. However, before coasting in W of Carlisle, he established communication with an AWACS ac – AWACS B – on 123.1 MHz (International Combined Scene of SAR) who was involved with a Tactical Leadership Training (TLT) exercise and able to provide a RIS – albeit very limited as a result of terrain, altitude and traffic density. While passing S of Carlisle Airport (that was closed) heading 095° at 130 kt, the AWACS controller informed him of fast jet traffic bearing 040° - 10 NM at the same height. He initiated a climb from 1000 ft to about 1500 ft agl, but as he climbed, the AWACS controller continued to report the other ac was at the "same height" and it appeared as though the jet might be climbing out of Spadeadam range. Unable to climb higher due to cloud cover and the freezing level (Sea Kings have very limited anti-ice capabilities requiring strict adherence to icing limits) he elected to descend towards a hill to seek shelter nearer the ground. In the descent the co-pilot - the PNF on NVG - and the winchman spotted another ac converging at 11 o'clock about 1 NM away and below his helicopter. The Co-pilot called "climb, climb, climb, climb", so he initiated a 30 degree cyclic climb and pulled power to avoid the jet, which passed from L – R about 300 ft directly below his helicopter.

He did not assess the risk of collision but added that the other ac – a Harrier - was apparently participating in the TLT and he thought it was operating lights out. Consequently, it was very difficult to detect even with NVGs.

THE HARRIER GR7 PILOT reports he was flying as No2 in a pair of Harriers participating in a night TLT Combined Air Operation (COMAO) exercise, some 4 NM 'in trail' behind his leader. Red strobes and navigation lights were on and he was operating under a FIS from an E3D ac - AWACS A. The lead ac was using infra-red (IR) lights that are visible on NVGs.

The Harrier pair exited Spadeadam EWTR - off-target - flying on NVG at a height of 250 ft, heading 250° (T) at 420 kt. The weather in Spadeadam was poor but improved to CAVOK to the S, in the vicinity of the Airprox location. E of Carlisle and S of the Haltwhistle Valley he spotted an ac's strobes R of the nose and saw the ac on NVG at 2 o'clock, but he could not determine the range due to the NVG. He turned R 20° adjusting his flight path to pass behind and 5-600 ft below the other ac, which was only identifiable as a Sea King helicopter about 5 sec before passing it. No traffic information was received from AWACS A until about 1 min after the Airprox; then 2 RT calls were received giving information about the SAR helicopter.

He expressed surprise that the Sea King helicopter was operating in the Night LFS during a night TLT COMAO without warning, and assessed the risk of a collision as "medium" because the use of NVGs masked the closure rate.

HQ 2 GP AIR SURVEILLANCE AND CONTROL SYSTEMS - SAFETY STANDARDS UNIT - (ASACS SSU) comments that the AWACS E-3Ds that acted as the control platforms were not equipped to record RT, hence a transcript was not available for this TLT exercise night sortie. Two E-3D ac were airborne for the exercise; AWACS - A was controlling approximately 26 ac flowing S into Spadeadam EWTR. The second E-3D, AWACS - B, was tasked to support the air defence ac operating against the main flow of the TLT 'package'. Unfortunately, due to limited ac availability, the planned E-3D collocation with TLT staff at Leuchars had not been possible. Ideally, the crew of A would have been briefed on all of the pertinent details of both route plans and the communications flow for the exercise. However, the tasking was accepted less than 3 hours before

take-off and this meant that detailed planning for this busy and complicated sortie was concentrated into a far shorter time period than would normally be the case. Furthermore, the provision of a 'control' service from the AWACS ac was not a prerequisite and the mission would have taken place with, or without, the additional level of support offered by the E-3D.

During the mission, a SCATCC (Mil) controller advised the flight deck crew of AWACS A, that the Sea King SAR helicopter was about to transit the exercise area and asked if a 'flight following service' (sic) could be given to the SAR crew. The TACTICAL DIRECTOR (TD) on board AWACS A - which had radar contact on the helicopter - advised that the control team on board was fully committed and thus unable to offer any service to the helicopter, but the TD then contacted AWACS B which was able to offer assistance. The SAR crew subsequently contacted AWACS B; the flight was identified, placed under a 'limited' RIS and clearance to transit direct through the ranges was relayed from Spadeadam Range. AWACS B's FIGHTER ALLOCATOR (FA) took control of the helicopter because the E3D's two controllers were already busy with their mission tasking. Meanwhile, the FA contacted AWACS A to request a 'wider berth' for the SAR helicopter by TLT participants; the FA aboard AWACS B advised that the position of the Sea King would be called in to all TLT participants. At this stage, the controller on AWACS A was providing a FIS only to the TLT ac because the control frequency was subject to communications jamming. Consequently, the exercise ac were remaining RT silent for the majority of the time as they flowed S through the area and they were switching frequencies between the forward air controller, range control and the AWACS controllers. AWACS A's controller called the position, heading and height of the Sea King helicopter to the TLT package ac and stated afterwards that at least one of these calls was acknowledged by the Harrier pilot's leader. AWACS A's mission crew considered that a 'knock-it-off' call to terminate the exercise would have been a further complication, as a large number of ac attempting to abort from low level - resulting in a large number of requests for both radar services and traffic information against stranger traffic - could have caused further difficulties. The AWACS B FA called the conflicting TLT traffic to the helicopter at a range of 20 NM and updated this information on 3 further occasions.

In summary, the pilot of the reported Harrier flowed through the area at night, at low level in an operational formation. Their primary control frequency was the subject of communications jamming and they had not requested, nor were they receiving, a radar service. The crew of AWACS A had no way of knowing which ac were on frequency and continued to provide a target broadcast including the positions of non exercise traffic. They considered the option of terminating the exercise but this was discounted. Furthermore, the AWACS B FA offered a service over and above the level that he should have provided - only a FIS should have been offered in the area because of the terrain. The FA passed repeated stranger warnings to the helicopter crew in an attempt to resolve the confliction. However, under the RIS provided, the Sea King crew was entirely responsible for their separation from other traffic.

THE SEA KING PILOT'S UNIT comments that the options for their SAR crew were limited given the weather and the aircraft's icing clearance. The limited radar service provided by AWACS B was invaluable in alerting the SAR crew to the Harrier's proximity. However, confusion regarding the jet's height resulted in the Sea King crew descending onto the Harrier. As the Harrier appeared to the SAR crew to be flying without lights, even on NVG, it was very difficult to spot. Moreover, the Sea King had all its lights on: anti-collision and navigation lights, landing lamp and a searchlight on the ac's port side (the side from which the Harrier approached) - normally used only for winching.

A review of the procedures to be used to alert other ac to the presence of SAR helicopters, even during a major exercise such as TLT, may be warranted because of this incident.

UKAB Note (1): The UK MIL Aeronautical Planning Document at Vol. 3 Part 1 Pg. 1-3-7 - The UK Night Low-Flying System - (UKNLFS) promulgates procedures for SAR helicopters penetrating the FW Region. This requires "*Aircrew on operational sorties* [this included this SAR flight] *before 2300 hours local...to broadcast frequent position reports on 300.8 MHz* [the low-flying frequency] *and notify the appropriate range controller if penetrating an ROA* [range operating area].

THE HARRIER PILOT'S UNIT comments that this incident occurred in a difficult regime - low level formation flying at night. Although the exercise area had been NOTAM'd, and despite RT contact with AWACS A, the Harrier pilot was not aware of the Sea King flying in his vicinity.

UKAB Note (2): A review of the LATCC Great Dun Fell radar recording is inconclusive, as the Airprox is not shown clearly. The Sea King helicopter - identified from its A0023 squawk is shown at 2007:52, eastbound indicating 3000 ft Mode C (1013 mb). Simultaneously, the Harrier which had previously faded from radar after exiting Spadeadam EWTR - EGD510 - is shown again about 0.75 NM S of the Sea King southbound after their respective tracks had crossed, but no Mode C is evident until the next sweep when the Harrier indicates 2700 ft Mode C.

However, further recorded radar evidence obtained from an AWACS radar, does show the respective acs' Mode C just before the merge. At 2007:56, the Sea King is shown at 3000 ft Mode C; before passing marginally astern of the helicopter, the Harrier indicated 2200 ft and is shown on the next sweep at 2400 ft, suggesting that vertical separation was in the order of 6-800 ft. The rapid climb reported by the Sea King pilot is not evident until some moments after the encounter.

HQ STC comments that even though the lead Harrier was operating with IR lights only, he would have been clearly visible, weather permitting, through NVGs. Furthermore, the second Harrier, with conventional anti-collision and navigation lights, would have been strikingly conspicuous. Nevertheless, for whatever reason, the Sea King crew saw the Harrier at short range. It is unfortunate that, in spite of the Sea King's presence being known to the ARCC and both AWACS aircraft, the Harriers were given insufficient picture to allow a more satisfactory conclusion. An all-stations broadcast on Guard by either AWACS, or even by D & D, might have removed any confusion and a collision warning system would almost certainly have helped. However, uncomfortable as the encounter must have been for the Sea King crew, the Harrier pilot manoeuvred in sufficient time to ensure an adequate degree of separation.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, an AWACS radar plot and radar video recordings from LATCC (Mil), and reports from the appropriate ATC and operating authorities.

It was evident to the Board that the two pilots' reports were slightly at variance. The Sea King pilot said the jet that he saw was operating without lights, contrary to what the No2 Harrier pilot reported. If the No2 had flown closest to the helicopter, its lights should have shown up well in the helicopter co-pilot's NVGs, and also been visible to those crew members not using such devices. However, the lead Harrier flew with only IR lights; whilst these would show up in NVGs they might not have been so conspicuous. Therefore, it was feasible that the Sea King crew might have seen the lead Harrier. Although the No2 Harrier pilot said he was flying 4 NM 'in trail' behind his leader - on a similar track - he may have been closer and here the difficulties associated with range perception on NVGs may have misled him. This could not be resolved with certainty and it was unfortunate that the LATCC Great Dun Fell radar recording did not show the lead Harrier's track - neither did the AWACS radar plot show it clearly - but on balance the geometry of the recorded data suggested that the reported encounter was with the No2 jet.

Although the timings of the traffic information to the SAR crew from AWACS B's FA could not be ascertained, another anomaly was that the raw AWACS radar data showed that neither the Lead nor No2 Harrier were at the "same height" as the helicopter, at the same time, before the encounter. It was apparent, however, that those involved were all endeavouring to help the SAR crew with their mission. Members wondered if more accurate information might have been provided by another unit - Spadeadam was suggested - but the limitations of radar/RT coverage suggested on balance that the AWACS had the best sensors in the vicinity. The decision to switch from ScATCC (Mil) to AWACS B's FA was, therefore, a shrewd move and probably allowed the Sea King crew to obtain the most comprehensive 'local air picture' available in their vicinity. The lack of radar contact with the

Harriers at the critical moment just before the encounter, as evinced by the Great Dun Fell radar recording - the same radar that ScATCC (Mil) would have used – proved this. Potentially, the AWACS had better information and traffic information had been provided by AWACS B's FA on several occasions. He had been able to track the Harrier and the SAR ac and warn the latter's crew about the jet closing at high speed from the NE. This essential information had ultimately allowed the helicopter crew to sight the jet, but the lack of an RT recording and transcript from the AWACS denied the exact wording passed to the Sea King crew about the height of the jets and when. It was this height information that had persuaded the Sea King pilot to descend back down because he deduced the Harriers were climbing. This descent unwittingly took the helicopter toward the jet. Without it the AWACS radar plot suggests that the Harrier would have passed clear beneath the helicopter.

A discussion on the radar service provided by the FA then ensued. The SAR pilot was clearly well aware of the nature of the 'limitations' under the 'limited RIS' that pertained and the FA had offered a service beyond the level that he should have provided. The Board's view was that he had done so with the best of intentions, making the Sea King crew fully aware of the limitations at the time and providing the best information and advice he could in this intensive scenario. It was not known in which radar 'mode' AWACS B's FA had been operating, but members believed the FA had told the SAR crew exactly what was being shown by his sensors at the time; the SSR contacts were probably intermittent at low-level and maybe at a similar height rather than the "same height". The lesson to be drawn is an awareness of the limitations of 'the AWACS system' in these situations, a point that needed to be made clear to pilots and which will be the subject of STC flight safety publicity.

The Board addressed the difficult dilemma faced by the Sea King pilot. Should he press on through the intensive traffic within the exercise area, or, unable to climb, knowing that the COMAO 'package' was heading S, loiter in the vicinity of Carlisle until after they had cleared through the area? A military FJ pilot member opined that the relative risks had to be balanced and the latter might have been a better option. Other members, including a helicopter pilot experienced

in SAR duties, disagreed. They emphasised the urgency of the mission to reach their destination as quickly as possible so that potentially life saving assistance could be rendered to the patient in the ac. In their eyes, there was no other option but to press on. Some civilian members wondered where the relative priorities lay; for example, should the exercise have been terminated to allow the SAR free passage through the exercise area. It was evident that this option had been considered by the AWACS crew who decided that doing so would have introduced greater risk at that juncture, a point reinforced by the HQ STC member and agreed by the Board. The STC LF advisor explained that 4 hours notice was needed to issue a NOTAM to all crews warning of the SAR helicopter transit - an unrealistic expectation here. In the end the AWACS FA had provided the best service available in the circumstances - and it worked – providing the Sea King crew with the vital 'heads-up' about the jet, whose pilot was oblivious at that stage to the passage of this urgent life-saving flight through his exercise area.

From the Harrier pilot's perspective he was operating without the benefit of any form of traffic information in a hostile EW and fighter environment where see and avoid was the only means of detecting other ac. Again, members pointed out this had worked. Without a warning from AWACS A and despite the known limitations of NVGs, the Board noted that the No2 pilot had detected the other ac in sufficient time to turn behind and 6-800 ft below the helicopter. Consequently, the Board concluded that this Airprox had resulted from a conflict in the NLFS FW region resolved by the Harrier pilot. Given the timely avoiding action and the apparent separation that pertained, the Board also concluded that no risk of a collision had existed.

The Board went on to ask if a 'Cease Jamming' transmission was warranted under these conditions and was advised that procedures were in place to cater for this. However, the jet pilot had not received a warning about the SAR mission before he saw it. It may have been that warning transmissions were missed because he was on another frequency when they were given. Pilots were switching 'RT silent' between units so the Harrier pair may have missed the critical information or it might also have been masked by jamming. Whatever the reason, it was not

surprising that the Harrier pilot had commented on an unexpected helicopter in the FW region of the Night LFS. The UK Mil Aeronautical Planning Document promulgates instructions to SAR crews to make broadcasts themselves when in transit through the Night LFS. It was unclear if this had been done by the Sea King crew, but if such transmissions were made on 300.8 MHz the Board recognised these might have been rendered ineffective as the Harrier pilots were instead not apparently operating on that frequency and were switching rapidly between others. This, and the comments by the Sea King pilot's unit, prompted a wide ranging discussion about the efficacy of the current broadcast warning procedure. Military pilots invariably listen out on GUARD and there was nothing to suggest that the Harriers pilots did not do so here. Warning transmissions are made on GUARD by D & D Sections when a TDA is established within the LFS for SAROPS. Thus, pilots already airborne can be warned of helicopter activity in an attempt to enhance safety for the helicopter crews and all concerned. Whilst this scenario was significantly different – a straight transit though the Night LFS – the Board considered that a warning transmission by the participating SAR helicopter on GUARD – or by the AWACS - giving an accurate position at regular

intervals may have provided a more accurate and effective warning to those in the LFS and here to TLT participants switching between frequencies. At face value, this seemed a sensible idea to many members. Consequently, the Board recommended that the MOD should conduct a review on the use of GUARD, instead of the LFS frequency (300.8 MHz), for warning broadcasts by SAR helicopter crews penetrating the FW Region of the UK Night Low-Flying System (UKNLFS) on operational sortie.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the UKNLFS FW region resolved by the Harrier pilot.

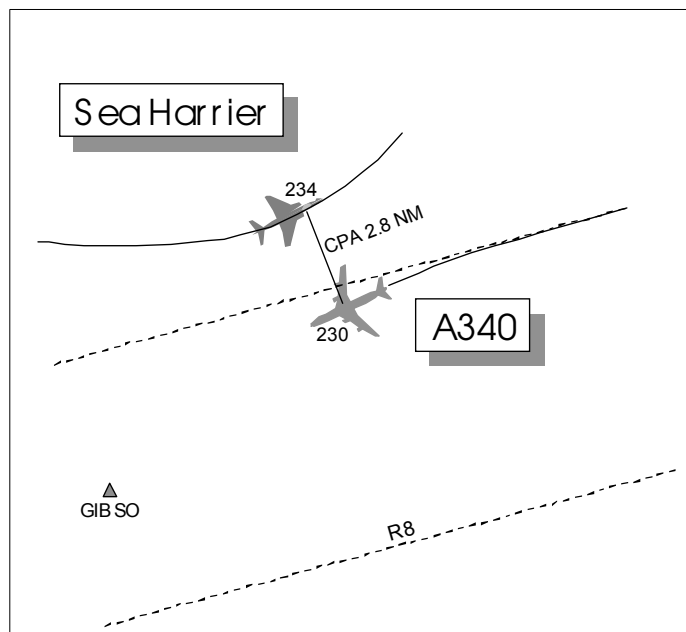
Degree of Risk: C.

Recommendation: That the MOD consider conducting a review on the use of GUARD, instead of the LFS frequency (300.8 MHz), for warning broadcasts by SAR helicopter crews penetrating the FW Region of the UKNLFS on operational sorties.

AIRPROX REPORT NO 16/02

Date/Time: 7 Mar 1540
Position: 5051 N 0226 W (7NM NE of GIBSO)
Airspace: Airway R8/FIR (Class: A/G)
Reporter: LACC
First Aircraft Second Aircraft
Type: A340 Sea Harrier
Operator: CAT HQ STC
Alt/FL: FL 230 FL 240

Weather VMC CLOC VMC CLNC
Visibility: 40 km 50 NM+
Reported Separation:
 4 NM 6-7 NM
Recorded Separation:
 2.8 NM, 400 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

LACC controllers report that the A340 was handed over from London TC to LACC heading 270° on the N side of R8 as per standing agreement; there were 2 opposite direction tracks on the S side of R8. Once through their level, the A340 was cleared to FL 250; passing FL 180 it was cleared 'own navigation' to LND and transferred to Sector 6/9T. The Sector S 6/9 controller noticed a STCA alert on the A340 and a Yeovilton return outside the airway; the A340 was passing FL 222 when the SC told the pilot to stop climb at FL 230 and turn L 10°. The SC passed traffic information on the other traffic, at FL 240. The A340 had been flying on the N edge of R8, routing direct to LND. The pilot advised that he had seen the traffic and that the stop climb had been a good call.

THE A340 PILOTS report heading 270° at 310 kt, on a radar heading and cleared to climb to FL 270. There was a transfer to another controller, and passing FL 227 they were ordered to stop climb at FL 230 and passed traffic information on an ac not on frequency. Shortly afterwards a TA announced traffic 800 ft above and 4 NM in their 2 o'clock which they immediately saw. It was a fighter ac; it passed about 4 NM to the R and above but descending through their level. There was no TCAS RA and no avoiding action was necessary.

THE SEA HARRIER PILOT reports flying various headings on a GH sortie at 300 kt. Yeovilton Approach, providing a RIS, informed him of traffic 15 NM to the E at FL 220 climbing which he acknowledged. He was in a left turn which he continued and saw the ac at about 10 NM bearing 100-110°. He rolled out on about 060° and the ac passed about 1000 ft below and some 6-7 NM S of him. He was not close to controlled airspace and there was no risk of collision, but the airliner did not appear to be inside CAS.

MIL ATC OPS reports that Yeovilton Approach (APP) (trainee and mentor) was controlling a Sea Harrier (SHAR) general handling in the Yeovilton (VLN) overhead between FL 60 and FL 240 under a RIS. At 1540:04 traffic information (TI) was passed on traffic running down the northern edge

of airway R8; *"traffic east 12 NM tracking west indicating FL 220"* to which the SHAR pilot replied *"Radar contact and visual"* at 1540:25. He was then reminded of his proximity to controlled airspace *"for information in your 12 o'clock controlled airspace up to err (break in transmission) FL 195 above"* which the pilot acknowledged. Although the range to controlled airspace was not specified the SHAR was observed to parallel the airway before turning onto N. Yeovilton's timings do not quite correspond with those of the video replay; correlating the first TI transmission with the range, it appears as though VLN's timing are 34 seconds ahead.

Timely and relevant TI under RIS was passed by APP and the SHAR had both radar and visual contact with the A340. Likewise a timely reminder of the proximity of R8 was also passed although, in retrospect, this could have been more distinct. The video recordings show that the SHAR remained in Class G airspace throughout the period specified; the closest it got to the airway was 1.8 NM. Under RIS in Class G airspace there appears little more APP could have done.

ATSI reports that the encounter took place close to the boundary between Class A airspace of Airway R8 and Class G uncontrolled airspace of the London FIR. The A340 was outbound from Heathrow to the Caribbean. To meet the standing agreement between LTCC OCK and the receiving sector at LACC, the A340 had to be positioned on the north side of Airway R8 and climbing to FL150. At 1533:05, the LACC Tactical controller operating S19,20 and 21, bandboxed, received the first call from the pilot, following the flight's transfer from the OCK sector. The pilot reported a radar heading of 270° and climbing through FL 130 for FL 150. It was apparent from the radar that the ac was still in the turn and when it reported steady on the heading the controller issued a further climb clearance to FL 190. The radar recording indicates that at this point the ac appeared well positioned to adopt a track that would keep it within the northern half of the Airway, as anticipated. A little over a minute later, following calls to other flights, the controller issued a further climb to FL 250, the standard

agreed level for transfer to the next sector. Though maybe not immediately apparent to the controller at the time, it is now clear from the radar recording that the A340's track was slowly converging with the northern boundary of the Airway, rather than remaining parallel to it. A further three minutes elapsed, by which time the A340 had reached the airway boundary and was tracking along its edge. Having for the time being resolved any conflicts with opposite direction traffic, the Tactical controller released the pilot to route on his own navigation direct to the Lands End VOR. As Lands End VOR stood at a range of about 149 NM on the airway centreline the angular adjustment required would have been small and therefore would not have not contributed effectively to restoring the A340 securely within the Airway once more. No other adjustment was made to the ac's track and a short while later the flight was transferred to the next LACC sector. The MATS Part 1, 1-49/50, para 12, VECTORING, Responsibility, states *"Although ac operating in controlled airspace are deemed to be separated from unknown ac flying in adjoining uncontrolled airspace, the radar controller should aim to keep the ac under his control at least two miles within the boundary where possible. Unpredictable manoeuvres by unknown ac can easily erode separation"*. On closer examination, the radar recording used indicates that at this time the ac was briefly between 1/5 and 1/3 NM outside the airway, however, with the range selected by the controller at the time, the flight was likely to have appeared to be just on the edge of controlled airspace. Without delay the flight made its first call to the receiving sector, S6/S9, also bandboxed, and was immediately cleared to FL270. At this point the radar recording shows an unknown fast moving target outside controlled airspace approaching the A340 from the west and passing FL 236 in a slow climb. Less than a minute later when the unknown traffic was at a range of about 15 NM, STCA activated and bringing the potential conflict to the attention of the S6/S9 Tactical controller. He instructed the A340 to turn left 10 degrees and provided traffic information, stating that *"there is unknown traffic just outside the airway at FL 240 stop climb FL 230."* At this point the A340 was passing FL 222 in the climb. The 10 degree heading instruction was slow to take effect and would probably have benefited from the use of 'avoiding action' phraseology. The unknown traffic had closed to a range of about 6 NM as the A340 was just

regaining controlled airspace in a gradual left turn. Ultimately the unknown ac did not penetrate controlled airspace passing about 2 NM N of the boundary also in a left turn. At their closest point the two ac passed each other, starboard to starboard, 2.9 NM apart (with the unknown 1.9 NM N of the boundary) but eligible to be 'deemed' separated.

CINCFLEET comments that this was another event occurring close to the boundary of Controlled Airspace (CAS) where both parties involved were legitimately going about their business. It is questionable whether this is actually an Airprox when the recorded separation was 2.8 NM and 400 ft, and the Harrier pilot had acquired the other aircraft at 12 miles. Once again this highlights the difficulties presented to civil controllers in maintaining Class A airspace minimum separation standards when attempting to fly aircraft close to the edge of CAS; had the A340 been on the airway centreline, separation would have been in the order of 6.8 miles.

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.

A heading of 270° for the A340 (12° off the track of the Airway) would inevitably take the ac out of CAS at some stage and required monitoring by both the bandboxed sectors involved; this monitoring appeared to have lapsed. From 1537, when the A340 was crossing the N edge of R8 abeam Bournemouth, and was cleared direct to LND, there was no opposing traffic in the airway. A routeing via GIBSO would have returned it more promptly to within the bounds of the airway.

However, with the aid of STCA, the S6/9 SC issued instructions which returned the A340 to within the airway before the Sea Harrier passed abeam, outside. At that point the ac could be deemed separated; members concluded from this that there was subsequently no risk of collision and that the incident was a controller perceived confliction.

Members noted that the pilots' estimates of the miss distance (4 and 6-7 NM) differed by much more than usual from the distance shown on the radar recording.

The Board discussed the concept of offset tracking on an airway, which would help controllers to separate opposite direction traffic on airways and which modern navigation systems were capable of maintaining. Members were advised that NATS had been trialling RNAV arrival and departure procedures and had intended to trial offset tracks on airways. However, the CAA had since produced ATS Information Notice No 9 which advises air traffic control service providers

of the introduction of a temporary moratorium on the use of RNAV based procedures and trials. The Chairman was invited to find out for members what was planned for the future of this trial, and report back. (ATSIN 9 can be viewed on the CAA web site.)

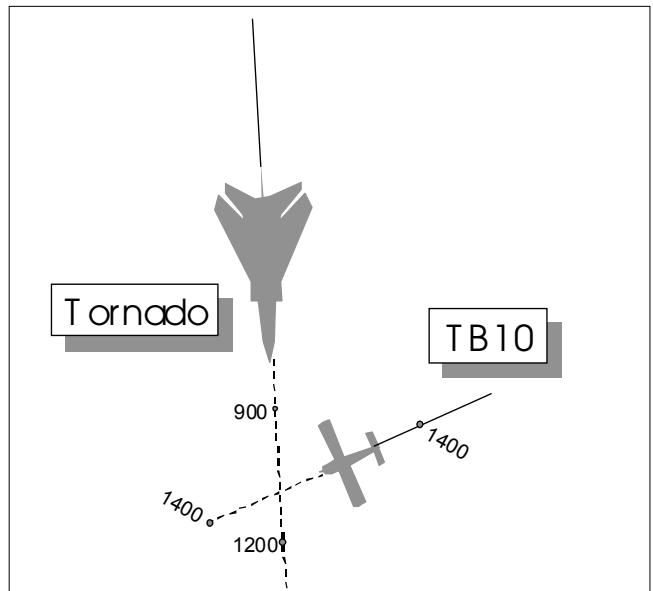
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Controller perceived confliction near the boundary of Airway R8.

Degree of Risk: C

AIRPROX REPORT NO 17/02

Date/Time: 7 Mar 1659
Position: 5258 N 0017 W (4 NM ESE of Sleaford)
Airspace: AIAA (Class: G)
Reporting Aircraft Reported Aircraft
Type: Tornado GR TB10
Operator: HQ STC Civ Pte
Alt/FL : 1400 ft ↑ 1500 ft
(Rad Alt) (QNH 1011 mb)
Weather VMC CAVK VMC CAVK
Visibility: 10 km+ 20 NM
Reported Separation:
100 m, 100 ft V NK
Recorded Separation:
200 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports heading 170° at 350 kt while climbing out of the LFS when he saw a light ac at very close range, 500 m ahead, just left of the nose, crossing L to R. He bunted to avoid it, topping at 1470 ft Rad Alt, and passing 100 ft below it and less than 100 m ahead of it. There had been an extremely high risk of collision. He had left Waddington's LARS frequency some 30 seconds before the incident.

THE TB10 PILOT reports heading 255° at 110 kt, cruising at 1500 ft QNH through the area of the Airprox and receiving a FIS from Coningsby. The controller advised him of fast traffic crossing R to L below and to keep a lookout for it but neither he nor his passengers saw it.

UKAB Note: The Claxby Radar recording shows the TB10, identified from its Coningsby/

Cottesmore squawks, tracking 244°, steady at 1400 ft Mode C. The Tornado tracks under the Cranwell MATZ stub at 250 ft agl and starts climbing towards the TB10, passing almost directly beneath it while climbing between 900 and 1200 ft Mode C, tracking 178°. The CPA is at 1658:50; between 1658:07 and 58:23 the TB10 was changing to Cottesmore's squawk. (Add 200 ft to Mode C readings for altitude.)

MIL ATC OPS reports that TB10 pilot was in receipt of a FIS from Coningsby Zone (CGY ZONE) whilst transiting west between Skegness and Widmerpool at 1500 ft RPS (1013 mb) and squawking 3757. During a largely uneventful 15 min transit, CGY ZONE passed the TB10 pilot TI on one occasion (unrelated to this incident) before conducting a radar handover to Cottesmore Zone (COT ZONE) at a position some 10 NM SW Coningsby. The handover was completed quickly, accurately and, judging by both controllers' comments, the TB10 was judged to be a 'clean' ac on transfer. After the handover had been completed, but before the TB10 pilot had been instructed to contact COT ZONE, CGY ZONE stated *"c/s, there's fast jets shortly right to left to pass underneath you indicating 1400 ft below"*, which was acknowledged. The TB10 pilot was instructed to contact COT ZONE and was passed an updated TI call from CGY ZONE just as he left the frequency: *"Roger, they're north of you by 3 miles now, indicating in the climb"*. The TB10 pilot did not acknowledge the second TI call. Shortly afterwards, the TB10 pilot made initial contact with COT ZONE, although no mention of any incident was made whilst the ac was on frequency.

The Tornado crew was under a FIS from Waddington Zone (WAD ZONE) whilst transiting on a south-easterly track towards the 'Coningsby-Cranwell gap' at low level prior to entering Wainfleet Range. WAD ZONE passed the RPS (1013 mb) and asked the Tornado crew to squawk ident; however, the ac was not formally identified, probably due to its height. As they passed clear of the gap the Tornado crew stated *"c/s is clearing to the south going en-route, good day"*; WAD ZONE replied *"Roger, good day"*. The entire transit took slightly more than 4 minutes from initial contact to leaving the frequency. Later the same evening, WAD ZONE received a telephone call from the Tornado pilot regarding an incident that had taken place shortly after he had left WAD

ZONE's frequency. WAD ZONE confirmed that there had been no relevant traffic showing on radar when the Tornado crew went en-route.

The Claxby radar recording shows the TB10 squawking 3757 indicating 1400 ft tracking 260° transiting to the south of Coningsby. At 1656:42, the TB10 is about 5 NM SSW of Coningsby at 1400 ft maintaining track, whilst the Tornado is about 5 NM NW of Coningsby tracking SW, squawking 7001 and indicating low-level (Mode C of '000'). At 1657:25, the Tornado turns left onto south tracking directly at the TB10, which has maintained altitude and track. At 1657:55, with the TB10 in their 12 o'clock at 4 NM, the geometry would suggest that the Tornado crew would pass very slightly behind the TB10 if the headings were maintained; shortly afterwards, the TB10 pilot begins changing to a 4640 squawk indicating that a handover is taking place. At 1658:20, the Tornado is indicating 100 ft and turns right 5-10° into direct conflict with the TB10. The Tornado continues to climb passing through 600 ft as the SSR labels begin to merge at 1658:44; the TB10 has maintained 1400 ft. As the primary returns begin to diverge at 1659:01, the Tornado is seen maintaining a southerly track, but has descended to 1000 ft; the TB10 has maintained track and altitude. As the 2 ac continue to diverge, the Tornado climbs to 1800 ft and turns left by 10°.

CGY ZONE passed 2 TI calls to the TB10 pilot prior to him making initial contact with COT ZONE; however, it is doubtful whether the TB10 pilot heard the second TI call and, at that late stage, there was little or no use in passing the information to COT ZONE. As both CGY and COT ZONE made no reference to the conflicting traffic during the handover, we can only assume that the Tornado – indicating '000 ft' on Mode C – was not painting on the relevant radars at the time of the handover, otherwise one or both of the controllers concerned would have made reference to it. Under the circumstances, it is difficult to suggest any alternative course of action or improvement to the service provided by CGY and COT ZONE. With regards to Waddington ATC, WAD ZONE is adamant that there was no relevant traffic in the vicinity of the Coningsby-Cranwell gap when the Tornado crew went en-route; however, he does recall an ac with a Cranwell squawk manoeuvring, indicating well above to the south of Cranwell. As a matter of fact, the Claxby radar recording does show an otherwise unrelated ac squawking 2642

indicating well above at FL 55 some 3 NM south west of the incident point. As WAD ZONE's recollection of the local air picture slightly before the incident is entirely accurate, we can only assume that the TB10 transiting at 1400 ft could not be seen on Waddington's radar 12-14 NM away, and so could not be called to the Tornado crew.

HQ STC comments that ultimately this was a failure to see and be seen in Class G airspace. However both crews may have been lulled into a false sense of security, since the ATC services they had received did not alert them to the potential conflict.

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.

As with another Airprox assessed at the same meeting, members were aware that pilots would sometimes receive radar derived traffic information while under a FIS and that this might lead some to expect it always. The name of the service was felt to be misleading and many members considered that something like a 'Flight Watch Service' might better express what pilots should expect. Presumably the Tornado would have been below Waddington's radar cover, but

the pilot's report gave the impression that he was surprised not to receive traffic information on the TB10; the controller may have been unable to see either ac at the time the pilot called going 'en route'.

The TB10 pilot was unaware of the close passage of the Tornado; the TI he was given indicated that it was 1400 ft below which may have suggested to him that he did not need to search for it. Its camouflage would not have helped him to see it, nor the lack of angular motion due to it being on a near collision course. As it was, with both ac receiving a FIS, both pilots were primarily responsible for their own lookout and avoiding action and the Board concluded that the cause of the Airprox was a late sighting of the TB10 by the Tornado crew and the non-sighting of the Tornado by the TB10 pilot. Members assessed that from the lateness of the Tornado pilot's sighting and his description of the event, the safety of the ac had been compromised.

The Board invited the Chairman to discuss the use of FIS and the expectations of pilots using it with DAP.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting of the TB10 by the Tornado crew and non-sighting of the Tornado by the TB10 pilot.

Degree of Risk: B

AIRPROX REPORT NO 18/02

Date/Time: 7 March 1521

Position: 5136 N 0105 W (Benson - elev 226ft)

Airspace: MATZ (Class: G)

Reporting Aircraft Reported Aircraft

Type: Puma HC1 Grob Tutor

Operator: HQ JHC HQ PTC

Alt/FL: ↑ 1600 ft 1900 ft ↓
(QFE 1015mb) (QFE 1015mb)

Weather VMC CAVOK VMC CAVOK

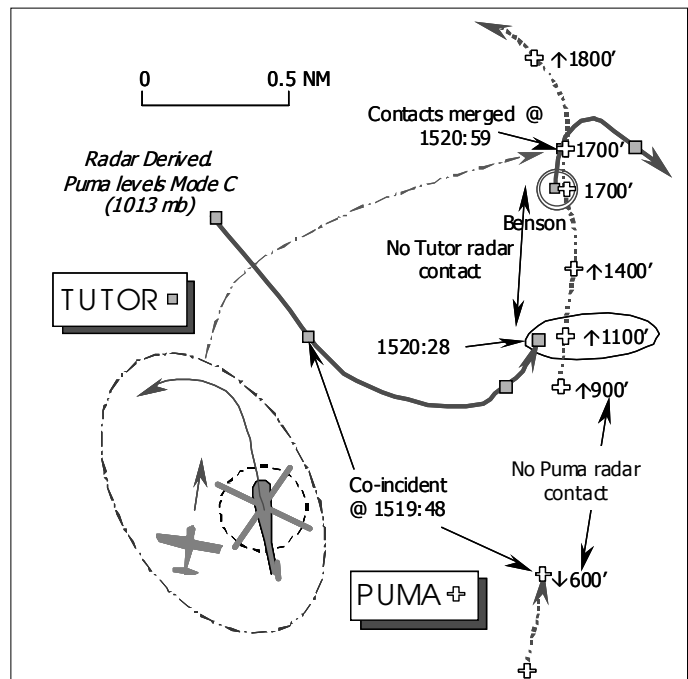
Visibility: 10 km 10 km+

Reported Separation:

150 ft H/150-200 ft VNil H/200 ft V

Recorded Separation:

Contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PUMA HC1 PILOT reports HISLs were on, during a TACAN approach to overshoot on RW 01RHC at Benson, flying at 100 kt in receipt of a RIS From Benson DIRECTOR (DIR) on UHF - 315.75 MHz and squawking A7372 with Mode C. He executed the overshoot on RW heading, as cleared, at his MDH of 500 ft QFE. Passing 1600 ft in the climb for his cleared height of 1800 ft QFE – VMC – and turning L through 350° for 220° as instructed by DIR, the aircrewman called "stop turn - descend" after he had sighted a Tutor emerging from their 6 o'clock position. The Tutor was about 50 yd to port - at about 8 o'clock - and 150-200 ft above his helicopter commencing a descending R turn. To avoid the Tutor he levelled his helicopter and turned R, whereupon it disappeared from view in his 6 o'clock in a descending turn. He assessed the risk of a collision as high and reported an Airprox to the ATC Supervisor after landing.

THE GROB TUTOR PILOT reports his ac has a white colour scheme and the HISL was on, whilst joining the visual Cct at Benson for a Practice Forced Landing (PFL) on RW01 RHC. He was in communication with Benson TOWER (TWR) on VHF - 127.15 MHz; SSR was on standby with the

Mode C off. He reported 'HIGH KEY' at 2500 ft QFE in a glide at the normal position on the deadside, heading 008° at 75 kt. Aware of instrument traffic – the Puma – from the 3 NM broadcast about 2 min before his call at 'HIGH KEY', he was not aware of its pilot's intention to overshoot early at 500 ft. In response to his 'HIGH KEY' call, TWR asked if he had seen a Merlin helicopter joining the Cct downwind. As he dipped his starboard wing to improve his view to the R he immediately saw the Puma, which had previously been blanked by the mainplane, about 200 ft directly below his ac. To avoid the helicopter he levelled the wings and continued ahead on the deadside, whilst the Puma continued its turn to the L. When the Puma was well clear, he turned R onto the live side - before the upwind end of RW01 - to complete the PFL.

MIL ATC OPS reports that the Puma pilot had just completed a TACAN approach to RW01RHC at Benson. The pilot reported overshooting at 1520:11, whereupon TALKDOWN (TD) – who was monitoring the approach - instructed the pilot to call DIR on 315.75 MHz. At 1520:32, the Puma pilot reported to DIR "...on the overshoot passing 1200 for 1800 (ft) 1015 (QFE)". The helicopter

was identified by DIR who reiterated the height, *"..climbing 1800 when passing 1500 turn left heading 220"*, at the same time traffic information was passed about traffic to the NE - 3 NM away. The type of ATS - a RIS - was not repeated after the o/s, but the Puma pilot acknowledged the traffic and advised DIR at 1520:50, that he was *"coming left onto 220"*. Thirty seconds later, at 1521:20, the Puma pilot asked DIR, *"were you aware of a Tutor..."*; DIR replied *"Roger, nothing appearing on mine (his radar display)"* at 15:21:44. No Airprox was declared on the frequency at the time and the sequencing continued without further incident.

Meanwhile, the Tutor crew - under a FIS from Benson APPROACH - at 1518:03 requested a PFL recovery. Joining instructions were issued including details of instrument traffic - the Puma - *"...runway 01 right-hand instrument traffic 3.5 miles"*. The Tutor crew reported *"going to TOWER"* at 1519:26 and 20 seconds later checked in on the TWR frequency. Although the trainee ADC responded with the wrong callsign, joining instructions and further traffic information on the radar traffic were passed at 1519:43, *"...Benson TOWER join RW 01 RH radar traffic short finals to overshoot"* - the Puma. The trainee ADC acknowledged to his mentor the use of the wrong callsign, but did not correct it on the RT and it appears that the Tutor crew either did not hear the error or understood the call was for them and responded at 1519:49 accordingly *"(C/S) call you at high key"*. Some time was spent establishing whether the Tutor crew was visual with a Merlin that subsequently called joining RHD downwind for RW01, before the Tutor pilot was given clearance to land at 1522:22. Later at 1523:17, the Tutor pilot advised TWR, *"my apologies I didn't see the Puma when he was doing his overshoot he was under my wing"*.

Clarification of the Tutor's callsign by TWR would have been desirable, to avoid potential confusion, however, the mentor was content that his trainee had recognised his error and the mistake has little apparent bearing on the Airprox. About 12 sec were spent establishing whether the Tutor pilot was visual with the Merlin joining downwind, which appears irrelevant and may have distracted the Tutor crew from the overshooting Puma. Nevertheless, TWR obviously felt the potential conflict downwind was a cause for concern, which was somewhat negated by subsequently

informing the Tutor pilot *"you're number one"* when TWR was not visual with the Merlin until 5 sec after the Tutor pilot. The Tutor crew had received 2 previous calls relating to the Puma, from APP prior to joining and from TWR on joining, plus a third, indirect prompt, when the Merlin called to join.

Following this incident the IFR climb out procedure at Benson has been changed. All ac, except those carrying out a short pattern circuit, will maintain RW heading until 2 NM before turning. It is felt that this may not be the solution and, as this occurrence has implications to other units, this HQ is currently investigating 'best practice' in an endeavour to prevent further incidents of this nature.

UKAB Note (1): The clearance to o/s was requested by TDN at 3 NM, issued by TWR and relayed to the Puma pilot by TDN verbatim at 1518:40, *"(C/S) clear to overshoot circuit clear"*, which at the time was correct.

THE PUMA PILOT'S UNIT comments that the method of joining a visual circuit from a practice forced landing is well proven and relies upon the need to see and avoid. In this instance, despite being informed about the Puma, it appears that the Tutor pilot did not realise his proximity to the helicopter whilst it was overshooting from an instrument approach. The incident is a timely reminder to clear the airspace before turning into it. Good lookout from the Puma crewman prevented the incident becoming more serious.

HQ JHC comments that as a result of this incident, procedures at Benson have now changed which should lead to more positive procedural separation between instrument and VFR traffic.

HQ PTC comments that again, a predictable conflict in flight paths between instrument and visual traffic has precipitated an Airprox. Light ac have carried out PFLs in mixed traffic patterns for many years. The incumbency to clear one's flight path under VFR is as binding on a fast climbing helo as much as on a PFL. In this rather fuzzy zone, accidents are only prevented by all concerned maintaining continuous alertness to the hazards this exposes - and exercising common sense judgement. This must include the TWR controller considering a "Caution" call when

ac appear to be converging unsighted on each other, even if the Rules do not require him to do so.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board commended the Puma crewman for his effective scan, alertness and prompt warning to his pilot about the Tutor as soon as he saw it. Evidently, the Tutor was approaching the helicopter from the pilot's blind side and he would not have known anything about it, but for his crewman's timely warning. This demonstrated good crew co-operation within the Puma - a practical example of the principles of CRM in action - and here put to good effect.

Members perceived that PTC's suggestion about considering a cautionary warning from ATC was well founded, but it would have been difficult for the ADC to spot the ac in this case, the Board was told, as the solid roof of the VCR might obscure the required field of view overhead the aerodrome. DIR would have been unable to forestall this close encounter, as he would have been unaware of the Cct state. Moreover, he would have expected the VFR Cct traffic to remain clear of his IFR pattern ac. Nonetheless, it was explained that the height restriction of "*when passing 1500 turn left heading 220*", was given to ensure vertical separation above the Cct, but, and unbeknown to DIR, this took no account of the Tutor that was above the nominal Cct flying toward HIGH KEY at 2500 ft. Consequently, the DIR's plan would not have separated the IFR PUMA from the ADC's patterns, which the resultant revised procedures should facilitate. It was observed that in advance of HQ STC Mil ATC Ops determination of 'best practice', these revised procedures will provide a 'known' path for overshooting IFR traffic to follow, which in the interim, will help pilots established in the visual pattern to plan their Cct accordingly. The Board also discussed the Cct state provided to the Puma crew within the ADC's clearance "*circuit clear*", which at the time was correct. However, by the

time the helicopter was actually passing through the Cct area the Tutor crew had called TWR joining for the PFL making the earlier information clearly out of date. Thus, the Puma crew were oblivious to the presence of the Tutor as they climbed out and there did not appear to be any mechanism to update this situation. The Board was briefed that civilian practice was to switch the overshooting ac to TWR – not only did this enable the crew to be passed the latest Cct state but it also enabled the ADC to give pertinent warnings if necessary. Military members opined that this was not practicable in a 'high speed' military visual Cct with fast jets and in the end the Cct traffic should remain clear of the IFR ac anyway. It was evident from the Mil ATC Ops report that the Tutor pilot had been informed about the Puma on two occasions, first by APP before he switched to TWR and then again by TWR when he called to join. Additionally he may have heard the ADC mention the Puma when the Merlin crew called later. Members agreed that the C/S error by the trainee ADC was not relevant because the Tutor was the only ac with TWR at the time. Nonetheless, the Tutor pilot, having been told about the IFR helicopter should have taken steps to ensure that he knew where it was and then amend his *practice* forced landing pattern if need be to avoid it. The radar recording revealed that the helicopter should have been visible as he turned in toward the aerodrome to commence his PFL at 1519:48. At this point the helicopter was still descending on the procedure, but thereafter should have climbed at a steady rate; it was also evident that the similar speeds of the two ac had contrived to keep the helicopter close in on the Tutor pilot's starboard beam as they converged on the aerodrome and finally merged at 1520:59. Whilst members noted PTC's comments, it was clear that the Puma pilot, though flying in VMC, was flying in accord with IFR and had 'right of way' here as he climbed up from his MDH of 500 ft. This was not early, as perceived by the Tutor pilot. Consequently, it was incumbent on the VFR Tutor pilot joining for a visual PFL to sight and remain clear of the Puma about which he had been told. As it was he had not seen the helicopter until he dipped his starboard wing, unaware how close it was beforehand. The Board concluded unanimously, therefore, that this Airprox had resulted because the Tutor pilot flew into conflict with the Puma, which he had been warned about but saw late.

Turning to risk, the Tutor pilot said he saw the Puma turn to the L; this was evidently after the helicopter pilot's avoiding action R turn – shown on the radar recording - away from his ac. It would appear, therefore, that the Tutor pilot saw the helicopter after he had been seen by the crew of the other ac. Nevertheless, late though the sighting was it was in sufficient time to ensure that he could remain clear of the helicopter before he turned into the liveside himself. Both pilots' actions had effectively removed the actual risk of a collision, but without any horizontal separation and only about 200 ft at most reported between

the heights of both ac, it was a close encounter nonetheless. The Board agreed, therefore, that the safety of both ac had been compromised

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tutor pilot (VFR) flew into conflict with the Puma (IFR), which he had been warned about but saw late.

Degree of Risk: B.

AIRPROX REPORT NO 19/02

Date/Time: 12 Mar 1317

Position: 5040 N 0057 W (1 NM W of NAB Tower)

Airspace: London FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: BN2T Defender Lynx HAS Mk 3

Operator: Civ Commercial C-in-C FLEET

Alt/FL: 350 ft 400 ft
(Rad Alt) (Rad Alt)

Weather VMC CLBC VMC CLBC

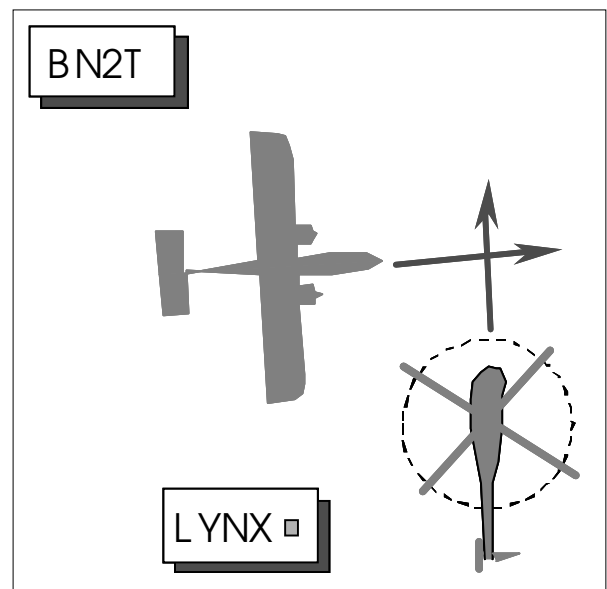
Visibility: 5 km 5-8 km

Reported Separation:

50-100 ft H, 20 ft V 75-100 yd H

Recorded Separation:

Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BN2T DEFENDER PILOT reports that his ac is camouflage drab green and black with light grey undersurfaces, but the anti-collision beacon was on, whilst outbound from Bembridge IOW into the English Channel for a radar equipment trial, VFR at 120 kt. A 7000 squawk was selected with Mode C. Approaching Nab Tower, heading 090° (M) at 350 ft asl they had just switched to London INFORMATION when one of the radar operators called a contact. He spotted a Lynx helicopter at R 1 o'clock about 50 – 100 ft away,

but it was "too close to take avoiding action". The helicopter passed 50 – 100 ft across the nose from R – L and about 20 ft above his ac with a "high" risk of a collision.

He opined that the view from the LHS - as with all high wing ac - is restricted to the R and the helicopter closed from within the 'blind-spot'. He added, with commendable frankness, that in his opinion this Airprox had resulted because both pilots had not seen each other's ac beforehand.

THE LYNX HAS MK3 CAPTAIN reports his helicopter is camouflage grey; HISLs are not fitted but red anti-collision beacons were on whilst operating on a student observer instructional sortie in the eastern approaches to the Solent. The crew was under a FIS from Plymouth MILITARY whilst operating at 400 ft asl. As part of the sortie the student was required to conduct a Helicopter Controlled Approach (HCA) to a surface contact. This is a standard procedure, using surface contacts of opportunity, practised to facilitate the safe return of the ac to its ship in poor weather conditions or when the ship's radar has failed.

Heading 360° at 120 kt, the Lynx was inbound toward a merchant ship in the vicinity of the Nab Tower on the HCA at 400 ft Rad Alt, some 500 ft below cloud with an in-flight visibility of 5-8 km. A squawk of 4602 was selected with Mode C. The Defender was first spotted at L 9 o'clock about 200 yd away by himself, sitting in the rear cabin behind the cockpit, as he glanced to his L through the cabin window. The other ac was seen to draw L and passed about 75 - 100 yd astern of his helicopter at a similar height, apparently R wing low.

He added that his student crew was operating under a high workload; the LHS Observer had his eyes 'in' on the radar at the time, whilst the PF was in the RHS looking forward. During an HCA the Lynx Observer is required to talk his pilot down a nominal glide-slope presented on the ac's radar display and had not seen any primary radar or secondary transponder returns which would have corresponded with the Defender. For practice approaches/instructional sorties the lookout is maintained by the instructor sitting immediately behind the crew in the cabin area. Whilst he considered that the Defender was "reasonably close" he did not consider that any risk of a collision had existed.

MIL ATC OPS comments that Lynx ac from Yeovilton call Plymouth MILITARY in this area and are placed under a FIS. However, the radio and radar cover in the vicinity of this Airprox is such that the Lynx could be neither seen nor communicated with unless it climbed into coverage. Therefore, crews working in these areas would do so autonomously.

CINCFLEET comments that this incident was a classic example of the need to see and be seen under "see and avoid". This commonly used procedure demands a high work rate from inexperienced, trainee aircrew and the need to maintain a good lookout throughout is very well illustrated. The reduced field of view from the instructor's cabin seat and the decision to conduct the serial in proximity to active airfields were contributory factors to this Airprox.

UKAB Note: This Airprox is not shown on the LATCC Pease Pottage radar recording. The Defender, is shown eastbound maintaining 400 ft Mode C (1013 mb) and at 1317:03, the Lynx is shown momentarily for one sweep, but neither a track nor the subsequent CPA can be determined.

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.

The Board noted the activity undertaken by the Lynx crew resulted in a fair amount of heads-in time for all the crew members. In the LHS the student observer was operating under a high workload looking at his display - conning the pilot on the HCA, who himself was trying to fly the approach as accurately as possible on instruments whilst following the student's directions. This resulted in the two front seat occupants who were in the best position to spot the Defender, concentrating their attention inside the cockpit to the detriment of lookout. It was explained that the captain of the ac, situated in the cabin behind the cockpit, was responsible in this situation for lookout and it was emphasised by the CinC Fleet member that these are well practised procedures. Nonetheless, members were concerned that from his restricted viewpoint behind the cockpit, the Captain of the ac was not able to fulfil this critical function fully. Although the board was briefed that such flights normally took place in established Danger Areas, which provided a measure of protection around such evolutions - here no such protection existed. It was explained however, that HCAs can only be conducted onto targets of opportunity where they exist. Hence, if there are no ships in the allocated

area then the HCA must be conducted in Class G airspace. A helicopter pilot member agreed that although it was not unreasonable to conduct these sorties in the Open FIR, the limited lookout exercised was not conducive to 'see and avoid' - as evinced by this Airprox. Another pilot member thought that the RHD seat pilot should have been able to spot the Defender, but apparently did not do so because he was absorbed totally in the head-down HCA procedure, which caused some angst among pilot members. There was general agreement that although the Captain of the ac might have been doing his best to fulfil the lookout requirements, he had set himself a very difficult task which he had not carried out successfully.

Turning to the view from the Defender's cockpit, the army member – who was familiar with the generically similar Islander – explained that although satisfactory between 10-2 o'clock, the view to starboard was not good and obscured by the starboard engine and propeller. Added to all of this was the colour scheme of both ac – camouflage grey, which against a grey seascape and cloud did little to promote conspicuity. Apparently neither ac was fitted with HISLs - a continuing source of concern to the Board - and why such basic equipment is not fitted to these ac seemed perplexing. Thus several factors all conspired to reduce the potential for both pilots/crews to spot each other's ac. Fortunately the Defender pilot, who was required to give way to the helicopter under the Rules of the Air in this situation, had assistance from his radar operator. However, it was not clear from the information available, what sort of radar sensors were carried on board the Defender or the relative arcs through which they could scan, but some members were surprised that the warning given was at such short range. Nevertheless, at this stage the Defender pilot saw the helicopter too late to enable him to do anything about it. Similarly, neither the radar fitted in the Lynx nor any of its EW equipment had detected the Defender. Nothing here had successfully assisted

early visual detection, and neither crew had spotted the other's ac in time to avoid it. Therefore, the Board agreed unanimously that the cause of this Airprox was effectively, a non sighting by both pilots/crews.

Turning to risk, members were concerned that even if the Lynx Captain had seen the Defender slightly earlier there would have been a delay between his visual acquisition, telling the pilot to do something to avoid it and the pilot ultimately effecting a change in the ac's flight path. Though the Lynx is an agile helicopter, its captain spotted the other ac very late as it drew aft and passed astern. Fortunately, and for no other reason than pure chance, the geometry of the encounter was such that the Lynx was always going to pass ahead of the Defender – albeit by only 50-100 ft according to its pilot. Without more positive recorded radar evidence the minimum separation could not be confirmed and there was a significant difference between the two reported assessments. Nevertheless, in the Board's view neither pilot was able to effect the outcome by avoiding the other's ac by a greater margin and members agreed unanimously that an actual risk of a collision had existed in the circumstances that pertained.

Post UKAB Note: It was subsequently ascertained that the radar sensors carried by the Defender are of a purely experimental nature and have no designed capability against ac, nor can they detect or interrogate SSR. The sensors were strictly air to surface vessel and none was active at the time of the Airprox.

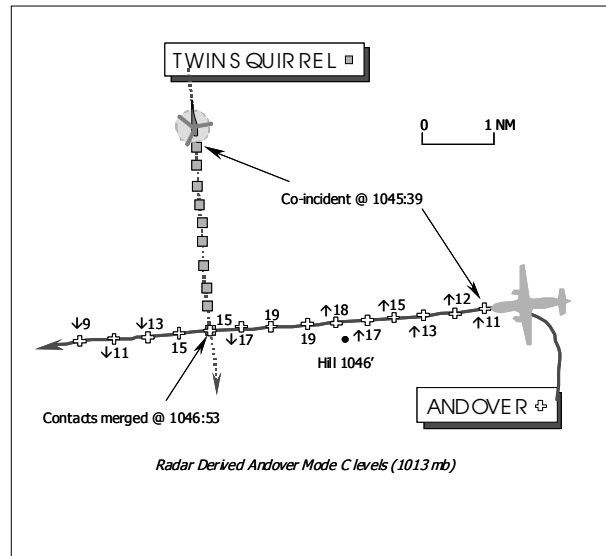
PART C: ASSESSMENT OF CAUSE AND RISK

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

Degree of Risk: A.

AIRPROX REPORT NO 20/02

Date/Time: 14 March 1046
Position: 5204 N 0207 W (3 NM NNE of Tewkesbury)
Airspace: UKDLFS - LFA 4 (*Class: G*)
Reporting Aircraft Reported Aircraft
Type: Andover Twin Squirrel
Operator: MOD DPA Civ Pte
Alt/FL: 800 ft ↓ 1500 ft
 (Rad Alt) (amsl)
Weather VMC NO CLOUD VMC
Visibility: >10 km >10 km
Reported Separation:
 3 - 400ft V 200 ft
Recorded Separation:
 Contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ANDOVER PILOT - the Captain of the ac and the PNF in the LHS - reports his ac has a distinctive red/white/blue colour scheme, anti-collision beacons and HISLs were on whilst conducting a flight trial at low-level in LFA 4. In a straight descent about 3 NM N of Tewkesbury, heading 270° at 160 kt, the trials equipment was assessed to be working incorrectly, commanding the PF - the co-pilot in the RHS - to fly below the desired height, so the trials officer in the rear cabin was making adjustments to the equipment. Descending through 800 ft Rad Alt, the PF first sighted the helicopter less than ¼ NM away to starboard of the nose in a gentle L turn perpendicular to his flightpath at 800 ft agl having just crested a ridge. To avoid the helicopter the co-pilot pulled back on the yoke to level the ac from the gentle descent, and the Twin Squirrel passed about 3 - 400 ft almost directly beneath the ac from R - L. He saw it shortly after the PF as it disappeared under the ac's nose, after the avoiding action had been initiated. They reported the Airprox to Gloucestershire Airport, but the crew was distracted from filing a full report because the trials officer in the rear cabin had fallen during the avoiding action and sustained a suspected broken leg. The trial was then terminated and the ac diverted to Lyneham to obtain medical assistance.

He assessed that the risk of a collision was "medium", adding that his lookout from the LHS was limited by an equipment display mounted in the centre windshield and the monocular Head Up Display.

THE AS355 TWIN SQUIRREL PILOT reports his helicopter has a red/grey livery. He had departed from a private HLS and was inbound VFR to Cheltenham Racecourse (it was Gold Cup week) heading S at 120 kt, in level cruise at an altitude of 1500 ft. A squawk of A7000 was selected but Mode C was switched off. He first spotted the Andover about ¼ NM away on the port beam 200 ft above his helicopter, and initiated a quick descent to avoid the twin-prop ac, which passed ¼ NM away and 200 ft above his ac. He assessed the risk as "medium", adding that the Andover was out of sight until a late stage, because it was on a constant relative bearing and hidden by the panel between the roof light and windscreen of his helicopter.

MOD DPA DIRECTORATE OF FLYING comments that this Airprox occurred whilst the Andover crew was undertaking an important trial. The ac was descending at about 1000 ft/min on a westerly heading and about to level-off, when the co-pilot sighted the helicopter, albeit very late; he

reacted correctly to check the descent and thus avoid the Twin Squirrel. It would seem from the relative geometry, that this encounter would have been very difficult to spot earlier, by either crew.

UKAB Note: The Clee Hill radar recording reveals that this Airprox occurred at 1046. The Andover is shown squawking 3/A 7001 steady westbound at 1045:39, climbing gently through 1100 ft Mode C (1013 mb). The Twin Squirrel is shown southbound, squawking A7000 without Mode C. The Andover attains 1900 ft Mode C at 1046:28, after passing 'Hill 1046' and then commences a descent. The respective contacts merge 15 sec later and the Andover levels briefly for a further sweep - about 8 sec - before descending further. There is no discernible horizontal separation at the merge. The applicable Cotswold RPS for the period was 1004 mb, thus 1500 ft Mode C (1013 mb) equates to about 1230 ft RPS (1004 mb). However, both pilot's reports concur, insofar as the helicopter passed below the Andover.

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 authority.

Members noted that though the Twin Squirrel pilot was wisely squawking A7000 - the conspicuity code - whilst transiting through the FIR, regrettably, he had not switched on the Mode C altitude reporting. During any flight outside the aerodrome traffic pattern, pilots should switch their transponder to the appropriate conspicuity/special purpose code - or other code as may be required by an ATSU with Mode C (UK AIP ENR 1-6-2-1). The Board agreed this most strongly. Although not a factor here, it would allow an ac fitted with TCAS to alert its pilot to other ac and in a close quarters situation provide a Resolution Advisory. Members observed that even in the low level environment PINS helicopters hope to carry rudimentary ACAS equipment in future and the Board strongly advocated the use of a squawk with Mode C unless there was good reason to do otherwise.

A Helicopter pilot member confirmed the Twin Squirrel pilot's assertion that the panel between the roof light and the windscreen was a hindrance to lookout. Nevertheless, the Board asserted that this should have been taken into account in his lookout scan, which might have enabled him to detect the Andover earlier. It also appeared that the Andover had climbed over 'Hill 1046' just before the Airprox, which should have skylined the ac to the helicopter pilot. However, in the end, for whatever reason, the Twin Squirrel pilot had not detected the other ac until it was about ¼ NM away. At that stage he had descended to avoid the Andover and here was one part of the cause, which the Board agreed was a late sighting on his part.

Similarly, from the comprehensive report submitted by the Andover pilot, it was evident that equipment displays and the monocular HUD had served to degrade this crew's lookout. Regardless of the nature or importance of the trial, members were concerned that the extraneous equipment might have impeded crews from looking out of their ac effectively when they were operating in the see and avoid environment of the UKDLFS/FIR. Without the aid of a CWS, such as TCAS, look-out was the prime way of avoiding collisions in this environment where no other safety nets remained to allow the Andover crew to steer clear of other traffic - as they were required to do under the rules of the air in this situation (if they could see it). Consequently, members agreed that the second part of the cause was a late sighting by the Andover crew. Members also observed that inherent risk should be taken into account when planning these trials in the busy low-level environment - particularly during a period when a greater density of helicopter traffic was likely in this area because of the Cheltenham race meeting.

The Andover co-pilot's avoiding action had resulted in an injury to the trials officer in the rear cabin of his ac, but this was not necessarily indicative of the severity of this manoeuvre. Nonetheless, it was evident from the radar recording that the two ac had passed reasonably close to each other in the horizontal plane, seemingly less than the ¼ NM reported by the AS355 pilot; there was no discernible horizontal separation at the merge. Unfortunately, the lack of a Mode C indication from the Twin Squirrel did not permit the vertical separation to be

determined with any certainty - the helicopter pilot reported 200 ft and the Andover pilot 3-400 ft. Given the distance between the two ac when the pilots sighted each other's ac and the time available to take avoiding action, safety was certainly not assured, members felt. However, the avoiding action taken by both pilots had removed any actual risk of a collision, but the Board assessed that the safety of the ac had been compromised.

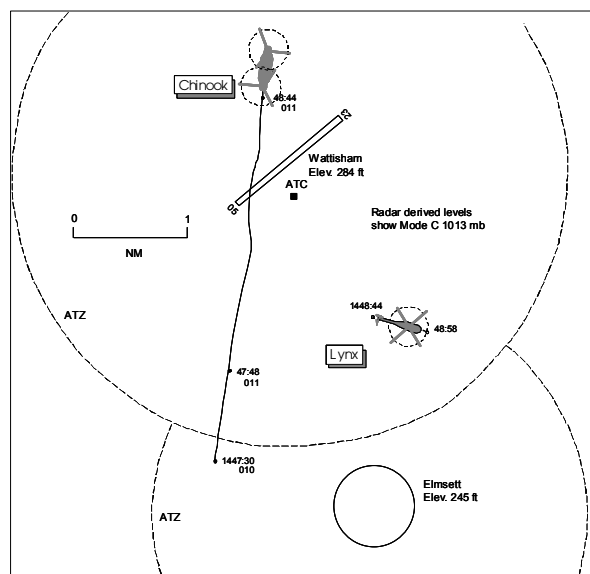
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Twin Squirrel pilot and the Andover crew.

Degree of Risk: B.

AIRPROX REPORT NO 21/02

Date/Time: 18 Mar 1448
Position: 5207 N 0057 E (0.5 NM SSW of Wattisham - elev 284 ft)
Airspace: ATZ (Class: G)
Reporting Aircraft Reported Aircraft
Type: Lynx Chinook
Operator: JHC JHC
Alt/FL: 500 ft ↑ 100 ft
 (QFE 977 mb) (agl)
Weather VMC RAIN VMC CBLC
Visibility: 6 km+ >10 km
Reported Separation:
 400 ft V 700-800 ft V 100 m H
Recorded Separation:
 not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LYNX PILOT reports on departure from RW 23 at Wattisham squawking 4542 NMC, the ac was camouflaged grey/green with HISLs switched on. The visibility was variable, 6->10 km, 1500 ft below cloud in slight rain in VMC and he was in receipt of an ADC service from Wattisham TOWER on 358.6 MHz. When climbing through 500 ft QFE in 20° banked L turn passing heading 175°, he first noticed a Chinook head-on, about 800 m ahead and 400 ft below, which appeared to be in a slight L turn. He took no avoiding action as his L turn was considered to be taking him clear. The Chinook had been very difficult to see owing to its green colour and low-level flight path against the

background terrain compounded by the rain. This had been an unexpected encounter with an ac heading in the opposite direction into an active cct and ATC had not passed any traffic information. He believed that this had been a dangerous situation but the risk of collision was low owing to the timely sighting of the conflicting traffic.

THE CHINOOK PILOT reports heading 005° at 120 kt and 100 ft agl on a VFR transit and in receipt of a FIS from Wattisham squawking 4527 with Mode C. The visibility was >10 km 1500 ft below cloud in VMC, the ac was coloured low visibility green, twin landing lights and dual strobe

lights were all switched on. ATC had cleared him to cross the ATZ via the airfield overhead (TACAN) and the crew first saw the Lynx climbing out of Wattisham at about 4 NM range; TI from ATC followed almost immediately informing them that the Lynx was climbing to 1000 ft. He continued Northbound whilst the Lynx was seen to turn L, eventually passing down his RHS by 100 m and 700-800 ft above tracking Southbound. He took no avoiding action as he had watched the Lynx climb clear of any conflict and his flight had been co-ordinated by ATC. He thought there had been no danger or risk of collision.

ATSI reports that Wattisham is situated within Class G Airspace with an ATZ from ground level to 2000 ft agl within a 2.5 NM radius of the mid-point RW 05/23. Additionally, a MATZ is established around Wattisham, for which Wattisham ATC is the Controlling Authority. This comprises the airspace from ground level to 3000 ft within a 5 NM radius of the mid-point of RW 05/23, with 5 NM long/4 NM wide stubs, orientated 231M and 051M, the vertical dimensions of which are from 1000 ft to 3000 ft aal.

Wattisham is situated within Low Flying Area (LFA) 10. This is a Dedicated User Area (DUA), for which the Co-ordinating Authority is Wattisham ATC during day flying. LFA 10 is used intensively by Army Air Corps (AAC) ac and, because of this, the area is not available to other military ac without pre-booking.

Wattisham is a Government Aerodrome, operated by the British Army. ATC is provided by licensed civil controllers but operating in accordance with JSP 318A (Military Air Traffic Services), under contract to the Ministry of Defence. Both controllers interviewed reported their respective workload as light at the time of the incident.

The Wattisham Meteorological observation, timed at 1450, was: surface wind 210°/21 kt, maximum 31 kt; visibility 20 km in moderate rain; cloud broken at 1400 ft/overcast at 2500 ft QNH 987 mb.

In accordance with the procedures for the use of the DUA, the CH47 Chinook's details had been pre-noted to Wattisham ATC. The relevant information had been added to the electronic 'tote', which can be accessed from both Approach and Aerodrome Control positions and annotated

on a fps, which had been placed on the Approach Control display board. The notified routeing was via Chelmsford to Stowmarket at 50 ft agl i.e. passing just to the W of Wattisham Airfield, within the ATZ. The helicopter contacted Wattisham Approach, at 1442, reporting an estimated position 15 NM to the S of the airfield and wishing to route through the overhead to Marham, low level. The APR confirmed that the Chinook was not visible on his radar display at the time, so he had used the range and bearing marker to draw the anticipated track on his display. The pilot was informed that a FIS was being provided, an SSR squawk was issued and the Chinook was instructed to report at, or abeam, Sudbury, which is situated under the western boundary of the MATZ stub, adjacent to the notified routeing. He explained that he believed he had heard the pilot's report of being S of the airfield but assumed this to be a generic term rather than meaning that he was actually due S of Wattisham. He added that this might have been as a result of his fixation that the Chinook was following its proposed routeing i.e. the track he had drawn on his radar display from SW to NE. With hindsight, he believed he had not assimilated the fact that it was still some 15 NM away. The Wattisham MATS Part 2, Page 4-2, requires the APR to co-ordinate with the ADC: *"MATZ crossers at or below 2000 ft QFE when it is known that the ADC may have traffic to affect the crosser"*. The APR said that, on receiving a position report at Sudbury from the Chinook, his intention was to inform the ADC of the MATZ crosser.

In view of its low transit altitude, the APR said that he did not expect to see the Chinook on his radar display until it was very close to the airfield. He explained that SSR data is fed into Wattisham from RAF Honington, about 15 NM away. Primary radar is not available at present, although there are plans to provide a 'battlefield' type radar on the airfield. Consequently, when the Chinook reported *"just entering your southern MATZ boundary confirm er Elmsett is clear"* it still did not show on the radar display. (Elmsett is a civil aerodrome, having its own ATZ, and is situated 3 NM S of Wattisham.) The APR replied that there was nothing known at Elmsett (traffic normally contacts Wattisham prior to departure from that location) but it would be best to avoid its ATZ. The controller admitted that he was still operating on the erroneous assumption that the Chinook was still routeing on, or close to, its pre-noted

route. He justified this assumption by equating the pilot's report of entering the MATZ to meaning the western stub and his query about Elmsett he believed was to reassure himself that there was no traffic about to depart, which might conflict with him tracking W of that aerodrome. The APR commented that, in the absence of radar information, he was totally reliant on the Chinook's position reports. Wattisham does have a Digital Resolution Direction Finder (DRDF), operating on UHF only. However, building work on the airfield has, apparently, affected its accuracy and it is no longer authorised for use.

The Lynx established contact with Wattisham Tower, at 1446, requesting taxi clearance for a detail departing to the S and E via Great Blakenham (situated on the MATZ boundary, E of Wattisham). This was approved and approx 90 seconds later the ADC telephoned the APR to inform him that the Lynx was just about to lift for Great Blakenham. The APR acknowledged this information and said *"you might see the Chinook pop-up at some point he's somewhere in the southern bit of the MATZ"* adding *"Going out towards Stowmarket and then up to Marham."* The ADC explained that this was the first time he was aware of the Chinook, although its details would have been available on the 'tote'. The Lynx was then cleared for take off. He said that he did not pass TI to the Lynx as the telephone call had been very vague as to the position of the Chinook and he assumed that there was no immediate threat to the departure. His intention was to pass relevant information later, when he had more reliable details. On that basis, he did not make a broadcast about the MATZ crosser on the Tower frequencies, as required in the Wattisham MATS Part 2, Page 1-4. He commented that, although a Distance From Touchdown Indicator (DFTI) is provided in the VCR, for the reasons mentioned previously, it shows only SSR returns and, consequently, the Chinook was not displayed.

Shortly after the Lynx had been cleared for take off, the Chinook reported well clear of Elmsett and asked for confirmation of a clearance to route through the overhead at low level. This routing was approved by the APR but was not co-ordinated with the ADC. At the same time TI was passed about a *"Lynx helicopter, which had just departed off two three out to the east"*. The Chinook reported visual with the departing traffic. The APR telephoned the ADC to inform him that

the Chinook was visual with the Lynx. The ADC said that he still could not see the crosser visually but the Lynx was climbing straight ahead, at the time, passing about 200-300 ft. He, therefore, asked the APR for the Chinook's position. In answer, he was told *" I don't know but he's coming up through the overhead he's just erm he's clear of the Elmsett ATZ so I guess he's about er two miles south er southwest of us."* Then adding *"A mile and a half something like that.....He's very low about fifty feet something like that."*

The ADC stated that he first sighted the Chinook shortly afterwards, before he could warn the pilot of the Lynx of its presence. It was crossing the RW 05 threshold, at about 50 ft, tracking NE. He explained that an earlier sighting was not possible due to buildings and trees, which blocked the low level view from the VCR in that direction. By this time he could see that the subject helicopters had passed. He telephoned the APR to inform him of the Chinook's position, the latter responding that it had *"popped up on radar now"*. The pilot of the Lynx commented on the Chinook that had gone just under him, straight over the airfield but no mention was made, at the time, of his intention of filing an Airprox report about the incident.

JHC HQ comments that although in this instance there was no real risk of collision, there is no doubt that the Lynx pilot should have been informed of the MATZ crossing ac, in accordance with Wattisham regulations.

UKAB Note: Analysis of the Debden radar recording shows the Chinook squawking 4527 entering the Wattisham ATZ shortly after 1447:30 steady tracking 005° at FL011 (100 ft QFE 977 mb) eventually crossing over the W side of the aerodrome. At 1448:44 the Chinook is 0.5 NM N of the RW at FL 011 as the Lynx appears as a primary on return 1.6 NM SSE of the aerodrome tracking 110°. The Airprox is not seen on recorded radar.

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 agreed with the ATSI report that the APR appeared to have convinced himself that the Chinook was following its pre-noted route even though position reports indicated to the contrary. The Chinook pilot had initially reported S of Wattisham and, although he had not subsequently reported at or abeam Sudbury as requested, he had reported crossing the Southern MATZ boundary with references being made to Elmsett. These reports all indicated that the Chinook was not on its expected route but were seemingly ignored by the APR. Members felt that the APR should have taken positive steps to establish the Chinook's position and actual routing before clearing it to transit through the MATZ and ATZ. By not doing so, the APR rendered himself unable to pass sufficient or accurate TI to the ADC during the co-ordination process; both this and the foregoing points were considered to be a part cause of the Airprox. The TI that was passed, albeit vague, did alert the ADC to the presence of a MATZ/ATZ 'crosser'. Although less than ideal in these circumstances members thought that a generic broadcast on the Tower frequency of the limited information available would have alerted the Lynx pilot about the approaching Chinook. However, no

information was given to the Lynx pilot during his departure phase and this had created an unwelcome 'surprise' element to the latter. Members considered this lack of information to be a second part cause of the incident.

Moving on to risk, although no TI was passed to the Lynx pilot by the ADC, he was in a climbing L turn already above the conflicting Chinook when he saw it 400 ft below and, despite being on converging tracks, their flight paths were diverging vertically. Meanwhile the APR had passed TI on the departing Lynx to the Chinook pilot who saw the Lynx immediately at 4 NM range and watched it climb well clear of his flight path. These elements combined led the Board to conclude that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

- a. The Wattisham APR did not establish the Chinook's position or pass sufficient TI to the ADC.
- b. The ADC did not pass any TI to the Lynx pilot.

Degree of Risk: C

AIRPROX REPORT NO 22/02

Date/Time: 20 Mar 1639

Position: 5215 N 0003 W (2 NM N Bourn - elev. 225 ft)

Airspace: ATZ/FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: DR253(Regent) Bulldog

Operator: Civ Trg Civ Pte

Alt/FL: 2000 ft ↓ 1500-2500 ft
(QNH 1013 mb) (QNH NK)

Weather VMC CBLC VMC CBLC

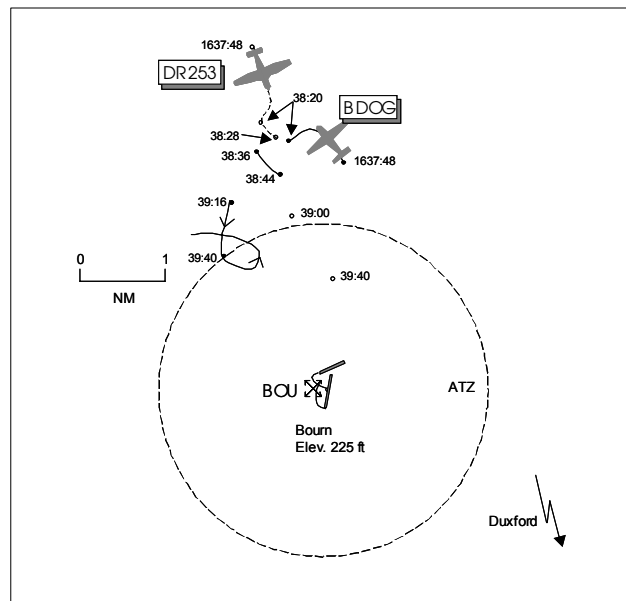
Visibility: >10 km 10 km

Reported Separation:

20-50 ft V 50 m H 100-200 ft V
500-1000 m H

Recorded Separation:

not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DR253 PILOT reports flying a dual IMC training sortie from Sywell with a student who was carrying out a practice NDB approach to RW 19 at Bourn. The visibility was >10 km 2000 ft below cloud in VMC, the ac was coloured blue/white/grey, anti-collision light was on and his transponder was switched off. He was listening out with Bourn Radio on 129.8 MHz, the frequency appeared to be unmanned. When he was on final approach heading 190° at 80 kt, he first saw the Bulldog ac in his 11 o'clock on a reciprocal heading approx 2000 ft above. Shortly afterwards, his attention was drawn to a fast moving contact in his peripheral vision. A Bulldog was seen overtaking him at high speed on his RHS in a straight and level attitude, passing extremely close (50m away) and just below his level (20-50 ft lower). The conflicting Bulldog continued flying ahead for about 100 m, slightly to the R of his track, before executing a climbing/rolling manoeuvre to the R. This had been a late sighting as the ac had approached from his blind area; no avoiding action was taken. He believed that there had been a moderate risk of collision.

THE BULLDOG PILOT reports flying a general handling/aerobatics sortie from Duxford and he was receiving a FIS from Duxford on 122.07 MHz. The visibility was 10 km 1000-2000 ft below cloud

in VMC, the ac was coloured red/white and he was squawking 7000 with Mode C switched off. He was manoeuvring between 1500 ft and 2500 ft and first noticed a low wing single engined ac below him in his 10-11 o'clock, 1-1.5 km away, when he was descending, passing the vertical plane, recovering from a loop. He completed the manoeuvre, levelling out about 100-200 ft below and displaced approx 500-1000 m to the R of the other ac; he then turned R to clear the area to continue with further handling. He did not consider that he had flown in close proximity to the other ac and thought there had been no risk of collision as he had maintained visual contact with the traffic throughout.

UKAB Note: Analysis of the Claxby radar recording at 1637:48 shows a primary only return, believed to be the DR253, 4.3 NM NNW of Bourn tracking 170° with traffic squawking 7000 NMC, believed to be the Bulldog, in its 11 o'clock range 1.8 NM tracking NW. The Bulldog then commences a L turn 8 seconds later as the DR253 continues generally SSE bound before fading from radar at 1638:28. The Bulldog steadies on a SW track and fades at 1638:20 0.44 NM SE of the DR253; it reappears 16 seconds later, to the W of the DR253's last observed position before fading again 8 seconds later having tracked SSE. The

DR253 is only seen again on two radar sweeps at 1639:00, on the Northern edge of the Bourn ATZ, and at 1639:40 1.3 NM N of the airfield having tracked generally SSE. However, the Bulldog reappears at 1639:16 2.5 NM NW of Bourn tracking S before it commences manoeuvring at 1639:40 on the ATZ boundary. The incident is not seen on recorded radar but it is believed to occur after 1639:36 when the Bulldog has crossed over the DR253's track and before the subject ac reach the ATZ boundary.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members were dismayed at the transponder selections made by both pilots. Although not having any direct bearing on this Airprox, both pilots should have selected the appropriate conspicuity code and switched on Mode C, when fitted, as recommended in the UK AIP ENR 1-6-2-1. In this case, the DR253's transponder was switched off and the Bulldog was squawking 7000 (not the aerobatics conspicuity squawk of 7004) also with the Mode C switched off. These SSR codes/squawks supplement primary radar returns, assisting ATCOs in the provision of an ATC radar service at ATSU's and pilots of ac fitted with ACAS of some description. Although the radar recording did not show the encounter, it did reveal the somewhat erratic movement of the Bulldog's track during its manoeuvring on the edge of the Bourn ATZ. What was clear from the pilots' reports was the very different viewpoint of the incident as seen from either cockpit. The DR253 pilot had seen the Bulldog flying in the opposite direction well above and was very

surprised, understandably, to then see it overtaking him on his RHS at very close range. He said it had passed 50 m away and 20-50 ft below, at high speed before turning away. It was known from experience that judgement of distances during late sighting encounters was difficult to estimate accurately in the heat of the moment. Meanwhile from the other cockpit, the Bulldog pilot had chosen to manoeuvre on the edge of an active ATZ and had first noticed the DR253 from the vertical plane, below him and ahead, while he was recovering from an aerobatic loop. He had then elected to complete the manoeuvre, levelling out he estimated 100-200 ft below and 500-1000 m clear to the R of the DR253 before turning away. Members were unable to resolve the obvious discrepancy between both pilots' estimates of separation distances. The radar had shown the Bulldog crossing the DR253's track before fading and reappearing very close to the DR253's projected track. At the time, the Bulldog pilot had thought that his manoeuvre was safely completed whilst maintaining visual contact with the DR253 throughout. While the Board were unanimous in agreeing that the Bulldog pilot was always in a position to avoid colliding with the DR253, it appeared he had not given enough consideration to the miss distance selected on completing his loop. The outcome of these actions was to cause alarm in the other cockpit and the reason for this Airprox. It was acknowledged that there had not been any collision risk, however.

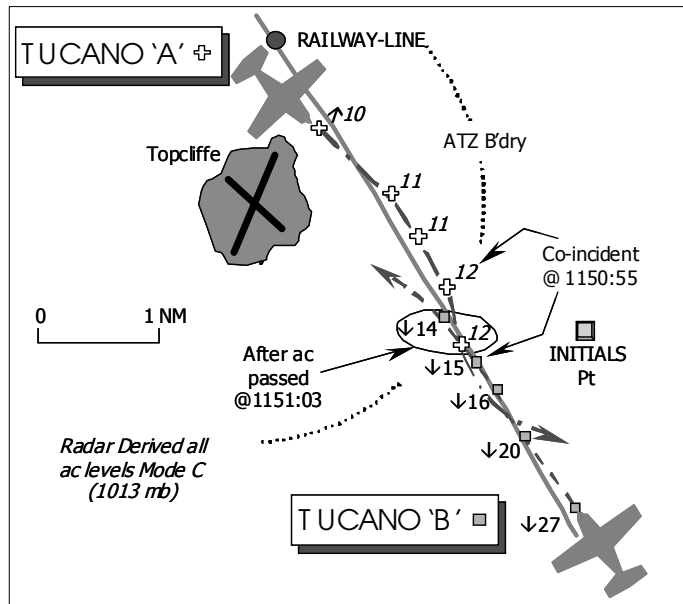
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Bulldog pilot flew close enough to cause concern to the DR253 pilot.

Degree of Risk: C

AIRPROX REPORT NO 23/02

Date/Time: 22 March 1150
Position: 5411 N 0120 W (2 NM SE of Topcliffe - elev 92 ft)
Airspace: MATZ (Class: G)
Reporting Aircraft Reported Aircraft
Type: Tucano T Mk1 Tucano T Mk1
Operator: HQ PTC HQ PTC
Alt/FL: 1400 ft 2000 ft
 (QFE 1021 mb) (QFE 1021 mb)
Weather VMC CLOC VMC NR
Visibility: 30 km + 10 km +
Reported Separation:
 5-10 ft V, 50-100 ft Not seen
 H
Recorded Separation:
 2 - 300 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TUCANO 'A' PILOT, a QFI, reports his ac has a high conspicuity black colour scheme and HISLs were on, whilst outbound from Topcliffe returning to Linton-on-Ouse at 240 kt. After take-off from RW31 at Topcliffe, he requested a right hand turnout and was 'cleared' so to do. He climbed to 1400 ft QFE (1023 mb) and flew to the W of and parallel to the Newcastle – York railway line in accordance with the 'Tower to Tower' transit procedure [and the right hand traffic rule], squawking A4575 with Mode C.

They switched from Topcliffe TOWER to Linton TOWER flying straight and level at 1400 ft QFE, heading 150°, with the railway to the L. Just as they completed their ac checks, another Tucano was spotted on the starboard beam on a reciprocal track as it passed 50 – 100 ft away and about 5 - 10 ft above his ac, 'belly-up' in a 30° AOB L turn.

Following the incident, he turned hard L to identify the other ac and informed Linton of the Airprox.

THE TUCANO 'B' PILOT, a QFI, reports his ac has a high conspicuity black colour scheme and HISLs were on, whilst on recovery to Topcliffe for

a visual recovery through initials, heading 320° at 200 kt and squawking A0421 with Mode C.

He heard another ac being cleared to transit back to Linton-on-Ouse VFR on the TOWER frequency and as this procedure is flown at 1400 ft QFE, he elected to level his ac at 2000 ft QFE until he had passed the aerodrome boundary, whereupon, he descended on the dead side of RW31 to 1000 ft QFE to join the circuit to land. The other Tucano was not seen at all during the recovery and he was unaware of the Airprox until after he had landed. Hence, he was unable to assess the risk.

MIL ATC OPS reports that at 1149:16, the crew of Tucano 'A' was given clearance to take-off by the Topcliffe Aerodrome controller (TOP ADC). After departure, at 1149:44, the crew requested a "right hand turnout", which was approved and they subsequently reported "departing tower to tower to Linton Stud 2" at 1150:35, some 34 seconds before Tucano 'B' called 'initials'.

Tucano 'B' had been prenoted to TOP ADC, by Topcliffe APPROACH (TOP APP) situated at Leeming at 1144:30, "Radar to Visual, [C/S] with 20 miles to run". The circuit state, "2 in", was passed and the crew subsequently called TOP ADC at 1150:19 for join – some 16 seconds before

Tucano 'A' left the frequency – *"Topcliffe TOWER [C/S] Join"*. Full joining instructions were passed and the Cct state reiterated – *"[C/S] Topcliffe TOWER, join RW31, QFE 1021, Surface wind 330/ 9 knots, 2 in"*. The crew of Tucano 'B' reported 'INITIALS' at 1151:09, after Tucano 'A' had switched to Stud 2 and the current Cct information passed - *"one repositioning High Key"*, the second ac having departed the Cct. At 1151:36, the pilot of Tucano 'B' reported *"on the break low to land"* and fifty sec later was given clearance to land.

At 1152:56 Linton SUPERVISOR advised TOP ADC that Tucano 'A' had *"just had an Airprox with another Tucano on a Tower to Tower transit"*. This statement required some clarification, as Tucano 'B' was, in fact, a visual join via INITIALS and not a 'Tower to Tower' transit. Based on the 'INITIALS' call, RT recording timings appear to be 39 seconds ahead of the LATCC (Mil) radar recording.

The 'Tower to Tower' procedure allows 1FTS pilots to fly between RAF Linton-on-Ouse and any of its Relief Landing Grounds (RLGs) without the requirement to call an APPROACH controller. This reduces the pilot's workload considerably. Guidance on how to conduct this procedure is scant. The 1FTS Flying Order Book (FOB) states, however, that *"Aircraft transiting between Linton and Topcliffe are to squawk 4575C and route via the railway line using the Right Hand Rule"*. Additionally heights of 1400 ft 'outbound' from Topcliffe and 1000 ft 'inbound' to Topcliffe are specified. The requested RHD turnout, against the Cct direction, would allow Tucano 'A' to acquire the railway line more expeditiously. Linton ATC – who administer Topcliffe - state in their report that the pilot of Tucano 'A' canvassed his QFI colleagues after this event and found that many performed the procedure differently in respect of which way to turn to acquire this geographical feature. Following consultation at Linton, in future, all ac departing Topcliffe RW31 will turn L and depart wide downwind climbing to 1400 ft to pickup the railway line via Dalton Industrial estate, thereby building in horizontal separation against 'INITIALS' traffic. Procedures for the other runways have also been reviewed.

Weather conditions were good and a warning to crews inbound via 'INITIALS' that an ac was departing via a right hand turnout, along with

Tucano crew 'A's own subsequent call, *"departing Tower to Tower"* might have been useful. Although, from the report by the pilot of Tucano 'B' this appears not to have been an issue. Without a predefined procedure on where and how to pick up the railway line, even a L turn out might not have prevented this occurrence. However, this appears, subsequently, to have been addressed by the Unit concerned. The 'INITIALS' point for RW31 is 3 NM on the extended centreline and 1 NM to the R - into the deadside – not below 1000 ft QFE. With Tucano 'B' joining before Tucano 'A' left the TOP TOWER frequency one could reasonably expect the crew to know that there was another ac joining through 'INITIALS'.

THE PILOTS' UNIT comments that this Airprox occurred between 2 ac that were carrying out standard procedures; one was joining a visual Cct and the other leaving the Cct on a VFR procedure. That they came so close is obviously a matter for concern and has prompted an investigation into the 'Tower to Tower' procedure, to look at potential conflicts and how they can be minimised or eliminated. The Topcliffe TOWER transcript reveals that the crews of both ac were on the TOWER frequency at the same time and each should have been aware of each other's presence. As Tucano pilot 'A' reports that he and his student were both carrying out 'checks' at the time, it might be that they were 'heads-in' the cockpit at a time when they should have been looking out for the ac joining the Cct. This point will be re-emphasised to all aircrew at No 1 FTS.

HQ PTC comments that it seems that Tucano 'B' noted the possibility of conflicting with Tucano 'A' and stayed High until approaching INITIALS, by which time they should have long passed – if the latter had turned L off RW31. That this procedure has endured successfully for so long without discovering this flaw is because it is a VFR procedure. It is reliant on lookout and therefore tolerant of the variable execution seen here. However, where lookout must inevitably be compromised by cockpit scan and the flow of flying instruction, sooner or later an incident like this will occur. We are satisfied that 1 FTS has now tightened the procedure (again) to make it much less prone to a similar recurrence. But however rigorously deconflicted, the flightpaths of opposing ac must still cross at some stage and the VFR therefore continue to be paramount.

Nevertheless, the reporting of this Airprox has already performed a valuable safety service and all aircrew should be encouraged to see the process in this light.

UKAB Note: The Claxby radar recording shows Tucano 'A' southeast bound from Topcliffe as it climbs through 1000 ft Mode C (1013 mb) – unverified – possibly slightly E and to the L of the railway line. Simultaneously, Tucano 'B' is shown inbound to Topcliffe descending through 2700 ft Mode C (1013 mb). The ac converge and at 1150:55 Tucano 'A' turns slightly R and appears to fly to the W side of the railway line indicating 1200 ft (1013 mb) – equating to about 1440 ft QFE (1021 mb). Meanwhile Tucano 'B' is dead ahead at 0.7 NM descending through 1500 ft (1013 mb). The vertical separation reported is not substantiated by the indicated Mode C, but the anomaly may be the result of the unverified Mode C of Tucano 'A' and a mistaken perception by the pilot, whilst R wing high in a slight L turn. However, the next radar return is after the ac have crossed in the horizontal plane, consequently the horizontal separation that pertained is not measurable but probably < 0.1 NM. However, at this point the flight paths of both ac have not crossed in the vertical plane, which suggests vertical separation here – after the ac had passed each other – was in the order of 200 ft Mode C.

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 authority.

The PTC member emphasised that it was extremely difficult to deconflict entirely, every procedure in the Vale of York AIAA, especially IFR versus VFR. Here, between Topcliffe and Linton-on-Ouse, flightpaths crossed – as they will in so many VFR procedures, placing reliance entirely on crews keeping their eyes wide open under a disciplined lookout scan. The Board was briefed that this Airprox had prompted a further review of arrangements by Linton, who had tightened up the 'Tower to Tower' procedure again since the last incident – Airprox 72/00. Members noted

that the Unit had elected to stipulate a LHD turnout off RW31 and a RHD turnout off RW03 to pick up the railway line, which effectively removed any ambiguity; reporting this Airprox had resulted in a worthwhile re-examination of procedures at this busy training unit. Controller members agreed wholeheartedly that a simple call from the ADC telling the pilot of Tucano 'B' that 'A' was outbound for Linton following the RHD turnout along the railway, would certainly have helped and may even have prevented this close encounter. However, that was speculation and it was emphasised that the ADC had acted in accord with normal practice insofar as the exact position of other Cct ac is normally specified when pilots report at 'INITIALS'. However, it was evident from the radar recording that the crew of Tucano 'B' had not passed through the 'INITIALS' point – 1 NM R of the RW31 centreline at 3 NM from Topcliffe – when they made that transmission. The reasoning was not evident from the pilot's report and members wondered why 'B' had apparently flown down the RW centreline whilst inbound on his visual recovery. The Mil ATC Ops adviser explained that from the 'INITIAL' point flights converge toward the aerodrome – remaining on the deadside – until breaking into the LHD Cct close in to the field. There may have been good reasons for following the centreline, but the reason for the offset is usually to take account of IFR approaches and here, the pilot may have been aware that there was none in progress at that moment. The Board wondered if missing 'INITIALS' was commonplace, so the PTC member was asked to research this point with the unit and undertook to advise the Board of the outcome of his enquiries in due course. That aside, the QFI in 'B' had clearly taken account of the potential for conflict with 'Tower to Tower' traffic and had wisely elected to stay high before reaching the aerodrome boundary. The radar recording showed 'B' at about 1640 ft QFE as he crossed the ATZ boundary 2 NM SE of the aerodrome which was about 240 ft above the promulgated transit height of 1400 ft QFE for outbound traffic and 2-300 ft above the other ac. Speculation arose as to why the pilot of Tucano 'A' had apparently strayed to the E of the railway line. Whilst the radar recording was open to interpretation at these extremely large scales, it appeared that he had crossed over the railway and then back again just as he met Tucano 'B' coming the other way. The Board recognised that on instructional sorties QFIs are working hard to

keep students in their charge on the 'straight and narrow' and of necessity have to allow them sufficient 'rope' to learn from their mistakes and this may have been the result of a momentary lapse by the student. Hence both crews appeared to be doing something not absolutely in keeping with the stated norm, which may in itself, have been a distraction to them. The Board concurred it was unfortunate that the crew of 'A' chose to do their checks at – unbeknown to them - this inopportune moment. Nonetheless, it was evident that neither the reporting Tucano pilot 'A' - nor his student - saw 'B' until a very late stage and 'B' did not see 'A' at all. Some members argued that non-compliance with a procedure was part of the cause, but in the end it was concluded that the crux of this Airprox was lookout resulting directly from a non sighting by the crew of Tucano B and a late sighting by the crew of Tucano A.

Turning to the risk inherent in this encounter, members noted that the spatial perception of the reporting pilot was at variance with that evinced by the radar recording. Errors in unverified data

was one explanation as to why the Mode C suggested 200 ft separation when 'A' reckoned 'B' was only 5-10 ft above his ac when they passed. Neither is the reported 30° Aob L turn of 'B' evident. However, the Board recognised that Tucano pilot 'A' was the only qualified pilot who witnessed the event and gave more weight to this than the Mode C with its potential to be incorrect. If pilot A's assessment was accurate, it had been a very close call - less than 10 ft above and 50-100 ft to starboard. Given the non sighting by the instructor in Tucano 'B' and the late sighting by 'A', who was unable to take any avoiding action in time to increase the separation, the Board concluded that an actual risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

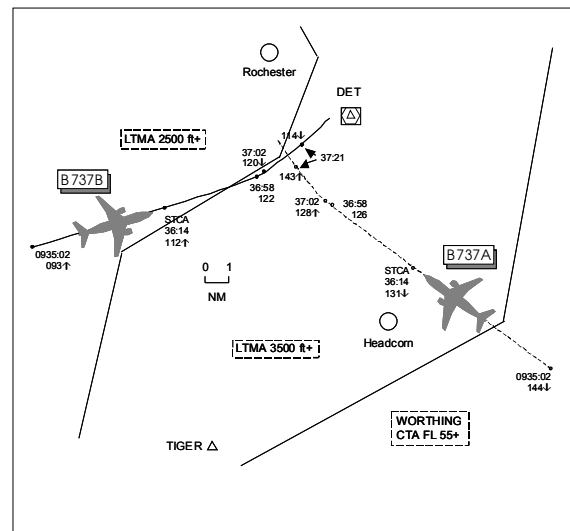
Cause: A non sighting by the crew of Tucano B and a late sighting by the crew of Tucano A.

Degree of Risk: A.

AIRPROX REPORT NO 24/02

Date/Time: 25 Mar 0937
Position: 5115 N 0032 E (4 NM SW DET)
Airspace: TMA (Class: A)
Reporting Aircraft Reporting Aircraft
Type: B737 (A) B737 (B)
Operator: CAT CAT
Alt/FL: ↓ FL 120 ↑ FL 170

Weather IMC KLWD IMC KLWD
Visibility: NK NK
Reported Separation:
 300 ft V, 2 NM H 300 ft V, <2 NM H
Recorded Separation:
 900 ft V 2.9 NM H



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 (A) PILOT reports heading 320° at 320 kt descending to FL 120 inbound to Stansted and in receipt of an ATC service from London on 120.52 MHz. He noticed traffic on TCAS in his 10 o'clock position on a closing heading and climbing but he was unable to establish visual contact owing to IMC; by now he was passing FL 126. ATC told him to turn L onto a heading of 295° towards the traffic as simultaneously TCAS annunciated an RA "*climb*". He complied with the TCAS advisory whilst advising ATC that he was following TCAS indications and that he was disregarding the issued L turn. The other traffic passed 300 ft below and crossed L to R 2 NM ahead on TCAS and he assessed the risk of collision as high. He opined that although ATC had given him 'no speed restriction', in view of the high rate of closure between his and the conflicting ac, 250 kt should have been the maximum in the high density airspace of the London TMA.

UKAB Note: The Speed Limiting Point (SLP) for Stansted inbounds on a STAR from the S via DET is 32 D N of DET.

THE B737 (B) PILOT reports heading 055° at 310 kt climbing to FL 170 in receipt of an ATC service from London. During the climb, in IMC, TCAS annunciated "*monitor vertical speed*", v/s was reduced. ATC issued a L turn of about 50 and during the turn TCAS gave an RA "*descend*" as ATC advised him to "*make the turn a good one, it is now avoiding action*". He disconnected the AP and followed the RA, TCAS indicated the conflicting traffic 300 ft above and <2 NM at the closest point. Another ac was heard being given an avoiding action turn onto heading 295°; he levelled-off at FL115 whilst manoeuvring clear of the traffic. He assessed the risk of collision as high.

ATSI reports that the TC SE SC described his workload as having reduced from high to moderate in the period leading up to the Airprox and that the TC SE Sectors were bandboxed although another controller was available if it had been considered necessary to split the position.

He added that both the Group Supervisor and Co-ordinator were occupied with the busy traffic situation on the SW Sectors at the time the incident occurred.

B737 (A) was on an ABBOT 1E STAR, inbound to Stansted. Traffic on this routing is not subject to a Standing Agreement and requires individual co-ordination between LACC S17 and TC SE and between TC SE and TC NE. When the flight established communication with the SE Sector, at 0930, the pilot reported maintaining FL 160, the level previously agreed with LACC S17, on a heading of 325°. The SC acknowledged the call and, shortly afterwards, co-ordinated the ac out of the sector, at FL 120, with TC NE.

At 0932, B737 (B) contacted the SE SC on departure from Gatwick, following a DOVER 2P SID, climbing to 6000 ft. The ac was identified and cleared to FL 90, with no ATC speed restriction. The SC explained that his plan was to issue descent clearance to B737 (A) to FL 120, the level agreed with TC NE, and place it on a heading which would take it behind B737 (B). Accordingly, at 0933, B737 (A) was cleared to FL 120 and instructed to turn L heading 315°. B737 (B) was then instructed to climb to FL 110 and given a L turn heading 075°. The SC said that he had decided to ensure vertical separation initially, with the intention of monitoring the progress of the two flights before issuing further climb to B737 (B), when appropriate.

Reassessing the situation a short while later, the SC reasoned that vertical and/or horizontal separation would be maintained if B737 (B) was cleared to climb through the level of B737 (A). He made this decision having taken the following factors into account: the expected effect of the strong northerly wind on B737 (A), both on its track and speed; its initial good RoD and B737 (B)'s observed RoC of approx 2500 ft/min. Consequently, at 0935:08, B737 (B) was cleared to climb to FL 170, the Standing Agreement level for transfer to LACC S15. The radar, timed at 0935:02, shows B737 (B) at FL 93, 23.7 NM WNW of B737 (A), which is passing FL 144.

STCA activated at 0936:14, when the subject ac were 11.1 NM apart. At that time B737 (B) was passing FL 112 and B737 (A) FL 131. The SC said that, around this time, he noticed that the respective rates of climb/descent of the subject ac had reduced significantly and the ac were closer together laterally than he had anticipated. Therefore, he considered it necessary to issue a turn instruction to both to ensure separation was maintained. B737 (B) was instructed to turn L heading 055° and B737 (A) to turn L heading 295°; the two ac were now about 7 NM apart. The SC explained that, initially, he did not consider that he needed to use the term avoiding action but because the pilot of B737 (A) did not reply to the turn instruction he repeated it a few seconds later, adding *"this is avoiding action"*. The pilot reported receiving a *"TCAS resolution warning"* but did not stipulate the action he was taking. The term 'avoiding action' was then added to the instruction issued to the pilot of B737 (B) to *"make the turn a good one"* and, in the same transmission, TI was passed. The pilot responded that he had reacted to a TCAS descent but that he was now climbing (radar recordings show the ac descending). B737 (A) reported *"TCAS clear"* and was reclassified by the SC to FL 120. The radar recording of the event (0937:21) reveals that B737 (B) had descended from FL 122 to FL 114 as it passed 1 NM in front of B737 (A), which by then had climbed to FL 143; the latter reached FL 153 before descending. It has not been possible to decipher whether separation was lost, albeit momentarily. The radar, timed at 0937:02, shows the ac 3 NM apart and separated vertically by 800 ft. The next sweep reveals that they are 2.8 NM horizontally and 1000 ft vertically separated. B737 (A) did not take the avoiding action turn.

The SC said that, initially, he had not been able to understand why his original plan had not worked. It was only later, having completed his report, that he realised that B737 (A) had been operated by a B737-300. Although its fps correctly showed the type, he had wrongly assumed it to be a BA46, in his experience the usual type which operated on this route. He thought that he had based his separation judgement on the generally lower performance/speed of the BA46 and had been caught out by the higher speed of the B737-300.

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 the application of speed control by ATC during normal operations. It was possible that the SC had assumed that the departing B737 (B) would accelerate after being released from ATC speed control but this would depend on the pilot's decision at the time. Depending on the circumstances, the pilot may elect to trade speed for height in order to climb as quickly as possible in the LTMA on certain SIDs (eg to clear the holding stacks); normally acceleration was commenced once above FL 100. Similarly, although B737 (A) had not reached the SLP on the STAR, the pilot could have elected to reduce speed early in the LTMA although members knew that high speed can be a useful tool in achieving high RoDs, sometimes being more effective than using airbrake at lower IAS. However, in this case speed control was not applied. ATCOs agreed that the SC's plan had initially been sound in climbing B737 (B) to a level 1000 ft below B737 (A) but, for whatever reason, he appeared to have misjudged the fluid situation when he had dispensed with vertical separation and climbed B737 (B) without ensuring lateral separation was maintained. Members agreed that this had caused the Airprox.

Looking at the risk element, STCA alerted the SC to the conflict and he had passed turn instructions to both crews, although it would remain unknown whether standard lateral separation would have been achieved if B737 (A) had taken the turn onto 295° when instructed. The B737 (A) crew were, quite understandably, reluctant to turn towards the TCAS conflicting traffic when in IMC and had followed the TCAS guidance in the vertical plane, although it would have helped if they had been able to tell the SC in which direction they were departing from their ATC clearance. Members were dismayed that the B737 (A) crew had taken overly robust 'avoiding action' (climbing > 2500 ft) which could have put their ac into potential conflict with other adjacent

ac; adequate avoidance would be obtained by adhering to the guidance given by the TCAS equipment. The B737 (B) crew had turned L, when instructed, and also followed the TCAS RA 'descent'. Although singly untidy, all of these elements combined persuaded the Board that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The TC SE SC dispensed with vertical separation without ensuring adequate lateral separation was maintained.

Degree of Risk: C

AIRPROX REPORT NO 25/02

Date/Time: 26 Mar 1233z

Position: 5316 N 0433 W (1¼ NM NW Valley aerodrome - elev 37 ft)

Airspace: ATZ (Class: G)

Reporting Aircraft Reported Aircraft

Type: Hawk T Mk1 Cessna C172

Operator: HQ PTC Civ Comm

Alt/FL: 1000 ft 1500 ft
(QFE 1031 mb) (QFE 1031 mb)

Weather VMC NIL VMC CAVOK

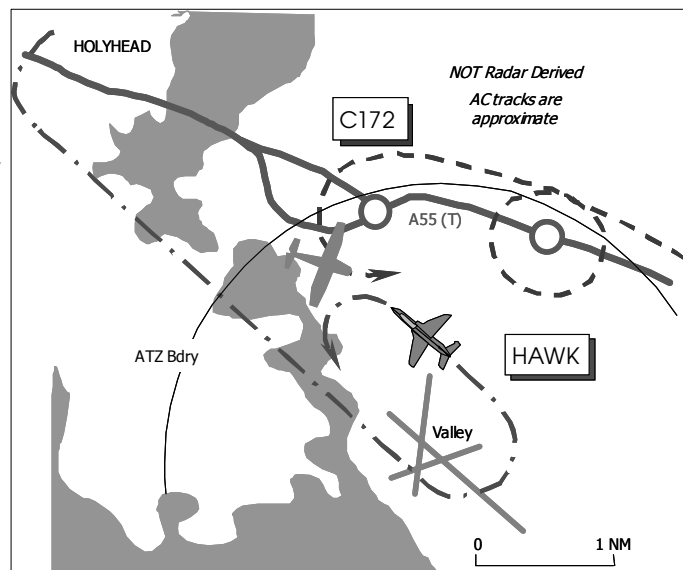
Visibility: 60 km >10 km

Reported Separation:

200 ft V, 300 ft H Not seen

Recorded Separation:

Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK PILOT, a QFI, provided a very comprehensive report, stating his ac has a high conspicuity black colour scheme, but HISLs were on whilst inbound to Valley for a visual join to RW14 and in communication with Valley TOWER on 340.175 MHz. A squawk of A7000 was selected with Mode C. The light civilian ac – a C172 - was reported by ATC to be at 1500 ft QFE (1031 mb) in the Valley MATZ and was first sighted and visually identified when he was 5 NM from Valley, whilst he was in transit from Mona - prior to joining the Cct. The light ac (LA) was following the A55 road at 1500 ft. During the Cct join, he thought Valley TOWER (TWR) reported the C172 was 1 NM N of the aerodrome, where it posed "no threat" as it was N of his projected flightpath. (UKAB Note (1): TWR actually advised the Hawk pilot "there is light civilian

traffic north-east of the airfield by 2 miles, 1500 ft Valley QFE", this was the only information about the LA given by TWR). After initials, the LA's position still presented no threat to the N of aerodrome as he 'ran in' on the deadside keeping it in continuous sight about 2 NM to the N of the aerodrome. It was still following the A55 - heading NW. He then executed his 'break' to land. Rolling out downwind for RW14, at 1000 ft QFE, heading 310° and approaching the 'tip in point' for finals at 150 kt, the C172 was encountered on a reciprocal heading in a "lazy" L turn through SE about 200 ft above his jet and 300 ft to starboard. Entering the finals L turn enabled him to avoid the civilian ac by the same amount, but there was no apparent reaction from its pilot.

The visual Cct creates a high workload; both crewmembers were performing visual lookout and discussing the Cct pattern, whilst concentrating on the runway environment and the 'approach area' to port. He added that this was a dangerous situation as the civilian ac appeared to have made an unexpected LHD orbit into the Cct area in conflict with Cct ac, but his avoiding action - by turning finals when he did - removed any risk of a collision.

UKAB Note (2): The UK MIL AIP at AD2 – EGOV–1–12-AD2-20 – Local Traffic Regulations - specifies that the minimum 'break' height is 1000 ft with a level 'break' into the Cct.

THE CESSNA 172 PILOT provided an extensive report. He had departed from Manchester (Barton) for a series of aerial photographic details with a photographer in the LHS to several pre-planned locations. These included the Liverpool CTR, St Asaph - N Wales, four locations around Bangor and then on to Anglesey - to carry out a survey of the recently re-structured A55 trunk road to Holyhead starting at the Menai Bridge. The work on Anglesey included photographing from 1500 ft all six road junction/roundabouts along the route of the A55 and when complete at Holyhead, to take more pictures, this time at 3000 ft of a location immediately to the SE of the RW at Mona aerodrome.

Valley RADAR was first contacted on 125.22 MHz at about 1145, some 6 - 7 NM E of Bangor – itself about 20 NM E of Valley – with a request that he position to Bangor to carry out the photographic detail at 1500 ft. This was approved, the Valley QNH issued and the four tasks at Bangor were completed. He asked RADAR if he could commence the main survey of the A55 trunk road to photograph the various road junctions, he thought that he specified that he would require to orbit each junction. After a short delay, the controller asked if the photographic run would go through to Holyhead - which it did. A short time later, he was given 'permission' to commence the detail and was assigned an SSR code at the same time. He flew with the line feature of the A55 to port and orbited each junction in a left hand orbit – sometimes orbiting several times. The road junctions to the SE of Mona were completed and he was just about to call the controller to advise that he would shortly be passing Mona aerodrome, when RADAR instructed him to fly at

1500 ft Mona QFE, adding that the Mona Cct traffic had been restricted to 1000 ft. He could see the jets in the Cct at Mona as he continued on past Mona towards Holyhead along the trunk road, pausing to orbit at each road junction.

As he flew closer to Holyhead he was told to set the Valley QFE, which he did and continued with his task maintaining 1500 ft – there was no reason to fly any lower – until he was instructed to call Valley TWR on 122.1 MHz. He switched to TWR immediately and was aware of the very busy Cct at Valley, with jets curving "almost one after the other", in a LHD pattern to RW14 for 'touch-and-goes' and/or 'low approach and go-arounds'. He completed the work at Holyhead maintaining 1500 ft Valley QFE as quickly as possible, and then asked if he could climb to 2500 - 3000 ft to complete the rest of the sortie. After completing tasks at an industrial site just SE of the runway at Mona airfield and then Llangefni, both at 3000 ft, he completed a task back in the Bangor area at 1500 ft at about 1315, whence he set course for WAL VOR. By this time, he believed he had been switched back to RADAR on 125.22 MHz and he had been passed the Holyhead RPS. The weather was CAVOK with very good visibility throughout.

Whilst repositioning back to Bangor he was informed by RADAR that an Airprox had been filed. This surprised him and at first as he thought the controller was talking about an incident near Mona airfield. In a later transmission, as he was departing Bangor towards Liverpool, he realised that he might be talking about an Airprox nearer to Valley aerodrome though nothing specific was said.

When he filed his report, he was not aware of the location or nature of the reported Airprox. He added that at all times during the photographic detail on Anglesey the heights given to fly at, as agreed with both the RADAR and TWR, were strictly adhered to and he believed at all times he was under the 'positive control' of the respective controllers. It was not possible to hear what instructions were being given to the jet traffic at the time, because they were using UHF, but he fully expected that the jet pilots were being kept informed of his position and height for the duration of the photographic detail.

UKAB Note (3): During a subsequent telephone call with UKAB staff, wherein the location and

nature of the Airprox was explained, the C172 pilot believed that he had not seen the Hawk at all at the time nor when it 'broke' downwind. He had seen jet traffic over Holyhead, and he might have seen the subject Hawk as it 'ran-in', but not later. He had assiduously maintained 1500 ft Valley QFE throughout and did not believe he descended below this height; he stressed that the task did not necessitate it given the quality of modern photographic equipment. During the orbits at each road junction, which he thought he had briefed RADAR about beforehand, he would probably have been looking L into the turn and he added that the visibility out of the high-wing Cessna below and to starboard whilst in the turn was very limited. He was very familiar with photographic survey work close to busy aerodromes – frequently conducted inside CAS close to major airports – so he was accustomed to being asked by ATC to move out of the way to accommodate inbound traffic, adding that he was very happy to accede to ATC's instructions to do so.

UKAB Note (4): This Airprox occurred outwith the coverage of recorded radar.

MIL ATC OPS reports that the pilot of the C172 was conducting a series of aerial photographic tasks along the A55 trunk road in the vicinity of Anglesey at 1500 ft QNH and in communication with Valley RADAR on 125.22 MHz. RADAR is a combined LARS and DEPARTURE position whereby the controller operates two RT frequencies simultaneously - UHF and VHF. However, there is no facility to cross-couple the two so that transmissions on VHF can be re-broadcast on UHF and vice-versa.

After completing his task at Bangor, at 1209:57, the C172 pilot reported to RADAR his further intentions, *"...we've got one to do now and it's at the A55 trunk road starting from the Menai Straits all the roundabouts and its for the Welsh Development Agency...I wonder if we can set course now. Initially it will be towards Mona but stopping off at each junction to circle"*. Unfortunately, the last and vital part of the information was missed by the controller as the frequency was *"stepped on by UHF..."*. Consequently, at 1213:04 – 20 min before the Airprox - clarification was sought - *"...can you say again...what you wish to do"*. The C172 pilot responded at 1213:09, *"Roger...it's to survey the*

main trunk road starting with the A55. Starting at the Menai Bridge and running initially towards Mona...its for the Welsh Development Agency and err we've got to do each junction along that road", but omitting the important information about circling around each junction. The flight was assigned a squawk of A3730, passed the Mona QFE (1025 mb) and at 1215:45, instructed to *"fly not below one thousand five hundred feet as you transit the A55 towards Mona"*, which the pilot acknowledged. Further clarification of the C172 pilot's intentions was sought by RADAR at 1216:04, *"just confirm that you're going...transiting all the way to Holyhead"*. The pilot replied that once he got to Holyhead he could *"operate a little higher if that might be more convenient"*. The flight was co-ordinated through the Mona Cct under a FIS at 1500 ft whilst the Cct ac were restricted to 1000 ft. Further updates on Cct traffic were passed before 1224:30, whereupon the C172 pilot was instructed to set Valley QFE (1031 mb) for the Valley MATZ crossing and at 1225:56, switched to TOWER on VHF - 122.1 MHz - as he flew from Bangor to Holyhead close to the aerodrome.

Meanwhile the Hawk pilot had first been informed of the C172 at 1218:14, whilst inbound to Mona, *"...traffic information...there is a C172 following the A55 westbound, 1500 (feet) Mona QFE on a photo task."* He saw it before he called Mona.

Upon initial contact TWR instructed the C172 pilot to *"report when leaving the MATZ"* and at 1229:37, to *"maintain not above 1500 ft, there is Valley traffic above you"*, which was acknowledged. One Hawk was already in the Cct when at 1230:47, the reporting Hawk pilot called on UHF - 340.17 MHz - requesting to join. TWR reported the RW in use, QFE and notified the crew that there was one in the visual Cct and one other joining – which was behind. However, no mention was made of the C172 during the initial message. At 1231:12, TWR transmitted to the two jets joining *"there is light civilian traffic north-east of the airfield by 2 miles, 1500 ft Valley QFE"*. The subject Hawk crew replied that they were looking, and then called at 'Initials'. The second Hawk crew following on behind to initials did not respond to the broadcast, but did call at 'Initials' about 11 sec after the first. Both Hawk crews then conducted independent 'run-in and breaks' to RW14 and landed, the crew of the second Hawk calling fuel priority as they broke into the

visual Cct. At 1233:41, a call was made to TWR – it was not then clear on RT from which crew – stating, *"what's that light aircraft doing?"*. TWR replied, *"Roger, he's doing a photo survey, he should be departing the MATZ shortly"*. At 1234:01, the first Hawk crew called TWR advising of their intention to file an Airprox.

Whilst manoeuvring over Holyhead at 3000 ft, after switching back to RADAR, the C172 pilot was informed of the Airprox. At 1311:09, RADAR asked the C172 pilot whether he was aware of the implications of the Airprox the pilot responded, *"..but at that time of course, all height changes were called out to you..initially we were at 1500 ft and then of course we climbed to 3000 ft over Holyhead"*. After completing his task, the C172 pilot took up a course for WAL but before leaving the frequency he advised *"at all times at Holyhead, we were operating...under the instructions of firstly the...RADAR frequency and then the Tower...that included the heights of course"*. The comment was acknowledged and the C172 pilot changed to his en route frequency.

This incident originated with the missed intentions of the C172 pilot, who required to orbit at each road junction as he flew NW toward Holyhead along the A55. Because of simultaneous transmissions on U/VHF on the first attempt, on the second transmission only half the picture was given of what he wanted to do. RADAR and TWR correctly coordinated the C172 pilot's MATZ crossing ensuring that 500 ft vertical separation was established between the C172's assigned height and Cct traffic at both Mona and Valley operating at 1000 ft on the respective QFE. Although TWR did not mention the presence of the C172 to the 2 Hawks joining the circuit on initial contact, traffic information was provided after both ac had checked in and received airfield information, which was arguably more sensible than making 2 identical calls. With hindsight, it would have been prudent for TWR to have made a standard broadcast including information on the C172's track or provided the C172 pilot with traffic information on the two Hawks. However, no further clarification was offered or sought. A reminder at this stage that this was a photographic survey ac may have alerted the Hawk pilot to the potential of finding an aircraft in an unusual configuration. At this stage the TWR controller's workload was just picking up with one

in and two joining the Cct, and a further pair for departure.

The instructions and information provided by Valley ATC should have been sufficient to separate the Hawks from the C172 provided each maintained their assigned heights. The C172 pilot confirms that he had maintained 1500 ft QFE when transiting close to Valley and the 2 Hawks should not have been above 1000 ft QFE after 'Initials'.

UKAB Note (5): A Hawk that was already established in the Cct when the subject Hawk joined was not specifically informed about the C172, nor its task, either through an all stations broadcast or a transmission directly addressed to the crew. However, the crew may have ascertained this information indirectly from the transmission to the subject Hawk. No mention was made of a 'photographic survey' on RT by TWR, or that the C172 was doing anything other than crossing the MATZ direct E-W, before the Airprox.

HQ PTC comments that to allow an unfamiliar C172 pilot to enter the visual circuit area to carry out a non standard task in an ac incompatible with the incumbents should presuppose a prescriptive brief and careful monitoring thereafter. Unfortunately, "not above 1500 ft" gave the Cessna pilot the latitude to drift down towards the Hawks' Cct height. Moreover, the lack of further lateral restraint enabled him to orbit towards the final turn – which he seems to have done. However, we are surprised that he should do so without asking, when he seemed otherwise anxious to be compliant with ATC instructions. The C172 pilot simply might not have appreciated the size of the Hawk Cct. If ATC had assumed that the Cessna was following the A55 as a line feature - keeping it on the L - then his route might have been considered to be sufficiently clear not to cause concern. The Hawk pilot can feel justifiably aggrieved at this extra distraction to his high workload but the lessons are largely for ATC.

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 authority.

The Mil ATC Ops advisor explained it was thought that the C172 pilot had telephoned Valley ATC the week before the flight, but it was unclear if his requirements were sufficiently refined and detailed at that stage to enable meaningful promulgation to the squadrons. Photographic survey flights were obviously very weather dependant and took place – inevitably – when Valley was also busy with its own intensive training programme. However, the PTC member emphasised that with prior co-ordination, the Unit could plan around it, yet it appeared that the C172 pilot had elected to conduct the flight without detailed prior notice. Some members wondered if an Airspace Co-ordination Notice (ACN) had been issued by Airspace Utilisation Section (AUS) for this photographic survey flight – this may have been the case – but it would probably have been mentioned by the pilot if it had. An ACN promulgated in advance and then briefed to all participants – pilot and controller alike – on the day would have enabled detailed information to be passed to all concerned. ACNs were not essential for every task, but its use here might have forestalled this occurrence.

The Board recognised that the C172 pilot had been trying to minimise any disruption to the station's flying task and had endeavoured to articulate his requirements. However, the critical "*but stopping off at each junction to circle*" information was not included the second time around when the RADAR controller was actually listening. This critical piece of information made the C172 flight very different from a straightforward MATZ crossing. Unbeknown to him, the C172 pilot had not communicated exactly what he wanted to do to Valley ATC when he thought he had - an important contributory factor to what transpired. Valley ATC had tried to effect appropriate vertical separation between the Cct traffic and the LA – 500 ft is generally the norm in a MATZ. Like HQ PTC, controller members were critical of TWR's instruction to the C172 pilot to "*Maintain not above 1500 ft*". Taken literally, this permitted the C172 pilot to manoeuvre at any height from ground level to 1500 ft. This was probably not what the controller intended, but the pilot was permitted by this instruction so to do. However, the C172 pilot has reported that he had no need and did not

fly below 1500 ft QFE. The Board concluded, therefore, that this poorly worded instruction did not apparently cause the Airprox, but nonetheless it was a most inappropriate 'slip of the tongue'. Some believed that TWR had treated the C172 as a MATZ transit, but other controller members opined that TWR should have kept a closer eye on the LA. Its pilot had evidently flown several orbits as he progressed toward Holyhead and before he arrived at the junction NNW of Valley. Some thought RADAR and TWR between them should have seen what the LA was doing. Whilst the orbits may have been too tight to detect on the Valley SRE, many members found it difficult to understand that TWR had not appreciated what the pilot was doing, even as late as the junction to the NNE of the aerodrome – both were in the ATZ – inside 2 NM from the VCR. Whereas the information provided by TWR was sufficient to attract the Hawk pilot's attention to the LA, it was its proximity to the downwind leg that caught him unawares. He had seen it previously when running in and whilst approaching the 'Break', but was surprised to see it in front of him subsequently on the downwind leg. Nevertheless, 500 ft of vertical separation should have existed between the two ac but without a radar recording the relative heights of both ac could not be ascertained at the critical moment. The C172 pilot was adamant that he had not flown below 1500 ft. Some pilot members thought it was possible that the Cessna pilot could have drifted down whilst in the turn and it was equally possible that the Hawk pilot might have climbed a little inadvertently. This might explain the reduced height separation reported, but it remained conjecture with nothing to support either suggestion. Perhaps surprise had been a factor. What was irrefutable was that the C172 pilot had not seen the Hawk at all at that point. Civil controller members pointed out the lack of a cross-coupled frequency capability – if the C172 pilot had been able to hear the jet pilots' Cct calls it might have given him a better appreciation of the Cct state. In the end, with no clear evidence to what extent, if any, separation had been eroded, the Board could only conclude that this Airprox had resulted from an impression by the Hawk pilot, of reduced vertical separation in the ATZ. Though the C172 pilot was oblivious to the occurrence the Board concurred with the Hawk pilot's own assessment of the inherent risk, insofar as he was always going to turn finals when

he did anyway - away from the LA - hence removing any risk of a collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: An impression by the Hawk pilot, of reduced vertical separation in the ATZ.

Degree of Risk: C.

AIRPROX REPORT NO 26/02

Date/Time: 24 Mar 1518 (Sunday)

Position: 5127 N 0048 W (3 NM E of WOD)

Airspace: LTMA (Class: A)

Reporting Aircraft Reported Aircraft

Type: A320 B737-200

Operator: CAT CAT

Alt/FL: ↑ FL 180 FL 180

Weather VMC CAVOK VMC CLBC

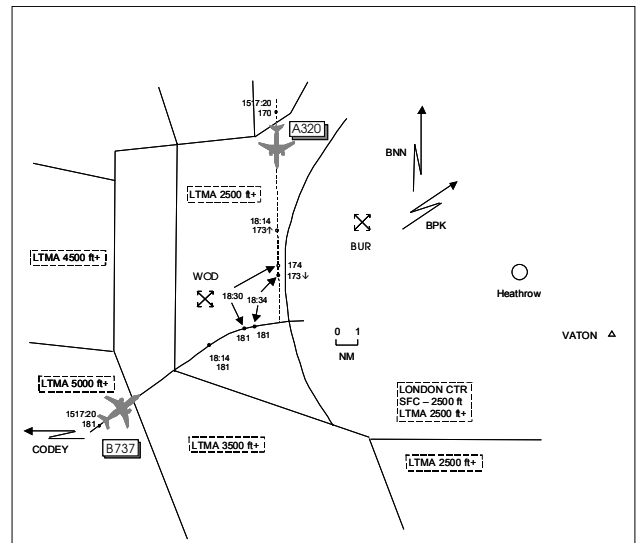
Visibility: 40 km >10 km

Reported Separation:

700 ft V 0.5 NM H 800 ft V 2-3 NM H

Recorded Separation:

800 ft V 2.7 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A320 PILOT reports heading 190° at 300 kt en route from Stansted to Tunisia and in receipt of an ATC service from London on 127.95 MHz. ATC gave a stepped climb, owing to traffic, and he was cleared to climb from FL 170 to FL 180. TCAS showed descending traffic in his 1 o'clock position crossing R to L; a TA alert followed and he visually acquired the conflicting ac. Responding to the alert, he levelled off and manually commenced a descent back to FL 170 before receiving an ATC call; there was no RA alert and the other ac passed 700 ft above and 0.5 NM ahead. ATC apologised for their error however, the crew were surprised that an RA alert was not triggered but opined that this was probably as a direct result of an early visual contact and subsequent prompt action. ATC had passed an instruction to "*level off immediately*", which was received as he took visual avoiding action, and it was fortunate he was flying with v/s mode (+500ft/min) selected at

the time, rather than 'open climb'. Had he complied with ATC with the latter mode selected, it would have endangered his ac. He assessed the risk of collision as high.

THE B737 PILOT reports heading 060° at 350 kt and level at FL 180 routing to BPK inbound to Stansted. After he was told to route direct to VATON (25 R turn), he saw traffic on TCAS 10 NM to the N of him heading S which was instructed by ATC to level off at FL 170. He then received a TCAS TA as the other ac approached to within 800 ft vertically and 5 NM horizontally before it was seen visually to pass 2-3 NM behind and 1000 ft below. ATC then queried his routing as the ATCO thought he had originally cleared his ac to VATON; the FO informed ATC that he had readback Brookmans Park. ATC accepted that it was his mistake and that he should have heard their readback.

ATSI reports that at the time of the Airprox both ac were under the control of the TC Capital SC. The component sectors, TC VATON and CPT, were band-boxed and had been so when the subject controller took over the position. The workload and traffic levels were described as high but manageable.

The B737 established contact with the SC at 1514:30, and reported level at FL 180 heading 100 degrees. Its position was over CODEY, 16 NM SW of CPT. Some 40 seconds later, the A320 established communication, approximately 5 NM NW of BNN, climbing to FL 160 and on a direct track to CPT. The SC had a number of southbound ac which would affect the further climb of the A320. One of these was a Birmingham outbound and his plan was to climb the A320 underneath this ac and route it behind an eastbound flight approaching CPT and passing FL 195 climbing.

At 1515:55, the SC instructed the A320 to climb to FL 170 on a heading of 185°. Almost immediately after this, he instructed the B737 to route direct to VATON, which would have required the ac to turn L approx 20° and follow a track of 080°, following the LOREL 1S STAR for Stansted. The readback from the B737 was unclear but, following careful analysis of the RT recording by the SRG Transcription Unit, is believed to have been a clipped "*Brookmans Park*", which is also on the LOREL 1S STAR. The SC was asked how he had interpreted this readback, to which he replied that he had been convinced the reply was 'VATON', which was what he was expecting to hear.

The A320 was cleared to climb to FL180, at 1517:20, which would keep it underneath the southbound Birmingham outbound traffic but was the level occupied by the B737. At this time, the A320 was in the B737's 11 o'clock at a range of 18 NM. The SC reported that he was keeping his strip marking up to date but did not scan the strips to check for conflicts, as was his normal practice, prior to issuing the climb instruction. Instead, he was relying on the radar and concentrating on the relative levels of the Birmingham outbound together with the

eastbound traffic. He had not taken the B737 into account when formulating his plan.

Shortly afterwards, whilst scanning the radar picture, the SC noticed that the B737 was following a NE track, rather than the E one which would have been expected if the ac was routing direct to VATON. The SC queried this with the B737 crew and, once again, the crew's reply was unintelligible other than the ac call sign at the end of the message. The SC then instructed the B737 to: "*fly heading of zero eight five please*" which would take it back towards VATON, as he had originally planned.

It was around this time that the SC noticed the confliction between the B737 and the A320, (STCA did not activate), and at 1518:20, the SC transmitted to the A320: "*A320 c/s stop your climb immediately stop your climb immediately traffic in your twel in your er eleven o'clock level a thousand feet above you descend immediately flight level one seven zero*". The phrase 'avoiding action' was not used, nor was any TI passed to the B737. The SC advised that he had reacted almost by reflex to the situation and accepted that the phrase should have been used. At the time of the transmission, the B737 was crossing from R to L through the 1 o'clock to 12 o'clock of the A320. Confirmation was sought from the crew of the A320 that they had received the instruction to which they replied: "*affirmative we've taken avoiding action we've TCAS and visual contact*".

UKAB Note: The radar recording at 1518:30 shows the A320 stopping its climb at FL 174 3.4 NM NNE of the B737 before commencing a descent. Minimum separation occurs at 1518:34 when the A320 is descending through FL 173 with the B737 in its 1 o'clock range 2.7 NM and 800 ft above; the A320 eventually passes behind the B737 by 1 NM and 1000 ft below.

SMF did not activate but immediately afterwards the crew of the A320 advised: "*We'll be filing*".

Later analysis of the radar recording showed that even if the B737 had turned to VATON when instructed, the confliction would still have arisen, as the two ac would not have been laterally separated.

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 although there had been an undetected readback error - by the TC Capital SC following a transmission from the B737 crew - it had not affected the eventual outcome of the incident. More importantly, the SC had not scanned the fpss to check for conflicts which should have revealed the presence of the B737. He had consequently not taken the B737 into account before he cleared the A320 to climb on a conflicting track. An ATCO told members that the Capital Sector could involve many crossing tracks requiring the SC to give step climbs to ac which eventually leave the sector climbing to an agreed level of FL 210. Although the sector was undoubtedly busy, the SC had taken the position banded and had been happy with workload and traffic levels. The onus was on the SC to split the sector which would normally entail an

additional ATCO assisting the SC mainly by effecting co-ordination.

Turning to risk, the SC had noticed the confliction prior to STCA activation and instructed the A320 to stop its climb and to descend back down to FL 170. By that stage, however, the A320 crew had already received a TA alert (on the B737), had levelled off at FL 174 and then commenced a descent thereby preventing conditions for an RA. Moreover, they had visually acquired the B737 and watched it cross ahead and above. For their part the B737 crew had received a TA alert on the A320 and seen it pass behind and below. All of these elements combined but particularly the proactive actions by the A320 crew persuaded the Board that any risk of collision had been effectively removed.

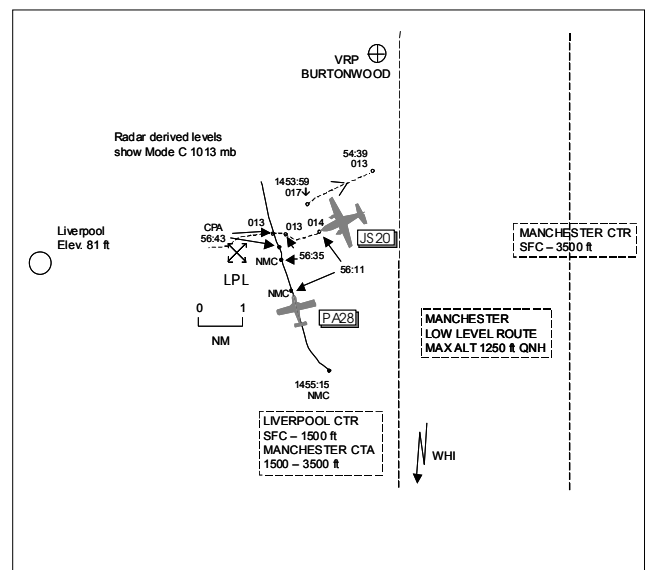
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The TC Capital SC did not take the B737 into account when he cleared the A320 to climb on a conflicting track.

Degree of Risk: C

AIRPROX REPORT NO 27/02

Date/Time: 27 Mar 1457
Position: 5321 N 0242 W (5 NM E of Liverpool)
Airspace: Manchester CTA (Class: D)
Reporting Aircraft Reported Aircraft
Type: Jetstream JS20 PA28
Operator: HQ PTC Civ Club
Alt/FL: 1750 ft 1220 ft
 (QNH 1029 mb) (QNH NK)
Weather VMC CLOC VMC HZBC
Visibility: 50 km NK
Reported Separation:
 250 ft V 0.5 NM H not seen
Recorded Separation:
 NK V 0.35 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JS20 JETSTREAM PILOT reports heading 266° at 125 kt and 1750 ft QNH inbound to Liverpool and he was in receipt of an ATC service from Liverpool on 119.85 MHz squawking 3264 with Mode C. After completing an inbound turn on the NDB/DME procedure for RW 27, ATC told him of conflicting traffic in his 11 o'clock position; the pilot in the LH seat saw an ac about 1 NM away on a northerly heading about 250 ft below. An avoiding action R turn onto 360 was issued and he commenced the R turn but as he had the traffic in sight, which he assessed and subsequently watched passing 0.5 NM behind, and with ATC's permission he immediately reversed his turn back onto the FAT. He thought that the safety of his ac had been compromised and that it was fortunate the weather was CAVOK.

THE PA28 PILOT reports heading 004° at 100 kt and 1220 ft QNH flying solo on his qualifying cross-country flight from Wolverhampton to Blackpool via the Manchester Low Level Route and he was in contact with Manchester Approach on 119.4 MHz. The weather was VMC with no cloud but in haze, the ac was coloured blue/white and he was squawking 7000 with NMC. He had advised Manchester ATC of his intention to transit the area via the Low Level Route but he was unable to recall the type of service that he had requested or was provided with but he had been given the Manchester QNH. He was shocked at being informed by the UKAB 3 days later that he had been involved in an incident as he had not seen the reporting ac.

UKAB Note (1): During a subsequent telephone conversation with the pilot of the PA28, he had commented that the visibility had been very hazy at the start of his route, to the extent that he had considered returning to Wolverhampton. However, the weather had gradually improved the further N he progressed so he continued, subsequently believing he had correctly identified the entry point to and flown along the Low Level Route. He was unable to ascertain why he had flown off track - he had flown along the route previously during his training - although he remembered that the area didn't 'look right' as he exited the northern end of the LL route but he had been able to navigate directly to his destination.

He thought that as the Jetstream pilot had seen him, he should have been able to see the JS20 so his look out needed to be improved as well as the need to confirm the type of ATC service that was being provided.

UKAB Note (2): Met Office archive data shows EGGP 271450Z 17010KT 150V210 CAVOK 14/04 Q1029=

ATSI reports that the incident occurred within Class D airspace. Rules for ATC with regards to unknown ac are stated in MATS Part 1, Page 1-51 *"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"*. Clearly, although the PA28 was not showing Mode C, because the base of the airspace was the surface (CTR), the latter applied.

Initially, the Liverpool APR passed the Jetstream pilot TI (1455:50) on the unknown. Unfortunately, the radar recording only shows the PA28 at the time but this ac is 2 NM S of the extended centreline to RW 27. Arguably, avoiding action could have been issued then but ten seconds later the pilot of the Jetstream, having been offered the choice of action, reported visual with the traffic. Shortly afterwards, an avoiding action turn was passed but not taken by the Jetstream pilot, as he reported the traffic was going behind and below.

The APR took appropriate action; TI quickly helped the Jetstream pilot become visual with the unknown traffic and allowing the choice to take the avoiding action advice if required. This ensured that the possibility of a collision was removed, as far as possible.

The PA28 pilot was being provided with a FIS from MACC at the time, having reported his intention to route along the Low Level Route. The flight was not identified.

THE JS20 PILOT'S UNIT comments that the Jetstream crew acted correctly throughout and share concerns over the possible risk had the weather been worse. Subsequent investigation

has established that the PA28 pilot was endeavouring to fly along the Low Level Route through Manchester's TMA but was over 2 miles W of the boundary of the route in CAS.

Although the PA28 pilot was receiving a FIS from Manchester, information on traffic in the Low Level Route is not routinely passed to Liverpool ATC, despite the proximity of their RW 27 approach path. Furthermore, aside from the CTZ Local Flying and Entry/Exit Procedures Diagram, there is no mention of the Low Level Route in the Liverpool AIP entry and it is not shown on the Liverpool TAPs. Thus, Liverpool ATC are not routinely forewarned of visual traffic using the Low Level Route while pilots on instrument approaches to Liverpool are unlikely to be aware of the possible proximity of visual traffic in what is generally believed to be CAS.

To improve flight safety and traffic management, consideration should be given to changes in 2 areas. All traffic using the Low Level Route should be under at least a FIS from either Manchester or Liverpool ATC and information on such traffic should be passed to the other ATC unit. The TAPs for Liverpool's RW 27 should include at least some reference to the existence of a visual corridor running underneath the approach path, including the top altitude and distance of the Route's boundaries from RW 27's threshold.

HQ PTC comments that although this does not look to be a terribly close encounter it does raise some significant issues; most of these have been raised by the JS20's unit. Whilst it might not be necessary or even desirable to implement all of them, some could be effective in preventing a recurrence. Of more concern is the blithe assumption that anyone who elects to use a VFR corridor is competent to do so.

UKAB Note (3): The UK AIP entry Manchester AD 2-EGCC-1-19 Para 7 Special Low Level Route states:

"Within the Low Level Route helicopters or aeroplanes may fly without individual ATC clearance subject to the following:

- a. *They remain clear of cloud and in sight of the ground;*

- b. *Maximum altitude: 1250 ft, Manchester QNH; Manchester QNH available from ATIS broadcast frequency 128.175 MHz;*

- c. *Minimum flight visibility: 4 km;*

- d. *They are transiting through the CTR or proceeding directly to or from an aerodrome in the CTR.*

Note: Flights using the Low Level Route are responsible for their own separation from all other flights when operating within the Low Level Route airspace at all times.

Pilots are advised that the Special Low Level Route is not aligned on the M6 motorway, or any railway line, and these should not therefore, be used as a navigational line feature for transit throughout the route. However, to the northwest and southeast of the route, stubs are aligned on the M6 and the Crewe-Winsford railway line to enable pilots to access the route accurately.

UKAB Note (4): Analysis of the Clee Hill recorded radar at 1453:59 shows the Jetstream 2 NM NE of the LPL NDB squawking 3264 tracking NE and descending outbound on the NDB procedure to RW 27 at Liverpool before fading from radar at 1454:39 level at 1300 ft Mode C (1730 ft Liverpool QNH 1029 mb). Subsequently, at 1455:15 a 7000 squawk with NMC is seen, the PA28, 3.3 NM SSE of the LPL NDB tracking 310° before turning shortly thereafter onto a 340 track which is maintained until after the Airprox. At 1456:11 the JS20 reappears on radar 2 NM E of the LPL tracking 255° level at 1400 ft Mode C (1830 ft QNH 1029 mb) with the PA28 in its 11 o'clock range 1.5 NM. 24 seconds later the Jetstream is seen to have turned R by approx 30° now level at 1300 ft Mode C (1730 ft QNH) with the PA28 in his 9 o'clock range 0.52 NM. CPA occurs 8 seconds later at 1456:43 as the JS20 crosses through the PA28's 12 o'clock range 0.35 NM; shortly thereafter the Jetstream commences a L turn towards the FAT and descends with the IAP.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

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

Members noted the comments made by the Jetstream pilot's unit. It was agreed that the purpose of the LL route is to allow the 'free passage' of VFR traffic through Class A airspace without requiring the pilot to call a 'controlling' ATSU. Also, the dimensions of the 'corridor' gave adequate vertical clearance to IFR Liverpool and Manchester traffic above ac which are flying within the confines of the LL route. The UKAB had no view on the suggestion to include the LL route on the Liverpool TAPs but felt that the Jetstream's unit could pursue this themselves through the normal channels. However, in this case it was clear that the Airprox was caused by the PA28 pilot who had inadvertently flown off track and penetrated the Liverpool CTR. In doing so, he had flown into conflict with the JS20 which he did not see. The Liverpool APR had given TI to the Jetstream pilot and asked if he needed to avoid the unknown traffic, the reported PA28. This was reliant on the JS20 pilot's ability to see the traffic, which he quickly did, and then he assessed the situation. After 10 seconds the APR had passed avoiding action instructions, which the JS20 crew acknowledged and started to action but had then opted to resume the approach as they judged and subsequently watched the PA28 pass clear behind and below. Some members thought that the APR had been slow to see the errant PA28 and that he should have passed the JS20 pilot avoiding action straight away in accordance with MATS Part 1. However, without full knowledge of the controller's workload/traffic at the time, the Board

agreed that the APR had ultimately fulfilled his task in a most flexible way within Class D airspace after he had noticed the conflict. The combined actions of both the APR and JS20's crew had been effective in removing any risk of collision.

Pilot members were surprised by the cross-country route which had been set for the student pilot, particularly on his qualifying flight. All agreed that the LL route was difficult to navigate, even for experienced pilots, owing to the lack of any suitable line features to follow with many depicted visual clues/features on the topographical charts being shown predominantly on the edges of the 'corridor'. The S-N direction was the most difficult to follow. However, the PA28 pilot's Flying Instructor must have assessed him competent to execute the task and suitably briefed on the day for the impending flight. Also of concern was the PA28 pilot's inability to see the Jetstream which had passed ahead of and slightly above his ac. It was believed that this encounter had occurred when the student pilot's visual lookout had been degraded by him concentrating on the navigational element of his task whilst flying in hazy weather conditions on this important PPL 'test' flight.

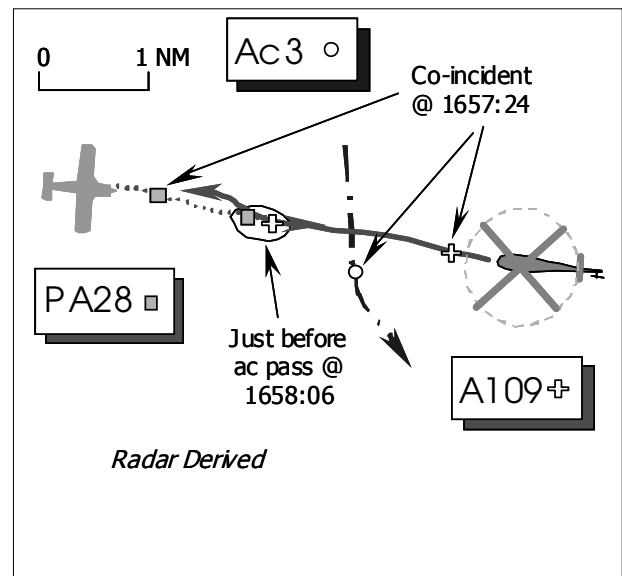
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Inadvertent penetration of the Liverpool CTR by the PA28 pilot, who did not see the Jetstream.

Degree of Risk: C

AIRPROX REPORT NO 28/02

Date/Time: 27 Mar 1658
Position: 5154 N 0130 W (7½ NM WNW Oxford/Kidlington - elev 270 ft)
Airspace: Oxford AIAA (Class: G)
Reporting Aircraft Reported Aircraft
Type: Agusta 109 PA28
Operator: HQ JHC Civ Training
Alt/FL: 3000 ft 2200 ft↓
(RPS 1025 mb) (QNH 1030 mb)
Weather VMC HAZE VMC
Visibility: 1500 m into sun > 10 km
Reported Separation:
100 ft V 150 - 250 ft V
Recorded Separation:
<0.1 NM

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE AGUSTA 109 PILOT provided a very comprehensive report, stating his ac has a predominantly white colour scheme, but HISLs are not fitted. Westbound from Westland Heliport to Credenhill, although the reported visibility was about 12 km in haze, he estimated it was actually in the order of 1500 m into sun, so he elected to climb to 3000 ft ALT and transit under a RIS from Brize Norton. The assigned squawk was selected with Mode C.

His planned route - heading 280° at 140 kt - took him just to the N of Oxford/Kidlington so he switched from Brize to Oxford APPROACH (APP) for about 5 minutes – whilst retaining the Brize squawk – to inform them of his VFR transit at 3000 ft Cotswold RPS (1025 mb). A report was made when N abeam the aerodrome but he could not recall being passed details of any other ac working their frequency to the W. Upon recalling Brize Norton ZONE the controller passed traffic information about two conflicting ac ahead of him to the W. One of the reported ac was spotted crossing R – L ahead and about 500 ft below his helicopter. The other ac was also reported as 3 NM ahead, on a reciprocal heading but "no height". Approaching 7 NM WNW of Kidlington in level cruise, despite searching for this conflicting ac with a good scan ahead from 10 o'clock round to 2 o'clock, he could not see it - the search made

more difficult by the sun at 11-30 - so he assumed that the second ac was either well above or well below his helicopter. He glanced inside the cockpit to check the instruments, but when he looked back up he saw a PA28 directly in front of him slightly below and, he opined, quite possibly in a descent to avoid his helicopter. To avoid the other ac he instinctively banked R and climbed as the PA28 passed about 100 ft directly beneath his ac, with a "very high" risk of a collision that could have been "possibly catastrophic". He emphasised that spotting the other ac was made more difficult by its relative position adjacent to the centre windscreen stanchion, whilst also flying into the sun.

THE PA28 PILOT reports that his ac has a white, orange and black colour scheme and HISLs, navigation lights and anti-collision beacon were all on whilst conducting a student training sortie. Inbound to Oxford from Haverfordwest, heading 110° at 100 kt, a squawk of A7000 was selected but Mode C is not fitted. Initially in communication with Oxford APPROACH on 125.32 MHz, about 7 NM NW of Oxford, he was descending through 2200 ft Oxford QNH (1030 mb) [about 2350 ft RPS] for a R base join to RW20. Whilst talking to the student and changing radio frequencies to TOWER, he spotted a helicopter about 1 NM away. He descended

rapidly and turned R to avoid the helicopter which passed about 150-200 ft directly above and whose pilot, as far as he could tell, had done nothing to avoid his ac.

MIL ATC OPS reports that the A109 had been released by Brize Norton ZONE to call Oxford APPROACH for transit through their overhead. At 1657:03, the A109 pilot recalled ZONE, was re-identified and placed under a RIS at 3000 ft COTSWOLD RPS (1025 mb) *"limited from all around due to high traffic density"*, which the pilot acknowledged. This was immediately followed, at 1657:19, with traffic information on 2 tracks, one at *"...12 o'clock 2 miles heading south, no height"* and another – the PA28 at *"12 o'clock 3 miles reciprocal heading no height"*. The pilot reported visual with one *"...crossing right left in front low"* at 1657:29, but just over 1 min later at 1658:36, reported *"and Brize [C/S] I've just had an Airprox"*.

Analysis of the LATCC (Mil) Clee Hill radar recording shows the A109's squawk change to A3703 – as assigned by ZONE - at 1657:08, in the middle of a melee of 6 primary and one intermittent contacts. Four posed no threat and were correctly disregarded by the controller; the 2 conflicting ac are shown, one 12 o'clock - 1.5 NM R - L indicating 2000 ft Mode C [about 2510 ft RPS and shown on the diagram as Ac3] with another – the PA28 – at 12 o'clock 3 NM on a reciprocal heading. ZONE recognised the need to call both tracks and did so quickly and reasonably accurately. The slightly misjudged range passed on the first conflict appears not to have been a factor as the pilot spotted this ac quite quickly.

Here ZONE managed to re-identify the A109, assess and report relevant conflicting traffic within 26 seconds. Under a RIS, JSP 318A 235.115.1.b states that *"the controller will only update details of conflicting traffic, after the initial warning, at the pilot's request or if the controller considers that the conflicting traffic continues to constitute a definite hazard"*. In hindsight, an update on the traffic, after the A109 pilot had called visual with the first contact may have been prudent, however, ZONE's workload was assessed at the time as *"medium to high"*. The A109 pilot could have called for an update, but ZONE had no way of knowing the effect the sun was having and further transmissions might have been distracting. ZONE appears to have done all that

could be reasonably expected in the time scale, to appraise the A109 pilot of the traffic situation.

UKAB Note (1): The Clee Hill recording shows the respective ac converging on the Airprox location 7.5 NM NW of Oxford Aerodrome. Contrary to the pilot's report, the A109 helicopter does not display Mode C at all. The other ac upon which traffic information was given by ZONE – Ac3 - is shown at 1657:24, crossing ahead of the A109 from R-L, as the PA28 closes head-on in the A109 pilot's 12 o'clock at 2.9 NM. The CPA occurs in between radar sweeps just after 1658:06, whence the contacts passed with little perceptible horizontal separation (<0.1 NM). Thereafter, the avoiding action R turn reported by the A109 pilot is just evident, but the R turn reported by the PA28 pilot is hardly detectable. The minimum vertical separation that pertained cannot be determined.

ATSI reports that the Airprox occurred following transfer of the A109 from Oxford ATC back to the Brize Norton frequency. Oxford APP did warn the A109 pilot that there were 4 ac out to the NW of the aerodrome prior to transfer, but without radar there is not much else they could have done at the time to assist the helicopter pilot. Although the PA28 was on frequency when the A109 called stating his intentions, traffic information could have been passed to the PA28 about the overflying helicopter as traffic information was passed to another flight concerning the A109 transiting E - W. Although the A109 pilot erroneously reported at 2000 ft ALT on initial call to Oxford, he was subsequently instructed to fly at 3000 ft QNH and apparently did so.

UKAB Note (2): Analysis of the Oxford APP RTF tape transcript reveals that the PA28 crew called APP just after 1643:30 requesting joining instructions but still over 15 min out from the a/d. The PA28 pilot reported his range as 15 NM just after 1648:30, whence APP requested the crew to report passing 6 DME. About 5 min later, the A109 pilot called and reported at 5 NM E of the a/d, requesting a transit through the overhead and a FIS. APP passed the QNH and the RW in use adding *"transit through the overhead is approved at 3000 ft report approaching the field"*, which was acknowledged by the helicopter pilot. Just after 1656, APP requested the PA28's range which the crew reported to be 8 NM, whereupon the A109 pilot reported *"..out to the N of the field"*.

After APP acknowledged this report, the A109 pilot requested to switch back to ZONE, to which APP agreed *"affirm contact Brize one one nine decimal zero I'm working..four fixed wings out to the north-west of the field bye bye"*, whereupon the A109 pilot answered *"goodbye back to Brize"*.

JHC comments this Airprox occurred despite the best efforts of the A109 pilot to visually acquire the PA28, exacerbated by the sun being in the 11:30 position and the other ac's relative position to the centre windscreen stanchion. The pilot had been informed of the other ac by ATC and concentrated his lookout to the vicinity of the conflicting traffic. This Airprox highlights the importance of lookout during all stages of VFR flight, and the necessity, where possible, to identify all conflicting traffic notified when in receipt of an ATS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members thought that the A109 pilot demonstrated sound airmanship when he climbed and obtained a RIS from Brize RADAR during his flight through this Area of Intense Air Activity. Some pilot members wondered whether this was the wisest choice of route through the AIAA as Oxford is a very busy training aerodrome; one helicopter pilot suggested routeing via Upper Heyford might have been better, but with so many diverse operations conducted in this vicinity plus the natural choke points between the Brize CTR/Oxford ATZ and EGD129/Croughton HIRTA it was difficult to find an alternative. At least this way, potentially, ATSUs might provide some useful traffic information. Having wisely switched to Oxford APPROACH for his transit close to the aerodrome, it was regrettable that the information the A109 pilot imparted did not result in a more useful interchange and some thought that the controller's final transmission of *"four fixed wings out to the north-west of the field"* somewhat unhelpful. The Board also concurred with ATSI's comment that traffic information from APPROACH to the inbound PA28 would have been

helpful. Nevertheless, after switching back to RADAR the helicopter pilot had been passed accurate traffic information about the unknown ac and had searched in vain – into the sun that would have been quite low on the horizon - for the PA28. The Board endorsed the Mil ATC Ops view, that the controller had provided an efficient service in highlighting the confliction to the A109 pilot, but having been told that another ac was there, some thought the pilot should have kept looking for it until it was known to have cleared astern rather than look inside the cockpit. A request to the controller for an update on the traffic would have assisted in this task, as highlighted in the Mil ATC Ops report. If a controller's workload permits, a military controller member thought it was good practice to do this anyway in a head-on 'dead-ringer' situation. Other controller members agreed and stressed that pilots should not hesitate to ask for an update if necessary – if it is not feasible they would soon be told. Clearly the helicopter pilot was at a disadvantage looking into sun and some thought that the pilot's visor should have helped against the glare, but visors can also degrade vision clarity. Some helicopter pilot members thought that the reported obscuration caused by the windscreen stanchion was not quite as much of a hazard as had been reported. A logical search pattern outside the cockpit – as had been used here according to the helicopter pilot's report - should include moving the head to look around such obstructions. All ac types suffered from these hindrances to a greater or lesser degree, but a disciplined scan must take this into account to ensure a satisfactory lookout. Nonetheless, this was clearly a busy piece of airspace and the A109 pilot had apparently done his best to try and mitigate this. Even the PA28's HISL would probably have been negated by the power of the sun and members thought the A109 pilot probably spotted the PA28 as early as he could. In the other cockpit the PA28 instructor - with the sun behind him - had spotted the A109 1 NM away – albeit without a HISL - and elected to turn and descend to avoid it. Though this was still later than desirable, the hazy conditions were probably responsible to a large extent. The Board assessed, therefore, that this Airprox was caused by a late sighting by both pilots.

Clearly these late sightings gave little time for avoiding action and the A109 pilot's report clearly related the sense of urgency with which he had

turned R and climbed to get away from the PA28, unbeknownst to its pilot. The actions taken by the instructor pilot appeared less hurried, but it was still a relatively close call as evinced by the minimal horizontal separation shown on the radar recording. In the members' opinion the combined action of both pilots had removed the potential for a collision, but the Board agreed unanimously 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 29/02

Date/Time: 28 Mar 1530

Position: 5041 N 0029 W (15 NM SE GOODWOOD)

Airspace: CTA/N859 (Class: A)

Reporter: LTCC WILLO SC

First Aircraft Second Aircraft

Type: HS25 BE90

Operator: Civ Comm Civ Comm

Alt/FL: ↑ FL 110 ↑ FL 115

Weather: VMC CLOC VMC CLOC

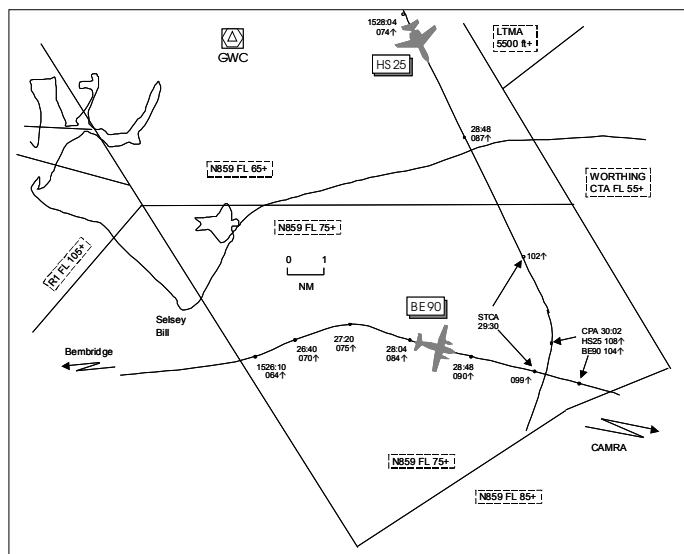
Visibility: >10 km >10 NM

Reported Separation:

300ft V 0.25NM H not seen

Recorded Separation:

400ft V 1.5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE LTCC WILLO SC reports that the HS25 had almost reached FL 110 when the STCA highlighted a conflict with an unknown ac squawking 7000 indicating FL 100 climbing and crossing ahead from R to L on a SE heading. He immediately gave the HS25 pilot an avoiding action R turn to the SW to ensure that it passed behind the unknown ac and gave TI. The HS25 pilot reacted immediately and confirmed he had a visual sighting with the traffic but was unable to identify the ac type or confirm its colour; the conflicting ac was later identified as the reported BE90.

THE LACC FISO (A) reports that the three FIR positions/frequencies were bandboxed when the BE90 pilot called, whose transmission was weak

and barely readable. The sector was very busy and by the time the FISO (A) managed to call the pilot to establish the flight details, a TC SC had telephoned to inform him that the subject BE90 was at FL 115. The FISO (A) asked if it was all right to descend the Beech below the base of CAS which was agreed; a joining clearance was subsequently issued and the ac was transferred to the appropriate sector.

THE HS25 PILOT reports flying outbound from Farnborough to Switzerland heading 155° at 250 kt and in receipt of an ATC service from LTCC on 133.17 MHz. The visibility was >10 km in VMC and he was squawking 5223 with Mode C. During the climb passing FL 107 shortly before levelling off at FL 110, he received a TCAS TA with

conflicting traffic indicating below him on the display. Two seconds later TCAS annunciated an RA alert "*climb, climb now*", which he complied with, whilst simultaneously ATC issued avoiding action instructions to turn R heading 200° and climb to FL 160. He visually acquired the conflicting traffic in his 11 o'clock range 0-25 NM heading approximately 100° 300 ft below and he assessed the risk of collision as medium.

THE BE90 PILOT reports heading 095° at 175 kt outbound from Bembridge to France and he was in communication with London Information on 124.75 MHz. The visibility was >10 km in VMC and he was squawking 7000 with Mode C; TCAS was not fitted to the ac. Whilst en route to CAMRA with the intention of joining CAS (Airway Y8), he informed London that he would be climbing to FL 115. He did not see any traffic during the climb phase of his flight and was subsequently informed by the UKAB that he had been involved in an incident.

ATSI reports that at the time of the Airprox, the HS25 was receiving an Area Radar Control Service from the TC WILLO SC and the BE90 was receiving a FIS from the FIR FISO at LACC. The FISO described both his workload and the traffic loading as 'high'.

The HS25 established communication with the WILLO SC at 1523, reporting at 3400 ft and routing direct to GWC. The ac was instructed to climb to 5000 ft and issued with a clearance to join CAS on a radar heading of 155°. Subsequently, the flight was cleared to FL 110.

The BE90 took off from Bembridge Airfield and called on the London Information East frequency, 124.6, at 1521:15. Although there are three frequencies notified for the London FIR, i.e. West, East and North, it would seem that it is normal practice to combine North and West on one position, whilst the frequency for 'FIR East' has its own dedicated position. On the day of the Airprox, the Thursday prior to the Easter Weekend, all three frequencies were bandboxed onto one position, with the whole operation being operated by one FISO. Analysis of the RT recordings indicates that the frequencies were busy and on numerous occasions ac calls were neither acknowledged nor replied to. The recordings also indicate that the FISO was engaged in operational telephone conversations

during the period preceding the Airprox. This would probably account for him missing a number of calls. The FISO does not have a radar display nor does he have, as a matter of routine, pre prepared flight progress strips. Writing the details down as pilots provide them is the usual manner in which such strips are produced.

Although the LACC MATS Part 2 makes reference to 'the FIS Assistant', the FISO involved in this Airprox could not recall ever being provided with an assistant since the move of the ACC from West Drayton to Swanwick. It was also explained that, on occasions, it is necessary for the FISO to leave the FIR suite and walk to the Flight Plan Processing Suite (FPPS), which is located in a different part of the Operations Room, in order to obtain certain information, e.g. weather reports.

The initial transmission from the BE90 was broken and slightly distorted, however, the FISO eventually established that the ac had taken off from Bembridge at 1515, and its destination was Le Bourget. The FISO confirmed the provision of a FIS and passed the RPS. At 1523:20, an ATR72 called the FISO requesting a clearance to join Dutch airspace at NEPTUNE. Once the FISO had obtained the relevant information from the ATR72 crew, he set about obtaining the joining clearance from Amsterdam ACC, which kept him occupied for several minutes.

Whilst the FISO was busy obtaining the ATR's joining clearance, two calls were made by different ac on the FIR frequencies, neither of which was answered. One of these was from the BE90 pilot stating: "*we climb flight level nine five to join the Airway Yankee Eight*". The BE90 pilot called again and asked: "*London from BE90 c/s how do you read?*" but did not receive a reply, instead the FISO passed the clearance to the ATR72. At 1526:10, the FISO called the BE90 and asked whether the crew were requesting an airways joining clearance. They confirmed they were, and added that they wished to join Airway Y8 at CAMRA. The FISO then asked for the ac's ETA for that position, together with their present position and altitude, to which the reply was "*passing flight level seven zero*" (1526:40), however, the FISO later stated that he believed the pilot had said "*flight level seven zero*" and interpreted this reply as indicating that the ac was maintaining FL 70. Accordingly, the BE90 pilot was not instructed to remain outside CAS.

Although the LACC MATS Part 2 states, on page FIS-5, para 2.5: *'When first contact with the FISO is established by an ac within 10 minutes flying time from controlled or advisory airspace which it wishes to enter, the FISO is to advise the aircraft to remain clear of that airspace'*, this was not done. At FL 70, on a direct track Bembridge – CAMRA, an ac would be below CAS as the base is FL 75. (Note: The UK AIP shows that Airway Y8 follows the route SAM – GWC – CAMRA – WAFFU – GURLU. However, between GURLU and WAFFU the airway is westbound only.) The FISO asked the crew to confirm they were en route to CMB (Cambrai) and they reiterated the position they were heading for was CAMRA. This exchange took approximately 1 minute.

Analysis of the radar recording shows the BE90 to have been approximately 8 NM S of GWC at that stage, tracking 075°. The HS25 was passing FL 63, 15 NM N of the Beech and converging with it.

At 1529:30, the STCA at TC activated and 3 seconds later the TC WILLO SC transmitted: *"HS25 c/s avoiding action turn right immediately heading two zero zero unknown traffic indicating flight level one hundred twelve o'clock three miles."* The HS25 pilot acknowledged this and reported the traffic in sight. Separation reduced to a minimum at 1530:02, whilst the HS25 was in a R turn and passing FL 108, (now in the climb to FL 160), with the BE90 1.5 NM SE and 400 ft below it. Subsequently, in his written report, the HS25 pilot reported that he had complied with a TCAS RA climb instruction. Although it is unfortunate that the TC WILLO SC had not noticed the infringement earlier, it is accepted that he was occupied with other tasks and had no particular reason to expect an infringement.

At 1531:30, unaware that an incident had occurred, the FISO called the BE90 and again asked for confirmation that a joining clearance at CAMRA was required and requested an estimate for that position. The pilot confirmed this and stated that they were 3 minutes from CAMRA. The FISO then asked the Beech pilot to confirm she was still at FL 70 to which the reply was: *"We are at flight level one one five BE90 c/s"*.

The relevant recordings indicate that the FISO telephoned the TC SE Co-ordinator's position at 1533, and informed him that S or SW of Goodwood was an ac at FL 115 working the FIR.

The FISO asked whether he could instruct the BE90 to descend to below FL 75 in order to take it outside of CAS, which was approved by the Co-ordinator who further advised that the ac had been involved in an Airprox. The FISO instructed the BE90 to *"descend immediately please, descend immediately to below flight level seven five"*, but no reason was given. The ac was subsequently allocated a squawk, told to remain below FL 75 and was then told to route to HARDY and request a joining clearance from London CONTROL on frequency 135.32 MHz.

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 concerned that the LACC FIR FISO had been operating all three FIR frequencies bandboxed and had been too busy to acknowledge or reply to ac calling for a service. Of even greater concern was the possibility that the FISO could leave his operating position to obtain information from another area within the Operations Room with ac on frequency under a FIS. The chance that an ac could suffer an in-flight emergency and not receive a response to an emergency call from the FISO left members wondering on the adequacy of the way in which the service was being provided (see Airprox 30/02). It was possible that the FISO was operating alone owing to staff shortages but the Board were clear that the FISO ought to provide the service 'as advertised' or close the position and issue a NOTAM to that effect - 'half measures' with respect to Flight Safety were not acceptable. In this case the busy FISO had not replied to the BE90 pilot's call that he was climbing to FL 95 to join CAS nor his subsequent call for a radio check. Later, when requesting the BE90 crew's intentions with respect to joining CAS, the FISO had not assimilated the information nor told the crew to remain outside CAS. These omissions had contributed to the incident. However, it was clear that the main cause was the unauthorised penetration of CAS by the BE90 pilot. For whatever reason, he had stated his intention on

frequency to climb whilst en-route to his airway joining point and entered CAS without receiving a positive ATC joining clearance.

The TC SC had been alerted to the situation by STCA as the BE90 flew into conflict - the Beech 90's 7000 label would have been filtered out until within STCA parameters. The SC had reacted quickly to the alert and, commendably, had given avoiding action and TI to the HS25 crew. Although the BE90 crew were unaware of the Airprox, the HS25 crew had received a TA alert on the Beech followed by an RA "climb", which they complied with, simultaneously receiving ATC instructions to turn R and climb; they saw the BE90 passing clear below on their LHS. The

combined prompt actions by both the HS25 crew and the TC SC persuaded the Board that any risk of collision had been removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Unauthorised penetration of Class A airspace by the BE90 pilot.

Degree of Risk: C

Contributory Factor: The LACC FISO did not say "remain clear of CAS" and did not assimilate the BE90 crew's stated intentions.

AIRPROX REPORT NO 30/02

Date/Time: 1 Apr 1611

Position: 5159 N 0004 E (BKY VOR)

Airspace: TMA (Class: A)

Reporter: LTCC Stansted INT DIR

First Aircraft Second Aircraft

Type: A320 PA34

Operator: CAT Civ Trg

Alt/FL: ↓ 4000 ft FL 70

(QNH 1012 mb)

Weather VMC HZ IMC NK

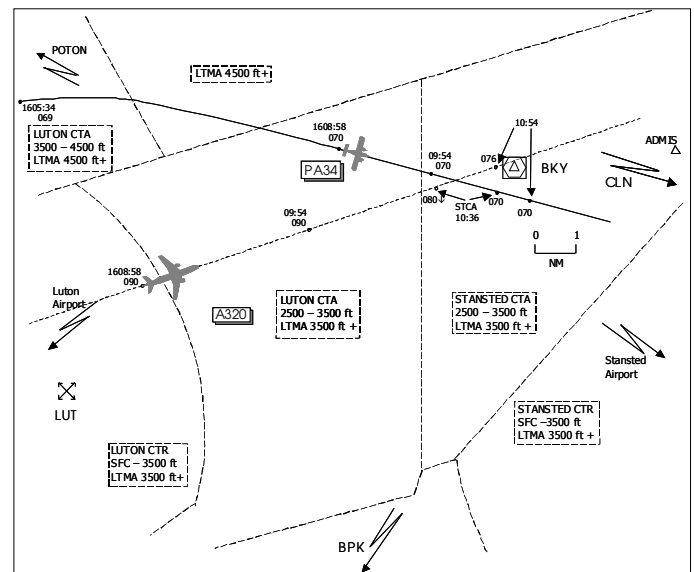
Visibility: 10 km NK

Reported Separation:

400 ft V 1.4 NM H not seen

Recorded Separation:

600 ft V 1.1 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

LTCC STANSTED INT DIR reports that the A320 was being vectored downwind for RW 23 at Stansted descending to 4000 ft QNH. As the Airbus was passing FL 76, a 7000 squawk, which he previously believed was not displaying Mode C, then showed at FL 70 which compromised lateral separation. He initially told the A320 pilot to stop his descent immediately and the pilot reported visual with a light twin engined ac at approx FL 70. He next issued climb instructions to FL 80 but

the A320 pilot reported that he was well clear of the traffic. As the speed differential had by now virtually restored lateral separation, he descended the A320 to 4000 ft and informed the crew that reporting action on the conflicting ac would be taken. STCA had triggered late into the incident, possibly owing to the lack of Mode C responses earlier from the PA34. He thought that had the 7000 squawk not carried Mode C and had he not

taken action, there would have been a definite risk of collision.

THE A320 PILOT reports heading 050° at 220 kt and FL 90 inbound to Stansted and in receipt of an ATC service from London on 120.62 MHz. After passing Luton and commencing descent to a cleared altitude of 4000 ft QNH 1012 mb, he was transferred to Essex Radar, he thought. However, before the controller finished his transmission, he was instructed to stop descent and level off owing to pop-up traffic in his 2 o'clock squawking 7000 indicating FL 70. He was already visual with the traffic and told the controller that their flight paths were diverging; ATC then asked him to climb to FL 80 and to identify the traffic. He recognised the ac type as a Seneca and, after confirming that he was still visual with the PA34 and diverging, he was allowed to continue his descent for landing. The visibility was good and the high level haze layer in conjunction with the sun being to his rear had aided the visual acquisition of the other ac. He had seen this conflicting crossing traffic earlier on TCAS indicating 2000 ft below before he had commenced his descent from FL 90 and saw it visually soon after. This initially appeared to be a co-ordinated descent to allow him to pass behind the other ac on a 60 crossing-angle track. It soon became evident that perhaps this was not the case, presumably owing to the PA34's slower speed, so he reduced his RoD. As he was about to query this traffic with ATC he received a TCAS TA, although the Seneca was by now in his 2 o'clock, simultaneously with the ATCO stopping his handover transmission to request him to level off. At no point was full avoiding action taken other than reducing the RoD/levelling-off as he had been visual with the PA34 throughout which was seen to be diverging. The cockpit workload had been relatively high owing to a non-standard arrival routeing into the TMA. Also, both crew members had stated that the initial visual contact with the other ac fitted the 'mental model' of a distant B737 (white ac) whereas it was in fact a light twin engined ac much closer. He assessed the risk of collision as medium.

THE PA34 PILOT reports flying outbound from Leicester to Holland on an dual instructional IFR training flight squawking 7000 with Mode C. The ac was coloured white, nav anti-collision and strobe lights were all switched on and he was receiving an ATC service from Luton, he thought.

In the vicinity of BKY whilst enroute at FL 70 at 130 kt in IMC, he was informed by ATC that he had entered CAS without clearance and that an Airprox report would be filed. He had received complaints from ATC about the ac's radios which had caused a considerable increase of cockpit workload. Whilst he had tried to solve the radio problems, the student allowed the ac to drift near to the airway. When he noticed this situation he initiated corrective action but ATC had then advised that they would be taking reporting action. He was unable to assess the Airprox encounter as he had not seen any conflicting ac at the time.

ATSI reports that the PA34 had departed Leicester Airport for Lelystad, in the Netherlands on the return leg of a training flight. The pilot had submitted an IFR flight plan at Leicester Airport before departure and this was faxed to Manchester Airport, the parent ATSU for Leicester. The flight plan was then transmitted to the IFPS Unit at Brussels from where it would have been distributed to relevant ATSUs on the route. The flight plan routeing filed was: Leicester Airport – BEDFO - POTON – Airway B317 - CLN - REDFA - SPY - PAM - LLS – Lelystad. A cruising level of FL 70 had been requested, but a CAS joining point was not stated. The lower limit of B317 between POTON and CLN is FL 75 with a minimum cruising level for flight planning purposes of FL 90 (UK AIP ref: ENR 3-1-1-18). The absolute base of CAS of the LTMA on this route varies from the surface (within the Stansted CTR) to 5500 ft (UK AIP ref: ENR 2-1-8/9). Between CLN and REDFA the minimum cruising level is FL 70 for the first 11 NM and FL 90 thereafter.

The PA34 departed from Leicester at 1540. Though unknown to the pilot, Leicester personnel then notified Manchester ATSU of the airborne time for onward transmission. A little over five minutes later, the pilot attempted to establish communications with Coventry APR to 'activate' his flight plan. The Coventry controller had no prior knowledge of the flight and it is not known why the pilot chose to call this ATSU. The initial transmissions from the flight were broken, with a heavy background noise, however, when satisfactory two-way communications were established, the pilot advised his point of origin and destination but made no reference to the ac's route or an intention/request to join CAS. The Coventry APR reports that he assumed the flight

was VFR and 'as a matter of courtesy' agreed to arrange for a 'Departure' signal to be sent. The flight was provided with a FIS and at 1557, the pilot reported reaching FL 70. The radar recording at this time shows the ac wearing the SSR conspicuity code 7000 with Mode C height readout of FL 70 (unverified). It is tracking SE towards BEDFO and beneath Airway B4, whose base in this area is FL 105. It is possible that the PA34 pilot believed that Coventry had a greater knowledge of his flight plan than was in fact the case. This is revealed in a transmission from the pilot who, in response to a request to call before leaving the frequency, stated *"Roger the frequency of London Control er can you pass that one on"*. In hindsight this may have been a request by the pilot for the relevant 'London Control' frequency. Coventry would not have had that information and at 1558 the flight was advised to *"free call London..124.6 for a FIS"*.

Just under a minute later, the pilot of the PA34 attempted to establish communications on 124.6 MHz, the London FIR frequency. This was one of the three London FIS frequencies being operated in banded mode by the FISO (A) at LACC who was assessed by the Unit as being very busy at the time. The pilot prefixed the message with 'London Control' suggesting he may have believed he was addressing an ATC sector. The FISO(A), however, correctly identified herself as London Information, but the flight's transmissions were, once again, broken and unreadable, the FISO(A) suggesting to the pilot that he called again *'in a minute or so'*. Several further attempts were made over the course of the next few minutes, during which time, it can be seen from the radar replay, the ac entered the LTMA in the vicinity of POTON at FL 70, then turned ESE towards CLN. It was not until 1609 that the FISO(A) determined that the flight was en route IFR at FL 70. The flight's position and route were requested and the pilot responded with *"forty four miles towards Clacton er radial 287"*. This report placed the ac within the LTMA just to the W of BKY and while the implication of this was not picked up by the FISO(A), she did, however, seek and obtain confirmation from the pilot that he was remaining outside CAS and whether he wished to join CAS at CLN.

UKAB Note: The LACC FISO(A) RT transcript at 1609:45 reveals the PA34 pilot's response as

"We're outside controlled airspace and we wish to join at Clacton".

Again he was instructed to remain outside CAS, given a time check (1610) and asked for an estimate for CLN. The ETA provided was 1625 and once more the pilot was reminded to remain outside CAS which was readback. The FISO(A) reports that she then initiated the process that would provide the flight with a CAS joining clearance.

The A320 was inbound to Stansted from Lanzarote on an IFR flight plan. At 1608 the flight established communications with the LTCC Stansted Intermediate Director (DIR), reporting on course to BKY (from the W), descending to FL 90. One minute later, at 1609, the DIR instructed the flight to continue on its present heading to position it RH D/W for RW 23 at Stansted. The radar recording of the DIR's display for this time shows the PA34 in the A320's 11 o'clock position at a range of 6 NM on a slowly crossing track. The PA34 is still indicating at FL 70, Mode C height readout, while the A320 has now reached FL 90. Just under a minute later (1609:54), the PA34 had moved into the A320's 12 o'clock position at a range of 3 NM. Not recognising the unknown traffic as a threat, the DIR then instructed the A320 to descend to altitude 4000 ft. Moments later, having initiated the A320's transfer to the Stansted Final controller (FIN), the DIR instructed the flight to remain on his frequency and to stop its descent. The pilot complied and immediately reported visual with *"a twin"*. Responding, the controller stated that there was unknown traffic *"squawking 7000"* which had inadvertently entered CAS. He then instructed the flight to maintain its present level. STCA triggered, but by now the unknown traffic had passed into the A320's 1 o'clock position at a range of 1.5 NM (1610:36). Minimum separation was reached moments later (1610:54) when the A320, having stopped its descent at FL 76, passed 1.1 NM astern of the PA34 still indicating FL 70. The DIR instructed the A320 to climb to FL 80 but the pilot declared *"we are well clear er happy to continue"*. The tracks of the two ac continued to diverge and the A320 subsequently continued its approach and landing without incident. It was not until about five minutes later that the PA34 was identified as the 'unknown' traffic. It was then transferred by the FISO(A) to the FIN controller

and a clearance to continue within CAS was negotiated.

In his written report, the DIR implies that while he may have been aware of traffic in the vicinity with the conspicuity code 7000, he did not believe it had been displaying Mode C height readout prior to the encounter. The radar recording of the DIR's display, however, does not support this account, as it clearly shows the ac's Mode C height readout throughout. It is disappointing that the presence of this ac was not detected earlier, especially in view of its relative position when the A320 was issued the descent clearance. That said, the controller would have been occupied with his routine operational tasks and, in the absence of any prior warning, would not have been expecting unknown traffic to be within CAS at FL 70. The majority of ac squawking 7000 would have been operating legitimately below the base of CAS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members agreed that this incident had been caused by an unauthorised penetration of CAS by the captain of the PA34. However, it was surprising as he was instructing on a dual IFR training flight and had been unaware of his transit within CAS until very late. It appeared that he had noted the airways route structure towards his CLN joining point but had not recognised the LTMA airspace coincident beneath. Also, he may have been under the mistaken impression that he was working a London Sector and not the LACC FISO although the FISO had correctly replied to his wrongly addressed transmission. Moreover, members thought that the FISO should have assimilated that the PA34 pilot's position report (CLN radial and DME) placed it squarely within CAS even though the pilot had stated that he was outside CAS; this had contributed to the incident. This Airprox had occurred when the LACC FISO was very busy operating 3 positions banded on a Bank Holiday, possibly owing to staff shortages. What concerned the Board was the

broken level of service provided by the very busy FISO - this had been the second infringement of CAS by an ac working the LACC FISO in similar circumstances (see Airprox 29/02). Members agreed that NATS should be asked to carry out a review of the efficacy of the London FIS as currently provided.

Also noteworthy, the Stansted INT DIR had issued descent instructions to the A320 pilot when the PA34 was crossing just 3 NM ahead. For whatever reason, the INT DIR had not noticed the PA34's Mode C readout at FL 70 which placed it within the LTMA and in conflict. Admittedly this had been an unexpected situation, but nevertheless the ac had been showing a Mode C response continuously on his display during the period immediately prior to the Airprox. This late recognition by the INT DIR had also contributed to the incident.

The INT DIR had eventually stopped the A320's descent after noticing the PA34's presence with STCA apparently activating after the PA34 had crossed and was diverging. Although the PA34 had not seen the Airbus, the A320 crew had recognised earlier, with the benefit of TCAS, the potential conflict prior to commencing descent. The Airbus crew were commended on their comprehensive report. This had highlighted their initial perception of an ATC co-ordinated descent which they assumed was against a distant B737, but realisation came during the fluid situation, that they were avoiding the smaller/slower and closer PA34 nearby. By monitoring the situation closely and reducing their RoD, the A320 crew had ensured adequate vertical clearance from the conflicting traffic with a TA alert being received simultaneously with the controller's 'stop descent' instruction. This proactive action by the A320 crew combined with the INT DIR's 'levelling off' instructions led the Board to conclude that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

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

Degree of Risk: C

Contributory Factors:

- The LTCC Stansted INT DIR did not notice the PA34's Mode C until late.
- The LACC FISO did not assimilate the PA34 crew's stated position, which placed the PA34 in CAS.

Recommendation: The UKAB recommends that the CAA asks NATS to review the efficacy of the London FIS as currently provided.

AIRPROX REPORT NO 31/02

Date/Time: 04 Apr 1139

Position: 5133 N 0202 W (2½ NM NW of Lyneham - elev 513 ft)

Airspace: Lyneham CTR/FIR (*Class:* D/G)

Reporting Aircraft **Reported Aircraft**

Type:	C130 Mk 4	Beech 23
Operator:	HQ STC	Civ Pte
Alt/FL:	1000 ft (QFE 991 mb)	1600 ft (RPS 1008 mb)

Weather	VMC HAZE	VMC HAZE
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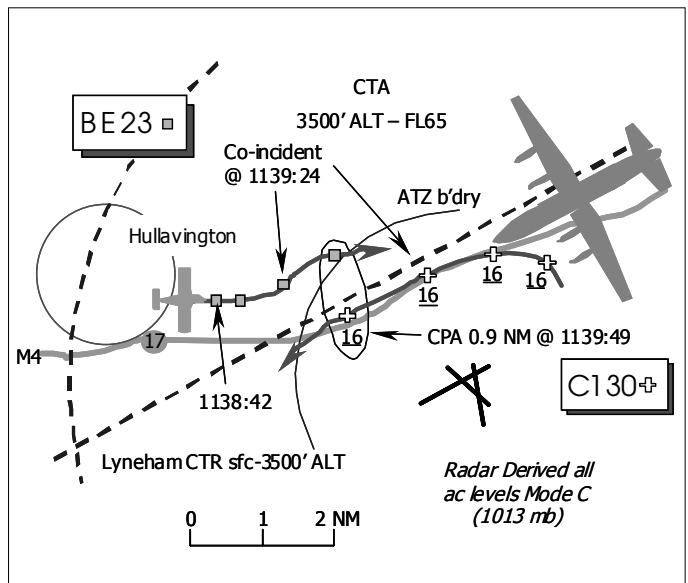
Visibility:	6 km	7-8 NM
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Reported Separation:

2 NM H 200 ft V	0.5-0.75 NM
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Recorded Separation:

0.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C130 MK 4 PILOT reports his ac has a grey camouflage scheme but the landing lights, taxi lamps and HISLs were all on whilst flying in the visual Cct to RW06 at Lyneham, in communication with TOWER on UHF. A squawk of A4504 was selected with Mode C; TCAS is fitted.

Passing about 1.5 NM N of the aerodrome, heading 240° downwind in the LHD Cct at 150 kt, he reports a TCAS Traffic Advisory was enunciated on traffic at 2 o'clock about 5 NM away descending from 300 to 200 ft above his ac on a reciprocal heading. He reported this to TOWER and believed that the other ac had descended below its "cleared" height. The other ac was acquired visually as it passed safely down his starboard side 2 NM away - he thought - and 200 ft above his ac. No avoiding action was required against the other ac and he assessed the risk as "low provided it did not turn or descend further".

THE BEECHCRAFT BE23 PILOT reports his ac has an overall white colour scheme with green stripes; the anti-collision beacon was on. He was flying VFR from Haverfordwest to White Waltham at 1600 ft RPS in accordance with his filed FPL, at 110 kt. SSR with Mode C is fitted and was selected on.

Flying in VMC – with an in-flight visibility of 7-8 NM in haze - he flew eastbound 'on-track' from the Old Severn Bridge in communication with Cardiff and Filton before calling Lyneham ATC. He was "asked" by ATC to change course onto N and climb to 2000 ft (991 mb) to avoid another ac, which he then spotted on a reciprocal course off to starboard in the Lyneham Cct after he had been advised of it by ATC. He assessed that the risk of a collision was "none".

Before being released by Lyneham he was advised that an Airprox report might be filed and

was asked to telephone Lyneham ATC when he landed at White Waltham, which he did.

UKAB Note (1): Though the BE23 pilot reports that his SSR was on, neither a Mode A nor Mode C response is evident on the radar recording, which reveals a primary contact only, suggesting SSR was either switched off, unserviceable or possibly not detected by the Clee Hill SSR during the period of the Airprox. From the ZONE RT transcript it is evident that no response was shown on the Lyneham Watchman SRE either. Further enquiries with the BE23 pilot ascertained that an SSR equipment fault in the ac was detected after the Airprox; not all contacts at the rear of the SSR equipment tray were making a sound connection in the unit, which required rectification. This may have resulted in an intermittently functioning SSR that went undetected by the Clee Hill radar and may explain in part the TCAS Traffic Advisory from the BE23 at short range when no SSR return was readily apparent.

MIL ATC OPS reports with RT transcript that the BE23 pilot freecalled Lyneham ZONE at 1132:09, 4.5 NM SW of Badminton, flying at 2600 ft COTSWOLD RPS (1006 mb), advising that he was routeing from Haverford West to White Waltham. ZONE queried the ATS required at 1132:32, to which the BE23 pilot responded *"..just a flight service if that's acceptable.."*, whence he was instructed to squawk A4530 and the flight placed under a FIS. [UKAB Note (2): A4530 is specified as an unvalidated and unverified code, assigned by Lyneham ATC to traffic for conspicuity under a FIS]. A Lynx helicopter crew then freecalled ZONE, 20 NM SE of Lyneham, requesting penetration of the CTR through the overhead, heading NW. The Lynx was identified and the crew instructed to fly at 1500 ft QFE. ZONE then obtained approval for a VFR CTR crossing clearance that was transmitted to the Lynx crew and read back verbatim. ZONE then passed information about the Lynx CTR transit to TOWER. At 1135:59, ZONE requested the BE23 pilot to recycle his squawk, whereupon the pilot reported that *"I think I have a bit of a problem with the transponder, I think other people have had difficulty picking it up"*. It then became apparent that the BE23's squawk was not being received. At 1136:40, ZONE transmitted to the BE23 pilot *"..**suggest** that you fly at...2000 feet Lyneham QFE 991 remain north of the M4 are you*

visual with the M4", to which the pilot responded *"yes and remaining N of the M4"*. Then at 1137:14, ZONE instructed the BE23 pilot to report passing the M4 Junction 17 – a VRP – which was acknowledged. Thereafter, at 1137:38, ZONE called APP and requested approval for the VFR CTR transit of the BE23, *"2 miles north of the M4, believed to be the one just about overhead Hullavington..I'll identify it to you when it passes junction 15"*, which was agreed. Shortly afterwards at 1138:06, ZONE called TOWER and advised *"zone transit for you East – sorry - West to East along 2 miles north of the M4 at 2000 feet believed to be the non-squawker, overhead Hullavington"*. To which TOWER replied *"2000 feet approved one in"*. After passing Cct joining instructions for RW06 to the C130 crew, TOWER advised them of the Lynx transit through the overhead - SE to NW - at 1500 ft QFE. The BE23 then reported passing the M4 junction 17, 4.5 NM WNW of the aerodrome at 1138:38, whereupon ZONE issued the BE23 pilot his CTR crossing clearance *"Roger...and your VFR zone transit Lyneham controlled air space approved at 2000 feet Lyneham QFE 991"* – the pilot responded at 1138:56, **"copy that"**, but ZONE did not press for a full readback of the CTR crossing clearance. Moments later at 1139:03, ZONE passed traffic information to the BE23 pilot on the subject C130 in the visual Cct – *"you may see traffic east 3 miles westbound C130 at 1000 ft"*. When the BE23 pilot responded he advised ZONE he was *"currently at 1500 feet 1006"*. Seven sec later ZONE requested the pilot to *"confirm your altitude"*, who reaffirmed *"1500 feet..1006"*. ZONE immediately passed avoiding action to the BE23 pilot at 1139:26, *"..avoiding action turn left heading..north traffic in the visual circuit east of you by 2 miles at similar level"*. The BE23 pilot immediately reported *"roger traffic..we're turning north now"*, adding 15 sec later that he *"has the traffic visual"* at 1139:52. Whereupon ZONE reiterated that the CTR crossing clearance was at 2000 ft QFE (991 mb).

Moments later at 1139:57, the C130 crew – downwind to roll in the visual Cct - queried TOWER, *"what's the traffic 200 ft above us?"*. TOWER thought the crew were referring to the Lynx and replied initially *"it's 500 feet and it's SE of us [the aerodrome] by 4 miles"*. The C130 crew retorted *"we're visual with it you reported traffic West to East"*. TOWER replied erroneously *"I briefed traffic East to West at 2000 feet VFR, 5*

miles north", and the crew replied *"OK it doesn't matter"*. Following this discussion, TOWER called ZONE and queried the BE23 CTR transit details. TOWER believed the transit had been requested from E - W.

The BE23 required a transit through the CTR toward White Waltham and requested a *"Flight Service"*. For flight within a Class D CTR, it is implicit that pilots receive an ATC Service. A pilot requesting a FIS should be given a VFR ATC crossing clearance and as the ac approaches Class D, the pilot instructed to remain VMC whilst transiting the CTR. JSP318A also states *"wherever possible, level restrictions should be based on an instruction to fly not above a particular level rather than at a specified level."* ZONE gave an ambiguous instruction when *"suggesting"* a height for the BE23 pilot to fly, instead of instructing the pilot to, for example, *"set Lyneham QFE 991 fly at 2000 ft"*. Here, ZONE could have shown more flexibility if he had instructed the BE23 pilot to fly not below 2000 ft, which would have allowed the pilot to fly at the height he wanted to maintain VMC, without affecting Cct or other VFR transit traffic. The actual height of the BE23 was not confirmed until the potential confliction with Cct traffic had been detected. Although the BE23 pilot's assigned height – 2000 ft QFE - was below the minimum Radar Vector Chart height and the flight not properly identified, ZONE quickly realised that the 2 ac were in close vertical proximity and reacted swiftly, with avoiding action. Whilst ZONE should have obtained an accurate readback from the BE23 pilot and his initial instructions were ambiguous, he later recovered the situation by acting quickly. However, issuing vectors to ac below the RVC heights are, in themselves, inherently dangerous.

ZONE had advised TOWER of 2 VFR CTR transits, both of which were approved and the C130 was the only ac in the Cct. However, TOWER only transmitted information about the Lynx CTR transit from SE to NW. TOWER said he omitted information on the BE23 because he understood the ac should have been at 2000 ft QFE and was, *"therefore never a factor"*. In Class D CAS, separation under VFR is the responsibility of the pilot, but *"controllers are to provide VFR pilots with sufficient information about other aircraft in Class D airspace to enable them to achieve their own separation."* Moreover, JSP318A, 310.110.1

states that *"information and instructions will be given to pilots...to achieve a safe, orderly and expeditious flow of traffic and to assist pilots in preventing collision between...aircraft flying within the circuit area"*. TOWER had been provided with the information on the BE23 but did not pass it to the C130 crew, who were apparently unaware of the BE23 until the ac was detected flying above them.

On this occasion ATC did not provide clear and concise information for the safe transit of the BE23 through the Cct area. Appropriate action has been taken.

UKAB Note (3): Following a request for clarification, the BE23 pilot provided the following observations accompanied by a chart depicting his planned route. He states that he was instructed by ZONE to report abeam Junction 17 of the M4 and continue, remaining north of the M4 at all times, which he complied with. This information was understood to be the Lyneham CTR transit clearance and allowed him to maintain a direct track to White Waltham that he monitored with his GPS and SKYFORCE LOCATOR mounted on the control column yoke. If a subsequent transit instruction was given to fly at 2000 ft, then it was not received or understood and, he believed, not acknowledged. When ZONE instructed him to turn onto a northerly heading and climb to 2000 ft QFE (991 mb), he requested clarification of the new altimeter setting whilst effecting the climb. This was the first occasion when he understood that a height change to that previously flown was required, as the Controller had *"suggested"* that he fly at 2000 ft (991 mb). He stressed that he did not intentionally contravene the Controller's instructions.

[UKAB Note (4): Analysis of the LATCC (Mil) radar recording at 1138:42, shows the C130 turning downwind in the visual Cct, squawking A4504, 2 NM NE of the aerodrome indicating 1600 ft Mode C (1013 mb) – which would equate to about 940 ft QFE (991 mb). This was moments after the BE23 pilot reported passing Junction 17, and where the non-squawking BE23 is shown outside the CTR boundary eastbound, 0.5 NM N of the M4. At 1139:26 – when ZONE issued avoiding action instructions – the BE23 is shown 2 NM W of the C130. The BE23 then turned L northeasterly; at 1139:49, the CPA is shown at 0.9 NM as the C130 maintained its course

downwind level at 1600 ft Mode C (1013 mb) inside the ATZ/CTR with the BE23 in Class G airspace approaching the ATZ boundary. An altitude of 1500 ft RPS (1006 mb) equates to a height of about 1050 ft QFE (991 mb).]

HQ STC comments that this Airprox serves to remind us of certain basic principles, which if overlooked can lead to unsafe situations. Firstly the necessity to get a positive readback of instructions. Secondly, the need to make a positive check, rather than relying on an assumption. A final point is that it once again highlights the potential dangers of mixing traffic flying on QFE and RPS.

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 believed that there were several lessons to be learned from this complex encounter at the boundary of the Lyneham CTR – for controllers and pilots alike. To accomplish his VFR transit of the Class D Lyneham CTR, the BE23 pilot had firstly to obtain a VFR CAS crossing clearance from the controlling authority. Once obtained it was then axiomatic that the CTR crossing clearance from ZONE had to be complied with – but here events did not unfold in such a clear-cut manner. ZONE had transmitted *"..suggest that you fly at...2000 feet Lyneham QFE 991"* in the first instance to indicate the controller's planned transit height for the BE23 through the CTR. The use of the word *"..suggest.."* by the controller attracted much criticism from the Board, who agreed with the Mil ATC Ops report that this was an ambiguous statement rather than a concise instruction and the use of conditional phrases should be avoided whenever possible in the interests of clarity. Nonetheless, to a civilian ATC member familiar with operations in Class D CAS it was not viewed as intrinsically wrong. At that stage, he considered that ZONE was indicating to the BE23 pilot the likely transit height which would be assigned, whilst the BE23 was still in Class G airspace and, notwithstanding the requirements

of JSP318A, was telling the pilot to fly at that height in preparation for entry into the CTR at 2000 ft on the applicable altimeter datum – the Lyneham QFE. This was slightly at variance with the promulgated phraseology in JSP318A, aimed at enabling pilots to maintain VMC whilst conforming with their ATC instructions; controllers should stipulate assigned heights as "not above". It was understood, however, that ZONE had specified a height to fly with the best of intentions and this should have enabled the BE23 pilot to achieve a height of 2000 ft in good time before the CTR boundary. Indeed it was evident that ZONE was attempting to 'separate' the VFR BE23 above both the VFR Lynx at 1500 ft and the VFR C130, flying within the Cct at 1000 ft QFE. This was arguably outside his remit in the application of the ATC service to VFR flights, whereby traffic information is provided to enable pilots flying under VFR to sight, and maintain their own separation from, other notified VFR and IFR traffic within the CTR. This controller had gone one step further and elected to separate VFR traffic within the CTR using 500 ft vertical separation, which, whilst laudable, once again engendered much debate amongst members. Military controller members felt that this was the simplest approach when dealing with a mix of GA and military pilots; if a pilot cannot maintain VMC at the assigned height he should immediately tell the controller. Following a previous recommendation in Airprox 67/02, allied to the application of ATSS in Class D CAS by civilian ATSSUs, the Mil ATC Ops advisor briefed colleagues that HQ STC intended to review the application of ATSS by military units in their CAS, once the outcome of the recommendation on Airprox 67/02, was known. The Board felt that the application of an ATSS in Class D by military or ATSSUs civilian should be identical, but apparently it was not and, therefore, awaited the outcome of these reviews with interest.

It was evident that the BE23 pilot had neither set the QFE, nor climbed to a height of 2000 ft following ZONE's 'suggestion', probably as a result of this imprecise phraseology. After internal co-ordination within Lyneham ATC, ZONE transmitted the BE23 pilot's VFR CTR crossing clearance appropriately about 1 NM before the CTR boundary – as he was required to do - and in accord with his plan. However, on this occasion the CTR crossing clearance phraseology used by ZONE to the BE23 pilot was not ambiguous *"your*

VFR zone transit Lyneham controlled air space approved at 2000 feet Lyneham QFE 991". This clear instruction required the pilot to fly at that height and he had responded immediately with "copy that". Thus the BE23 pilot had acknowledged receipt of the crossing clearance at 2000 ft – albeit loosely - and apparently at variance with his recollection. It was not until ZONE passed traffic information on the C130 to the BE23 pilot (in conformity with the ATC service) that it became evident that the BE23 was still flying at 1500 ft RPS and separated by only 50 ft from the Cct height, rather than the planned 1000 ft. In one GA pilot member's view the BE23 pilot had done nothing wrong by not flying at his assigned height before he entered the CTR; strictly speaking this Airprox had occurred as the BE23 approached the boundary. This was, however, a solitary view. Other members opined that the BE23 pilot had every intention of entering the CTR and it was the prompt and effective avoiding action issued by ZONE that placed the BE23 outside the CTR during the encounter. Thus it was agreed that non compliance with Zone's instruction was part of the cause of this Airprox. However, ZONE should have ensured that the BE23 pilot had understood his clearance by requesting a full readback of the CTR crossing clearance, which had not happened, leaving both the pilot and ATC mutually responsible for the omission, which was the second part of the cause - the Lyneham ZONE controller did not challenge the BE23 pilot's readback. The lessons here for controllers were salutary – use clear concise RT and never assume that a pilot has understood a CAS clearance unless a full and accurate readback has been obtained. Pilots should also heed the lesson here of ensuring that they comply with the requirement to give an accurate and complete readback. As an aside it was observed that the ASR does not theoretically exist beneath CTAs or within CTRs, hence the RPS is not valid for use in this airspace and indeed the UK AIP at ENR 1-7-1, amplifies this point by recommending that pilots use the A/D QNH to avoid inadvertent incursions.

Within the aerodrome Cct, the C130 crew was oblivious to the presence of the BE23 as TOWER had not passed traffic information – for whatever reason. One member thought that as both flights were being accorded separation (though the BE23 pilot had not been advised that is was only

500 ft if the Lynx was taken into account) then traffic information was not essential. The overwhelming majority took the fail safe view that, regardless, traffic information should have been proffered at the outset. This was the primary means of ensuring that pilots of ac flying under VFR were aware of each other and the omission, though not a direct cause of the outcome, contributed towards it significantly. In the end it was left to TCAS to warn the C130 crew about the BE23. The reported TA in light of the apparent unserviceability of the BE23's transponder was perplexing; advice from a Qinetiq TCAS expert obtained after the meeting suggested that an intermittently functioning transponder seemed to be the most likely answer. TCAS interrogates nearby transponders once per one-second cycle with a "whisper-shout" sequence so there might be several opportunities for the transponder to reply on each cycle. Furthermore, TCAS does not require a response on every cycle in order to track an 'intruder' and for non-Mode S intruders, TCAS works on Mode C interrogations only where the lack of a Mode A return would not be a factor. Thus the TCAS safety net proved its worth yet again, but it was no substitute for a conscientiously applied ATS in the first instance. Although the C130 crew had spotted the BE23 and considered no avoiding action was necessary, they had significantly over-estimated the minimum range of the BE23 as it passed safely to starboard 0.9 NM away, not 2 NM as they had reported. Nevertheless, the Board agreed that with both pilots in sight of each other's ac following the avoiding action turn initiated by ZONE, no risk of a collision had existed in these circumstances.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

- a. The BE23 pilot did not comply with the VFR CTR crossing clearance issued by Lyneham ZONE.
- b. The Lyneham ZONE controller did not challenge the BE23 pilot's readback.

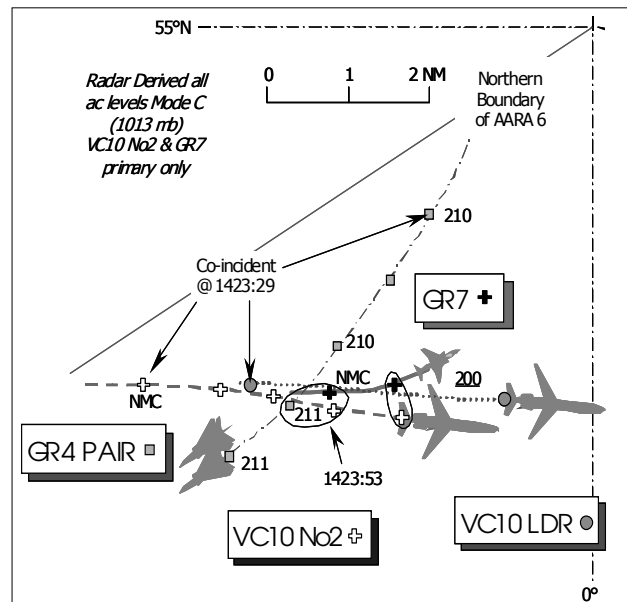
Degree of Risk: C.

Contributory Factor: Lyneham TOWER did not pass traffic information to the C130 crew about the VFR BE23 CTR transit.

AIRPROX REPORT NO 32/02

Date/Time: 4 April 1423
Position: 5456 N 0010 W (AARA 6)
Airspace: AARA6 (Class: G)
Reporting Aircraft Reported Aircraft
Type: VC10 K formation Tornado GR4 pr
Operator: HQ STC HQ STC
Alt/FL: FL 200/FL 205 FL 210

Weather VMC CLOC VMC CLOC
Visibility: 'Excellent' '10 km +'
Reported Separation:
 3-500 ft V 1000 ft V
Recorded Separation:
 <0.5 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VC10 PILOT reports he was leading a formation of two light grey VC10 tankers in 1 NM trail conducting air to air refuelling (AAR). They were operating in a block FL 180 – FL 220 within Air to Air Refuelling Area (AARA) 6 and in receipt of a RIS from LONDON MILITARY and squawking A6101 with Mode C. Two fast jet receivers were in formation with his VC10 – all at FL 200; the rear element – 1 NM in trail - comprised a VC10 tanker - his No2 - with a GR7 Harrier receiver in formation - both at FL 205.

Heading 080° at 360 kt, LONDON MILITARY reported traffic in his 11 o'clock heading S at FL 210. About 30 sec later he spotted a pair of unknown Tornados at about 10 o'clock - 2 NM away from his tanker - on a potential collision course with the rear element of his formation - the No2 VC10 and GR7. With about 10 sec flying time to a potential collision, the unknown Tornados were called to the rear tanker on the discreet AAR frequency, because the LONDON MILITARY ATC frequency was busy. The rear

element were unable to manoeuvre and there was no time for avoiding action before the Tornado pair passed 500 ft directly above the rear VC10 tanker maintaining their southerly heading and about 300 ft above the GR7, whose pilot had just initiated a climb and was in the process of departing the rear tanker. He assessed the risk as "medium to high".

He stressed that this was a large unwieldy formation and the rear element had no time to carry out avoiding action. They were also operating under a high workload with other formation elements joining.

UKAB Note (1): The Harrier GR7 pilot within the second element had nothing further to add to the VC10 formation leader's report.

THE TORNADO GR4 PILOT reports - with a copy of his chart – that he was leading a pair of GR4s in transit to Leeming at FL 210, heading 190° at 430 kt and in receipt of a RIS from

SCOTTISH MILITARY; a squawk of A4651 was selected with Mode C. Approaching a navigational turning point the controller reported traffic "R 1 o'clock - 10 NM, crossing R – L at FL 200". His navigator called 'visual' and informed ATC that they would be turning R onto 230°, which was acknowledged by the controller. At about 1423:00, when steady on the new heading of 230°, he spotted a tanker and shortly afterwards he also saw the trailing ac – a VC10 and GR7 – about 1 NM behind the lead tanker. At this point there was only a short period to assess the relative flight paths and in the belief that his section was separated by 1000 ft above the tanker tow-line traffic, he did not initiate any avoiding action. Visual contact was maintained throughout as his section passed about 1000 ft directly above the GR7. He assessed the risk of a collision as "low".

MIL ATC OPS reports that the GR4 pair was handed to ScATCC (Mil) Controller (SCOT) 5 about 55 NM E of NEWTON POINT heading 190° and two way communication was established with the lead ac at 1418:42. The flight was placed under a RIS at FL 210 in transit southbound for the vicinity of Leeming. About 3 min before the Airprox - SCOT5 started to take another unprenoted handover from LONDON MILITARY Controller 15 on an unrelated track, which became protracted, initially because SCOT5 had difficulty identifying the track being referred to and subsequently because of the complicated nature of this flight's intentions. With this handover finally complete, traffic information was passed to the GR4 pair at 1422:24, "(C/S)traffic right one o'clock 10 miles crossing R to L indicating FL 200" (UKAB Note (2): the lead VC10 was the only ac on the tow-line squawking at this point). The lead GR4 crew replied "visual with that traffic and (C/S) will be looking to come R onto 230°". SCOT5 passed approval for the turn at 14:22:38, "R 230 approved". About 17 sec later the other ac on the unprenoted handover from London MILITARY endeavoured to make contact, however, there was some difficulty in establishing satisfactory 2-way communication. During this period London MILITARY Controller (LON) 10 called to advise SCOT5 that her traffic had just flown through his tanker towlines' operating level block. At 1423:41, LON10 advised "you're going through my tanking block.. I've got a tanker at FL 205 there". SCOT5 replied "Apologies I thought (the top of) the block was

200", whereupon LON10 contended "*..the top of the block's 220*".

AAR is carried out in accordance with Air to Air Refuelling National Instructions (AARNIs), which states that "Air to Air Refuelling Areas (AARAs) have the status of National Airspace Reservations" and as such "other airspace users are co-ordinated to avoid AAR traffic". AARA 6 is notified as permanently available between FL 70 and FL 290 (by NOTAM to FL 350) and when in use ScATCC (Mil) is to be informed. ScATCC (Mil) reports that AARA 6 was correctly notified as active between FL 190 – 220, within both the unit's daily brief and the Support Information & Retrieval System (SIRS) 'Stop Press' information page. However, despite having self-briefed prior to commencing her watch, SCOT5 did not assimilate correctly the information presented to her. Furthermore, an inappropriate displayed range selection of 110 NM, coupled with RT problems, distracted SCOT5 such that she did not realise that the traffic on which she had passed traffic information to the GR4 pair was the busy tanker towline.

This Airprox occurred in Class G airspace whilst both lead crews were receiving a RIS, the rules for which were adhered to. Despite the GR4 crews' awareness that AARA6 was active and that separation was the responsibility of the lead GR4 crew, there was also an onus on SCOT5 to ensure appropriate separation between ac under her 'control' and the tanker towline traffic. AARNIs states that "aircraft engaged in AAR should be afforded priority over other controlled military flights whenever possible". Thus, the lead GR4 crew could reasonably have expected the controller to co-ordinate the activity of AARA6 against their desired track even though they were flying through the published levels.

THE TORNADO GR4 PILOTS' UNIT comments that this incident resulted when the GR4 formation turned onto a track that put them in conflict with the tanker formation.

The GR4 leader had been warned of traffic at FL 200 and assumed this to be, in the absence of any other information, a single ac. As they turned onto the conflicting track, the crews saw the first VC10 immediately and some seconds later the second VC10 and Harrier. The lead pilot believed that 1000 ft separation existed throughout and

did not consider that avoiding action was necessary. However, if the second tanker was flying in a cell, at a minimum of 500 ft above the first tanker, then it is possible that the separation was closer to the 3-500ft quoted by the lead tanker pilot.

It is extremely unlikely that an Airprox would have occurred if the GR4 leader had been warned of the composition and correct level of the tanker combine. In the event, the sighting of the tankers by the lead GR4 crew was sufficiently early to avoid any risk of collision.

UKAB Note (3): The Claxby radar recording illustrates this Airprox, but as neither ac within the rear element was squawking the vertical separation that pertained cannot be ascertained with certainty. The rear element is shown as a single primary contact about 1 NM astern of the VC10 Ldr, eastbound within AARA6. At 1423:29, the Tornado GR4 pair are shown maintaining FL 210 Mode C (1013 mb) and converging on the rear element as reported. The GR4 pair appear to pass close astern of the No2 VC10 and GR7 between radar returns and are shown at 1423:53, about 0.5 NM astern of the rear element just as the GR7 is evident departing the No2 tanker, which was reported to be maintaining FL 205. At this point the GR4 pair indicated FL 211 - about 600 ft above the No2 tanker with the GR7 apparently climbing as it 'hailed-off' the towline.

HQ STC comments that there was a low risk of collision in this incident, because of the 500 ft separation and the GR4 crews gaining visual contact with the rear tanker in sufficient time to take avoiding action if required. However the GR4s did penetrate the AAR reserved airspace under ATC guidance, and did acquire the rear tanker later than desirable. The controller issues are dealt with succinctly by Mil ATC Ops, who highlights a worrying erosion of experience levels in Area Radar units. The late acquisition of the rear tanker may be partly due to the GR4 crews assuming that they had received full traffic information from the Controller and thus reducing their lookout scans. The old adage of 'don't assume - check' is still very relevant, and aircrews must still maintain awareness and lookout when receiving an ATC service. This incident has been given wide publicity within the RAF.

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 adviser explained that SCOT5, was an inexperienced controller who had graduated direct to the Area Radar Training Course from the Joint Air Traffic Control Course. Consequently, she has no terminal experience and had held her Area Radar endorsement for under 3 months at the time of the Airprox. Nonetheless, she had demonstrated a good deal of aptitude and ability for the area radar control task where she had proved herself in high intensity traffic situations. Subsequent to this Airprox appropriate remedial training has been undertaken.

The SUPERVISOR was aware of SCOT5's traffic loading, however, with 2 other consoles manned by trainees screened by their mentors and an ALLOCATOR busy taking 'freecalls', his priorities lay elsewhere. The Mil ATC Ops adviser emphasised that the inappropriate displayed range selection and the RT problems SCOT5 encountered dealing with another ac, all conspired to distract her attention and she did not appreciate that the GR4 pair was closing on a tanker formation conducting AAR in AARA6 – a programmed activity which she had not apparently assimilated from the brief. Discussion moved to what the ScATCC (Mil) controller would have seen; with a displayed range of 110 NM surveying a fairly large expanse of airspace it would have been difficult to determine from a single glance that there were additional primary returns from the formation elements within 1 NM of the lead VC10 tanker, which itself was the only ac squawking at the time. A military controller member explained that the LATCC (Mil) SOP is to change the displayed label in the Code Callsign Distribution System (CCDS) so that instead of the tanker callsign or Mode A code being shown, "ARA6" or "TANKER" would be displayed. This provides an instant reminder on the radar display for the benefit of other London MILITARY controllers that AAR is in progress and that appropriate priority should then be accorded to

those ac. This converted LATCC (Mil) data is also shown on the ScATCC (Mil) display in the same manner (but unfortunately not vice versa). Here, however, SCOT5 had deselected the Mode A part of the SSR label leaving only the Mode C displayed. Having masked this additional 'trigger' that this was 'tanker' traffic, members understood why she had just passed traffic information on the remaining conspicuous SSR data she could see – a single Mode C indicating FL 200. Consequently, she passed traffic information to the GR4 leader under the extant RIS, which gave the misleading impression to the crew that the reported traffic was a single ac at FL 200. It was evident that this was resolved when the GR4 lead pilot spotted the No2 Tanker and GR7 Harrier. Members recognised why the Tornado leader presupposed that he was passing 1000 ft above the trailing element from the information provided, but this was apparently not the case. The STC member explained that the GR4 crews should have been aware from their pre-flight planning, that AARA6 would be active but would expect ATC to smooth their path through it and were understandably concerned at the incomplete traffic information given.

In different circumstances under a RIS, crews would be solely responsible for their separation against other traffic. Here, the procedures specified in AARNIs held sway. Moreover, although it was at the extremity of the SCATCC (Mil) area of responsibility there was an overriding compunction on the part of SCOT5 to co-ordinate the passage of OAT under her 'control' through AARA6. If she had been aware of the situation she would have done so, but as she had not assimilated the brief she treated the observed track as ordinary OAT and did not accord it the priority it warranted. From the London MILITARY controller's perspective there was little more he could have done other than call the traffic to the lead tanker crew, which was done before he observed the GR4 pair turning away onto 230°. With the AAR activity correctly notified to ScATCC (Mil), LON10 could reasonably have expected their controllers to co-ordinate penetration of AARA6 within the notified level block beforehand. The Board concluded that similarly, the GR4 leader could reasonably have expected the controller to resolve his transit through AARA6 and agreed unanimously that this

Airprox resulted because ScATCC (Mil) Controller 5, did not co-ordinate the transit of the GR4 pair through AARA 6, with LATCC (Mil) Controller 10.

Without Mode C the vertical separation at the time could not be determined but as the No 2 tanker was reported to be at FL 205 with the GR7 just starting to detach and haul-off, members concurred with the VC10 tanker formation leader and GR4 Unit's estimation that the separation was probably in the order of 3-500 ft. They recognised that no other safety nets had existed beyond the RIS provided and the crews' eyes; even if TCAS or another CWS had been fitted to any of the ac involved, the rear tanking element had not been squawking and so would have remained 'invisible'. Mindful of previous TCAS encounters between formations and other ac some members wondered whether this was a satisfactory situation. Whilst it might draw attention to the presence of more than one ac, a military controller member contended that it has been shown that if individual ac were squawking this created too much clutter because of label overlap and the SSR data then became unreadable, thus defeating the purpose. Similarly, the NATS adviser also thought that it might be difficult for TCAS to discriminate between a large number of ac in close proximity. However, the Board recognised that once the GR4 leader had eventually spotted the No2 tanker and Harrier 'chick' they had kept it in sight throughout the encounter and the geometry was such that, intentionally or not, the GR4 pair was always going to pass astern of the No2 tanker formation. Here the more nimble GR4 pair could have given the No2 tanker and GR7 a wider berth than the recorded 0.5 NM horizontal separation at any stage. Therefore, taking all these factors into account, the Board agreed that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: ScATCC (Mil) Controller 5, did not co-ordinate the transit of the GR4 formation through AARA 6.

Degree of Risk: C.

Contributory Factors:

AIRPROX REPORT NO 33/02

Date/Time: 3 April 1549

Position: 5412 N 0144 W (10 NM SW of Leeming - elev 132 ft)

Airspace: (Class: G)

Reporting Aircraft Reported Aircraft

Type: Harrier Formation Hawk

Operator: HQ STC HQ STC

Alt/FL: ↑FL 100 11 000 ft
(QFE 1003 mb)

Weather VMC Sky Clear VMC No Cloud

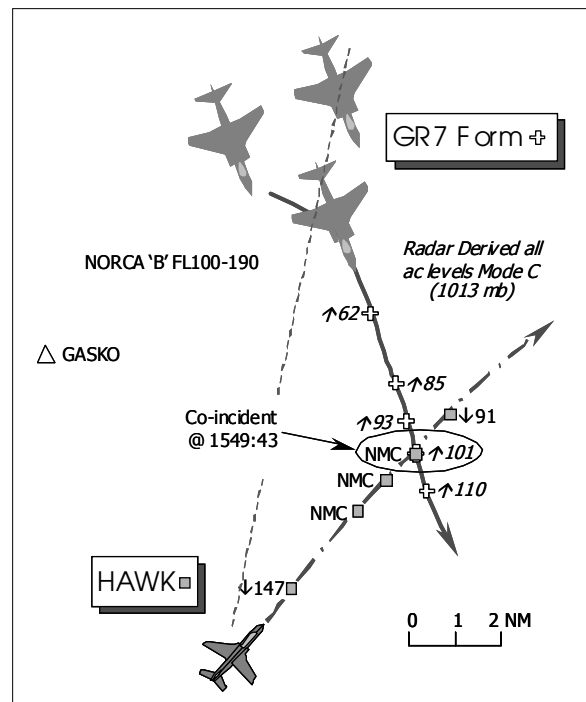
Visibility: 10 km 10 km+

Reported Separation:

500 ft V/nil H 500 ft V/nil H

Recorded Separation:

Contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HARRIER GR7 PILOT reports that he was flying as the LHD rear No3 of a 3-ship loose 'Vic' triangular formation, with 0.5 NM between formation elements, climbing out from LL to FL 235. His ac is camouflage grey, but white HISLs were on in all ac and they were en route to Cottesmore under a RIS from Leeming APPROACH (APP) [he thought ZONE] - limited to secondary radar contacts only. Whilst exiting low level heading 155° at 317 kt, the formation received traffic information from APP about another ac 7 NM to the SW heading NE, descending through FL 180. About 30 sec later, with all formation ac at the same level passing FL 100 in a 10° climb, he spotted an inverted Hawk at 2 o'clock less than 0.5 NM away heading 045°, about 500 ft above his ac in a descent. The Hawk passed 500 ft directly overhead and descended toward his 8 o'clock with an extremely high risk of collision. There was no time to take any avoiding action - his leader never saw the Hawk at all - but the RHD rear No2 saw the Hawk about 1-2 sec before he spotted it.

He emphasised that all 3 Harriers' HISLs were on, the weather was good VMC, but the sun was in

the same sector as that from which the Hawk approached. An Airprox was reported to APP on 292.7 MHz and to the Leeming ATC SUPERVISOR (SUP) by telephone after landing. It would appear that the Hawk was executing a PFL into Leeming under a FIS from DIRECTOR.

THE HAWK PILOT reports his ac has a black colour scheme, HISLs and the nose light were on whilst on recovery to Leeming for a Radar PFL under a FIS from DIR. Approaching 11000 ft Leeming QFE (1003 mb) in descent, heading 055° at 330 kt, he first sighted the Harrier formation in his L 10 o'clock - 0.5 NM away and 1000 ft below his ac. To avoid the formation he immediately pulled wings level into a climb and maintained this flight path until he was satisfied that any risk of a collision had been averted. Whilst climbing he rolled L, to maintain visual contact with the formation and assessed that his avoiding action had achieved a minimum vertical separation of about 500 ft – nil horizontally. He opined that the risk of a collision would have been "high", if he had not taken avoiding action, but subsequently when taken it was "none".

MIL ATC OPS reports that the Harrier formation was climbing out from low-level W of Leeming to FL 235, squawking A0402 with Mode C, whilst under a limited RIS from Leeming APPROACH (APP) - because Leeming ATC was operating with only SSR and primary radar data was not available. At 1548:38, APP advised the Harrier formation *"C/S, traffic southeast, correction, southwest, 7 miles, northeastbound, indicating 180 in the descent"*, which was acknowledged. During the next minute, APP passed instructions to another formation on frequency and at 1549:42, the No 3 in the Harrier formation stated *"Leeming, C/S 3, I'd like to file an Airprox pleaseit's approx 30 seconds ago, we had a Hawk inverted, come through the formation at about 13,000 ft whilst we were in the climb. He was heading northeast"*. APP replied *"that was the traffic called to the south of you descending through 160"*; the No 3 responded *"he got very close for comfortif he was visual with us, I am going to phone him up, if he wasn't I am not happy"*. APP requested that the pilot contact the SUP after landing and the formation was handed to London MILITARY at 1553:09.

Controller sickness had resulted in the APP and LARS (ZONE) positions being combined and there was no separate controller available to man the DIR position. Therefore, the SUP assumed the role of DIR as APP's workload was increasing to the point where he was in need of support. The Hawk was handed over from London MILITARY to DIR at 1546:48, on a FIS, squawking A0413 at FL 210. DIR ascertained that the Hawk pilot required a Radar PFL, whilst remaining under FIS. Thereafter, DIR confirmed the Hawk's range as 26 NM at 1547:04, and asked the Hawk pilot to report accelerating; DIR provided ranges every mile until the Hawk crew reported accelerating at 18 NM at 1548:13. Ranges were transmitted by DIR until 1549:48, when the Hawk pilot reported *"I saw them...a 3-ship of Harriers just climbing up from the northwest"*, which was acknowledged. DIR continued calling ranges every 0.5 NM, and transmitted a clearance for the Hawk pilot to join the visual Cct at 1550:20.

It is common practice at Leeming steadily to reduce the range scale of the radar display during the progress of the Radar PFL. At 20 NM displayed range DIR became aware of an A0402 squawk - the Harrier formation - 10 NM to the NW of the Hawk. At this stage there was 8000 ft of

vertical separation between the respective Mode C responses and DIR considered the formation was no threat, so the 10 NM range was selected to continue the procedure. The A0402 response was intermittent and as the range was reduced all SSR responses were momentarily lost whilst the picture was 'rebuilt', but as the SSR returned, the Hawk pilot called visual with the Harriers. The SSR data update rate is 8 rpm and the source is located at RAF Linton-on-Ouse.

Although not best practice, it is permissible for the SUP to assume a control position, but this is very much an individual's judgement call. Whether it was good judgement to commit oneself to a demanding procedure, which would inevitably require all of one's concentration, when the APP controller's workload was increasing is debatable. The alternative, however, was to refuse the traffic and, by doing so, potentially allow it to go VFR inbound and essentially become 'unknown'. Similarly, having spotted the Harrier's intermittent A0402 squawk - a possible indication of rapid climb - it may not have been prudent to change range scales at that point. However, familiarity with a procedure often leads to actions being taken without reference to the actual circumstances. Nevertheless, the Hawk pilot had specifically requested a FIS, so the controller may have been justified in deciding to concentrate on the conduct of the RPFL rather than providing traffic information.

Without primary radar data the other formation elements - including the subject No3 Harrier - could not be seen by DIR at all. However, as they were flying within the prescribed parameters for a formation, this was not a major factor. Traffic information was passed to the formation, but whilst ATC was operating with only SSR, the displayed picture is inherently incomplete. Under RIS, JSP 318A - Military Air Traffic Services - 235.115.1b specifies that: *"The Controller will only update details of conflicting traffic, after the initial warning, at the pilot's request or if the controller considers that the conflicting traffic continues to constitute a definite hazard."* The lead Harrier pilot did not request an update, however by using *"southwest"* rather than the more accurate clock code, APP may not have sufficiently alerted the pilot to the potential treat. There is an apparent 53 second gap on the frequency recording when an update could have been given. However, APP was working 3

frequencies; during this period APP spoke to ac on 337.825 and VHF 127.75 and was also conducting a handover of LARS traffic. Undoubtedly, APP was busy with little spare capacity to give or receive further information. Nevertheless, a timely interjection by either controller on what their respective ac were doing might have been useful. Whilst both controllers operated within the rules of JSP318A, the inclusion of ALL the facts may have effected the pilot's actions.

In retrospect, a prudent supervisor may have considered the wisdom of removing his support from an already busy controller to conduct a training procedure. Notwithstanding any managerial manipulation of manpower resources that may have been possible earlier in the day, the alternative, at the time of the Airprox, was to refuse a home based flight an element of their own training needs and the desire to be helpful is ingrained in most military controllers. The requirement for APP to work 3 frequencies was highly undesirable and the onus on these occasions is to prioritise the workload - this does not appear to have been done on this occasion. The Headquarter's view is that it is impossible for supervisors to perform their duties to an adequate standard if they are controlling ac. Consequently, a directive that individuals rostered as supervisors are not to assume controlling duties, during the period of their watch, will be issued.

THE HARRIER PILOT'S UNIT comments that even in clear weather conditions under a relatively low workload, small fast moving ac are difficult to acquire. In this instance, none of the Harrier pilots saw the Hawk in sufficient time to avoid it.

THE HAWK PILOT'S UNIT comments that a contributory factor to this Airprox was the late sighting of traffic. The Harrier formation was warned of the Hawk and did not request a traffic update. Had the SUPERVISOR not elected to control the Radar PFL, he would hopefully have had the situational awareness to warn APP of the converging tracks. However, by assuming control of the Hawk, he became focussed on the task in hand. Nevertheless, the conflict occurred between 2 VFR flights in the 'Open FIR' and a collision was averted by the lookout and timely avoiding action taken by the Hawk pilot. Upon sighting the Harrier formation the Hawk pilot

stopped his descent, commenced a climb and once the conflict was avoided, rolled L to maintain visual contact and ensure separation was maintained.

HQ STC concurs with the views expressed by the Hawk pilot's unit and Mil ATC Ops. When resources are stretched we must guard against a natural 'can do' attitude leading to overstretch. With hindsight, in this instance it would have been better to decline a service rather than give pilots a false sense of security, and STC agrees with ATC Ops initiative to direct that supervisors should not control to the detriment of supervision. That said, the pilots were all responsible for collision avoidance under the services they had requested. Finally, it is debatable whether a Radar PFL should be given under a FIS, since it requires detailed radar information to be passed, and a considerable degree of head-down concentration in the cockpit.

UKAB Note: The Great Dun Fell (GDF) radar recording does not illustrate this Airprox clearly as the Hawk's Mode C is not shown throughout the encounter – probably as a result of the altitude encoding not being able to keep pace with its ROD. Additionally, individual elements within the Harrier formation are not detected by the GDF primary until after the encounter - indicative of close formation keeping. The Harrier formation is shown during the encounter climbing at a steady ROC of about 7000 ft/min. It is difficult to determine the Hawk's RoD during the occurrence as no Mode C (NMC) is evident after 1549:12, when the Hawk is shown passing FL 147. The respective contacts merge in azimuth about 10 NM SW of Leeming at 1549:43, when only the lead Harrier's Mode C is shown passing FL 101.

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 authority.

At busy units the issue of rostered supervisors controlling ac during their watch, while fulfilling the supervisory role, had been covered in the Mil

ATC Ops report. Whilst manpower difficulties were not a matter for the Board directly, they became so when the provision of an ATS was dependent on a 'fine thread' such as here where it had clearly broken. The Mil ATC Ops advisor explained that this situation was being addressed by STC ATC; the HQ view was that supervising and controlling were mutually exclusive and members welcomed the HQ intention to provide clear and comprehensive guidance on the topic.

APP had been very busy, fulfilling both the APP and ZONE tasks with all the attendant pitfalls that entails, but here he was also operating on 3 frequencies. With little if any spare capacity amongst his 'control team', members understood the dilemma which faced the SUP. The decision on whether to refuse traffic - in this case the Hawk - or provide the ATS himself was a matter of judgement, involving as it did a home based ac. In this instance the resultant positive 'can-do attitude', had proved counter productive. The Mil ATC advisor said it was a matter of priorities; the station's APP/DIR task would normally take priority over a LARS transit for example, which was provided as an adjunct to the station's 'terminal' services. It was acknowledged that SUPs were sometimes reluctant to terminate promulgated ATSS when manpower shortages dictated that an individual service must be curtailed and traffic offloaded. This necessitated prioritising the services that could be provided from the remaining resources and here, with traffic on LARS just about to be handed over, this would have been a difficult decision. SUPs had to do everything possible to mitigate peaks of traffic loading and terminating LARS was a prime option. Similarly, another option was to refuse the Hawk pilot a service during his PFL, but he could still have continued in toward the field under VFR as unknown traffic. In pursuing the latter course, debate led to the conjecture that the Hawk pilot might have been able to exercise a more effective lookout scan, which might have detected the formation earlier. Whilst the conjecture was acknowledged, the Board concurred that 'lookout' was the crux of this incident.

The STC FJ pilot member found it difficult to reconcile the provision of a FIS whilst conducting a Radar PFL, as highlighted in the HQ comment. He reasoned that the provision of radar data - here accurate range information - was intrinsic to the 'radar service' and thought that a FIS was not

what the pilot needed - though he had indeed asked for it from the outset. The principle in this form of recovery involved the pilot matching his altitude against range calls from the controller. To do this the Hawk pilot would have been frequently 'heads-in' the cockpit monitoring his instruments and so was unable to maintain a continuous lookout. Therefore, radar traffic information would have been of great benefit to supplement his own lookout. Evidently the Hawk pilot had been taken by surprise from his remarks on RT and it seemed to many members that a Radar Information Service, at least, should be provided during a Radar PFL. However, selecting an appropriate ATS - to have a RIS/RAS or not - was a matter of airmanship and HQ STC intended to review this topic in due course, but the outcome seemed likely to be that pilots within the Command should obtain a radar service whilst flying a Radar PFL.

It was evident that the SUP - whilst acting as DIR - had earlier discounted the GR7s as a potential conflict with the Hawk and was caught unawares when using the short range scale for the Radar PFL. However, the Hawk should have been plainly evident to APP and many controller members were surprised that APP had not pointed out the GR7s to the SUP/DIR. Whilst APP had provided traffic information to the Harrier formation, giving these three pilots the best chance of spotting the other ac, it seemed to the Board that this transmission had not painted a clear enough picture for the GR7 leader to absorb this information and detect the black jet, to which they were required to give way under the rules of the air. That said the small Hawk would have been extremely difficult to spot at range positioned above the formation in a descending head-on aspect. None of the 3 pairs of eyes in the Harrier formation had seen its nose-light, but the sun in the bright sky might have rendered it ineffective. As it was the No2 GR7 pilot spotted it first, but apparently had no time to warn the rest of the formation before the reporting pilot saw it; neither was able to take avoiding action or call their leader to do so in the time available, hence this was effectively, a non-sighting on their part. Pilot members thought the 3 ac formation should have been the easier target to spot visually although the GR7s' camouflage had to be taken into account. Without the benefit of any prior warning from SUP/DIR, the Hawk pilot had sighted the GR7 formation 0.5 NM away -

somewhat late at these speeds the Board thought. This was judged to be the other part of the cause, which the Board determined, was effectively, a non-sighting by the Harrier formation and a late sighting by the Hawk pilot.

Turning to risk, although the Harrier pilots had not detected the Hawk or altered their flight path the Hawk pilot had taken effective avoiding action by arresting his descent and pulling into a climb, before rolling L to keep the formation in sight. The minimum vertical separation was not shown on the radar recording, but both pilots agreed it had resulted in about 500 ft between them when

their ac passed. Hence, the Board concluded that the Hawk pilot's timely and robust avoiding action had effectively removed the risk of a collision.

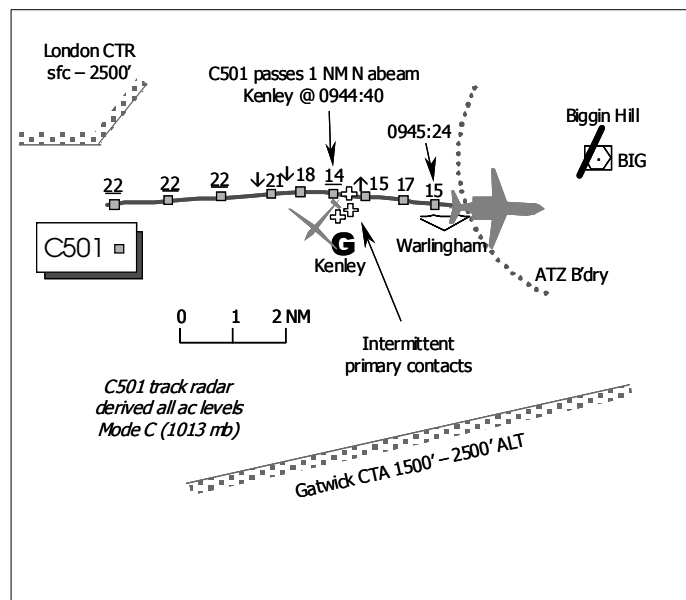
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effectively, a non-sighting by the Harrier formation and a late sighting by the Hawk pilot.

Degree of Risk: C.

AIRPROX REPORT NO 34/02

Date/Time: 5 April 0944
Position: 5119 N 0006 W (1 NM N of Kenley - elev 566 ft)
Airspace: London FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Viking Glider C501 Citation
Operator: HQ PTC Civ Pte
Alt/FL: 900 ft 2400 ft↓
 (QFE 986 mb) (QNH 1006 mb)
Weather VMC No Cloud VMC
Visibility: 6 km in Haze 5000 m Haze
Reported Separation:
 200 m H/200 ft V 3-400 m H
 250-300 ft V
Recorded Separation:
 Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VIKING GLIDER PILOT reports that he had just completed a normal winch launch to a height of 1000 ft QFE (986 mb) into the Kenley Cct and was in communication with Kenley on 129.975 MHz. His glider has a predominantly white colour scheme; no HISL is fitted. To clear the launch line he turned L onto a heading of about 330°, which he maintained for no more than 1 min before another turn was initiated onto

210°. Just as he was rolling out of this turn at 52 kt within the Kenley Cct, another ac - the Cessna 501 Citation - was seen approaching his glider fast from the RHD side about 1000 m away in a slight descent. There was little time to react to the initial sighting, as the C501 passed about 200 m astern heading E, 200 ft below his glider. The risk of collision seemed high at the time, but diminished quickly as separation increased

because of the diverging tracks. After landing he reported the incident to Biggin Hill Ops by telephone, who advised the identity of the Cessna.

THE CESSNA 501 CITATION PILOT provided a very frank and comprehensive report stating that his ac has a predominantly white livery and HISLs were on whilst descending inbound to Biggin Hill, from whom he was receiving a FIS on 129.4 MHz. The assigned squawk was selected with Mode C; TCAS is not fitted.

Whilst working Thames RADAR earlier under a radar service he had been instructed to head for Biggin Hill for an IFR approach, but subsequently elected to continue with a VFR approach. Expecting to land on RW21 and already tracking N of Kenley – which he was aware of - this suggested a right base join, but he was then offered RW03, which was better as it avoided an approach into the sun. Thinking that he was too close to Kenley to alter course to pass to the S, he intended to pass to the N of the glider site but the terrain was less familiar and he was acutely aware of the London CTR to the N – previously he had almost always passed to the S of Kenley – so he might unintentionally have been tracking further S than he intended. He was monitoring an appropriate radial from BIG to keep him clear of Kenley, but in hindsight he opined, this was insufficiently accurate at the small distances involved - about 8 NM from BIG – as the DME stopped displaying, but this was almost certainly an ac reception problem as it subsequently worked satisfactorily.

Heading 090° at 220 kt, he had been flying at 2400 ft QNH, but he could not recall exactly when he had descended from that altitude. When he first saw the glider it was about 0.7 NM away and seemed to be below his ac turning L and climbing. To avoid it, he increased his RoD and turned L, which he believed would give the glider pilot the most options as he passed about 3-400 m astern and 250-300 ft below it.

He added that it was very difficult to pick out the white glider against the background of sun and haze, and undoubtedly he saw it later than he would have wished. The ATIS at Biggin Hill was giving 2500 m in haze, but between 090 – 180° the sun severely impaired horizontal visibility – in the northeasterly quadrant the visibility was

about 5000 m - but the slant visibility appeared better than the forward visibility.

On landing he tried to contact Kenley after they had called Biggin Hill Ops. He called the number given and was advised that someone would call back in 20 min – he also gave his mobile number. He specifically delayed his departure, but despite calling back again and being told to await a call from the pilot he heard nothing before he departed. He thought – as a matter of courtesy – he should speak to the other pilot and telephoned the number given several times over the next few days but his calls were never answered. He was subsequently contacted by AIS (Mil).

UKAB Note (1): The 0920 Biggin Hill METAR was - surface wind: 060/6; visibility 2500 m in Haze; Sky clear; air temperature +10; dew point +07; QNH 1006 mb.

UKAB Note (2): The UK AIP at ENR 5-5-1-3, promulgates Kenley as a winch launching Glider Site where cables may be encountered to 1700 ft agl, sunrise to sunset, 7 days/week. Kenley does not have an ATZ. An appropriate entry is also included on the applicable CAA 1:250,000 & 1:500,000 VFR chart indicating a potential hazard from winch cables to 2500 ft ALT a note is also included in the chart amendments relating to winch cables:

"Maximum altitude of the cable is represented in thousands and hundreds of feet above mean sea level calculated using a minimum cable height of 2000 ft agl plus site elevation. At some sites the cable may extend above 2000ft AGL. Due to the ground-based cable, aircraft should avoid over flying these sites below the indicated altitude."

Warlingham is listed in the UK AIP at ENR 5-5-1-3, as Kennel Farm – elev 590 ft amsl - a winch launch hang-gliding and paracending site, where cables may be encountered to 500 ft agl, sunrise to sunset, 7 days/week.

ATSI reports that the Cessna 501 Citation, was inbound to Biggin Hill from Waterford, Ireland, on an IFR FPL. The pilot established communications with Thames RADAR at 0940 reporting at 2400 ft ALT. No ATS was formally agreed, but it would appear that Thames was providing the flight with a RAS. The controller instructed the flight to maintain 2400 ft, advising

that he would provide radar vectors to a VOR DME approach or a visual approach to Biggin Hill, whichever the pilot wished. The pilot reported he had received Biggin Hill arrival 'Information FOXTROT', adding that he would advise if he became visual with the aerodrome. Responding, the Thames controller instructed the flight to route direct to BIGGIN (BIG VOR), which is located on the aerodrome. The radar recording for this time shows the C501 about 20 NM W of Biggin Hill, eastbound and indicating 2400 ft ALT. At 0942:10, the C501 pilot reported that he was now content to complete a visual approach to Biggin and the controller instructed the flight to descend to 2000 ft ALT with a request to report the 'field' in sight, which RADAR advised was at *"12 o'clock..range..10 miles"*. A little over 1 min later, the pilot again stated that he was happy to continue visually and requested transfer to Biggin Hill. Before approving the transfer the controller ascertained that the C501 would be positioning for a L base for RW03. The pilot was then advised to *"keep the turn pretty close to the field and stay outside the Gatwick area (CAS)"* and, at 0943:55, was instructed to change to the Biggin Hill APPROACH/AERODROME frequency. The flight was not told, however, that the radar service being provided had now terminated. By that stage, the ac was about 7.5 NM W of Biggin and on a projected track that would take it about 1 NM to the N of Kenley. The Heathrow radar recording (the 23 cm source most probably used by the Thames controller) shows no evidence of any unknown traffic in the vicinity of the C501 as it passes about 1 NM N of Kenley towards a L base-leg for RW03. Following transfer from Thames, the C501 pilot immediately established communications with 'Biggin APPROACH'. Although given the option to position downwind for a landing on RW21, the pilot elected to continue for an approach for RW03. Upon reporting L base leg just after 0945, the flight was cleared to land. At no stage during communications with Thames and Biggin, did the C501 pilot report having seen, or flying into close proximity with, another ac.

UKAB Note (3): The Pease Pottage radar recording does not illustrate this Airprox clearly. Intermittent primary contacts which may or may not be the glider flown by the reporting pilot are shown in the immediate vicinity of Kenley (within 1 NM). However, the C501 is shown continuously as it approaches from the W, level at 2200 ft Mode

C (1013 mb) – this would equate to an altitude of about 1990 ft Biggin Hill QNH or a height of about 1390 ft Kenley QFE (986 mb) – elev 566 ft. At 0944:15 the C501 is shown descending 1.5 NM NW of Kenley and achieves a minimum level of 1400 ft (1013 mb) - a height of about 590 ft Kenley QFE (986 mb) - as it passes 1 NM N of the glider site. This accords generally with the vertical separation reported by both pilots during the occurrence. The C501 then climbed 200 ft before passing over Warlingham at 0945:24, and then entered the Biggin Hill ATZ indicating 1500 ft (1013 mb) - about 1190 ft Biggin QNH (1006 mb). The minimum horizontal separation that pertained cannot be determined with any certainty.

HQ AIR CADETS - GLIDING OPS comments that as the separation distance at the time the C501 was spotted was increasing, the likelihood of these 2 ac coming into conflict was reducing all the time. However, the VGS operate up to 7 ac and so the potential existed for more than one glider to have an Airprox.

There is evidence to suggest that Kenley is used as a reporting point for ac under control of Thames RADAR and Biggin Hill. Others are known to use Kenley as a suitable track reporting point on departure from Biggin Hill. In discussion with Biggin controllers, they have assured us that they no longer request ac to call when at Kenley but when abeam. It does not take much of a navigation error to put them over Kenley!

We are very concerned at the number and reasons for, ac who put themselves and others at risk by overflying Kenley when it is active 7 days/week - Surrey Hills Gliding Club suffers similar problems.

Other than painting the airfield 'dayglo orange' we must rely on both Thames RADAR and Biggin to provide wayward pilots with appropriate guidance. At times some pilots appear to not listen or take no notice. Either that or the advice/reminder is lost in the ether.

NATs Ltd reports that a Unit Supplementary Instruction was issued to Thames Radar Staff at Heathrow – USI46/02 - on 20 Aug 2002. In addition to promulgating advice about ATZs, the USI contained the following note about Kenley:

"At present Kenley does not have an Aerodrome Traffic Zone but should be considered active during daylight hours. The 615 VGS and the Surrey Hills Gliding Club both operate from Kenley and **will not** notify Thames Radar when gliding operations commence. Controllers should exercise caution when providing a Radar Advisory Service in the vicinity of Kenley."

HQ PTC comments that we are sympathetic to HQ AC's well-founded concerns. Kenley is overflown 3 or 4 times each working week by Biggin traffic and the VGS have given up reporting all but those qualifying as an Airprox. In this case a change of preferred RW seems to have caused the Citation to compromise his intention to avoid Kenley. The time is overdue for the 4 parties concerned to evolve a Letter of Agreement (LoA) to reduce the risk of a recurrence. We shall actively encourage this.

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 NATS adviser briefed the Board that Kenley is marked on the Thames RADAR video map as a location to avoid, but by an unspecified margin. The STC member said that military pilots had to avoid sites like Kenley by a specific margin – very often 2 NM - and thought similar restrictions should also apply to civil ac. Civilian pilot members were conscious that this aspect was not mandated by the ANO, nor stipulated within the AIP, and the airspace around Kenley remained Class G 'Open FIR'. In the Board's view it was the pilot's responsibility to ensure that routes gave a suitable margin around these notified glider launching sites and the entry in the AIP could be viewed as a warning on two counts. In the case of Kenley the Board believed the cables, which could be encountered up to 1700 ft agl at the site, were the first inherent danger if pilots directly overflew the launch site below this height; the second danger was, the presence of gliders themselves in the Cct – but it was all a matter of airmanship. Passing within 1 NM N of the site – as the C501 did here - was a different matter and

whilst some would argue this was not a large enough margin, the Cessna pilot was aware of Kenley and trying to steer clear of it. Controller members cited the congested airspace in the vicinity below the LTMA, S of the London CTR and N of the Gatwick CTA, pointing out that there was very little space to manoeuvre around Kenley when approaching Biggin from the W. Moreover, they were also concerned that no 'Contract' had been specified by the Thames controller about the ATS provided to the C501 pilot – nor had he queried it. As an aside, responsibilities on terrain clearance can be affected by the type of ATS. In the Board's view it was essential that both pilot and controller were aware what service the pilot wanted and what ATS was then provided to avoid any ambiguity. A CAT pilot member suggested that pilots still got confused about the nature of services provided outside CAS as was evident from some other Airprox reports. This situation was highly undesirable – some thought unacceptable - and clear explanations were available in numerous documents that the pilots should understand as an essential point of airmanship.

In this case, the C501 pilot had elected to continue with a visual approach to Biggin Hill, whereupon the Thames RADAR controller had instructed him to descend to 2000 ft ALT, about 2.5 min before the Airprox occurred. It was pointed out that descending to an altitude of 2000 ft placed the ac 266 ft below the maximum attainable elevation of a cable – 2266 ft amsl - if the C501 had overflown Kenley. However, the C501 pilot passed 1 NM to the N and members recognised that this was effectively an encounter in the FIR near a notified site – not over it. The Board commended the C501 pilot for his frankness and he was apparently trying to stay clear of Kenley whilst approaching his destination and by the time of the Airprox he was under a FIS from Biggin Hill. He had reported that the sighting was late, but into the sun and haze, members thought he probably saw the white glider as early as he could - about 0.7 NM away. Having seen it, he elected to descend and turn L to avoid it. From the glider pilot's perspective he saw the C501 very slightly later – 1000 m is about 0.54 NM - but could do little else as he watched the jet pass by at 220 kt; there had been no time to take any avoiding action. From all of this the Board concluded that the Airprox resulted from a

conflict near a notified gliding site, that had been resolved by the Cessna 501 Citation pilot.

The PTC member reinforced the HQ view that an LoA between the units and ATSUs concerned would probably be useful here, but the GA member pointed out that unless it presaged warnings to pilots on RT from ATSUs or further guidance in the AIP about glider operations in this vicinity it would be of little practical benefit to visiting pilots. Nevertheless, members endorsed the suggestion which PTC had undertaken to progress. The STC member also wondered if a stronger warning could be placed on the chart. However, it was mentioned by a GA member that the graphics associated with Glider sites had recently been changed on CAA VFR charts in an effort to do just that.

Turning to risk, the issue here was whether there had been a risk of a collision between the two ac

rather than any danger of colliding with the winch cable. Without a radar recording that showed both ac clearly it was impossible to confirm the minimum separation which pertained here. Both pilots agreed the Citation had passed behind the glider (by some 200 m – 400 m) and below it (200 ft – 300 ft). Unlike the glider pilot, the Citation pilot had seen the other ac at 0.7 NM range and had selected a flight path to clear it and give the glider pilot the most options (he thought). Taking both views into account, the Board concluded that no risk of a collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict near a notified gliding site, resolved by the Cessna 501 Citation pilot.

Degree of Risk: C.

AIRPROX REPORT NO 35/02

Date/Time: 5 Apr 1429

Position: 5244 N 0350 W (2 NM SW of Dolgellau, N Machynlleth Loop)

Airspace: UKDLFS/LFA7 (Class: G)

Reporting Aircraft Reported Aircraft

Type: Hawk F15E

Operator: HQ PTC Foreign Mil

Alt/FL: 250 ft 1000 ft
(msd) (Rad Alt)

Weather VMC HAZE VMC HAZE

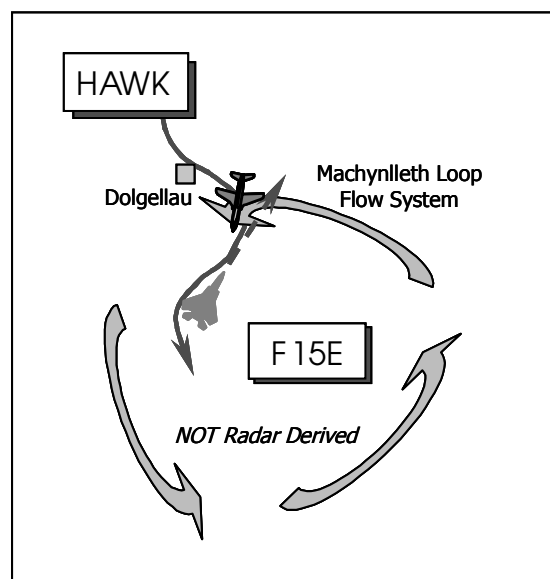
Visibility: 8 km NR

Reported Separation:

200-250 ft V, nil H 4-600 ft V, nil H

Recorded Separation:

Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK PILOT, a QFI, reports his ac has a black PTC colour scheme and HISLs were on whilst flying a routine staff continuation training sortie at low-level and monitoring the low-level frequency of 300.8 MHz. After 4 min at low-level, he commenced a R turn to enter the northern part

of the Machynlleth loop flow system at 420 kt. Half way through the turn passing 220° and committed to entering the valley at 250 ft agl, an F15, previously hidden by the high ground, departed the valley heading NE - against the flow - at between 500 – 750 ft agl. The terrain and

proximity of the F15 left him no alternative but to continue on his flight path in the R turn, whereupon he passed about 200 – 250 ft directly below the other ac. An Airprox was filed with LATCC (Mil) on completion of the sortie and also reported to RAF Valley ATC. He believed that this was a "High Danger" situation but assessed the risk of collision as "average" because his flight path was taking him below the F15.

THE F15E PILOT reports that his ac is camouflage dark grey, but HISLs are not fitted. He was conducting a low-level sortie in N Wales with a rear-seat occupant who was not aircrew. Whilst flying in the direction of the circular flow arrows at an unspecified position at 450 kt, he spotted a Hawk ac flying in the opposite direction below his ac. He climbed to avoid the Hawk, which passed 4-600 ft below his ac with a "low" risk of a collision.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar. The F15E HUD recording was not available.

UKAB Note (2): The UK MIL Aeronautical Planning Document at Vol. 3 Part 1 Pg. 1-2-7-2 (LFA 7) specifies that the Machynlleth Loop deconfliction measures apply to the valleys bounded by promulgated co-ordinates, which are to be flown in an anti-clockwise direction only. This restriction applies only to ac flying in the valleys.

THE HAWK PILOT'S UNIT comments that this was an unusual location to encounter 'head on' low-level traffic against well known flow arrows. The situation required a timely and correct decision from an experienced instructor to prevent a potential collision. It serves as a reminder to all low-level operators, that although flow arrows in the LFS are there to influence the planning process, they can only minimise potential conflicts with military ac and crews should not assume absolute protection from them, even on extremely well known routes such as the 'Machynlleth loop'.

HQ PTC comments that although both pilots saw each other sufficiently early not to need radical avoiding action, it is disturbing that both thought that they were complying with the published flow. Although the Hawk was flying inside the circular flow printed on the LFC he was, from the map

fragment he provided, unquestionably flying in sympathy with it.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac and a report from the Hawk pilot's operating authority.

The absence of a HUD recording from the F15 and the lack of recorded radar information inhibited the Board's assessment of this encounter in the LFS. The Machynlleth Loop deconfliction measure was a well known flow system, which had been established over a significant period and had remained in force following the IFS review of LFS flow restrictions. Some members were of the opinion that this was a prominent series of valleys, which an experienced pilot would be hard pressed to mistake. Here – in the Board's view – was the crux of the issue. The reporting Hawk QFI was in effect flying 'in his own back yard' and both Hawk pilots would be intimately familiar with the local area, within which they flew and instructed students on a daily basis - a point reinforced by the PTC member. Conversely, members thought that although he was UK based, the F15 pilot might not be quite as familiar with this area as were the Hawk pilots. Members did not disbelieve what the F15 pilot said – there was no reason to doubt his report - but his extremely brief submission included neither a position for the reported Airprox nor a marked copy of his LFC with his track flown. The Hawk pilot had provided documentary information showing his route into the Machynlleth Loop and it was extremely important in the investigation of such incidents to provide as comprehensive a picture as possible for the Board's assessment. On this point, the STC member stressed that it is now a requirement within his Command that HUD recordings are made whenever feasible in ac so equipped, for reasons such as this, but it was unfortunate that the Hawk had no such facility. The Board urged most strongly that HUD recordings/navigational plots be retained for Airprox investigations where they have proved their worth on many occasions and members found its absence most disappointing in this instance. The HQ3AF advisor acknowledged the Board's view on this issue. Military pilot members thought that despite the use of a moving map

display and the ac's GPS navigation suite, the absence of the second crewmember might also have been a factor here. There was a broad consensus amongst the members that whilst the solitary F15 pilot may be absolutely sure of where he thought he had been at the time, and thought he had flown in conformity with the Machynlleth loop flow system, he may not actually have done so and there was nothing to show that he had. Unable to resolve the issue with certainty, the Board could only conclude that this Airprox was the result of a conflict in the Machynlleth Loop flow system.

Turning to risk, the reporting Hawk pilot opined that confronted with the F15, he had to maintain his flight path and fly under it – by 200-250 ft - as he was constrained in his ability to manoeuvre by the surrounding terrain. However, this action

took him clear below the F15 anyway – hence in effect no avoiding action was taken but it had been an uncomfortable situation nonetheless. From the F15 cockpit, the solitary pilot had spotted the Hawk and climbed above it by 4-600 ft in his estimation. Despite the differing perceptions of the vertical separation, which could not be resolved without a radar recording, in the Board's view no risk of a collision had existed in these circumstances.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the Machynlleth Loop flow system.

Degree of Risk: C.

AIRPROX REPORT NO 36/02

Date/Time: 8 April 0930

Position: 5320 N 0257 W (2.95 NM Finals RW09 at Liverpool - elev 81 ft)

Airspace: Liverpool CTR (Class: D)

Reporting Aircraft Reported Aircraft

Type: BAe ATP Grob Tutor

Operator: CAT HQ PTC

Alt/FL: 1200 ft 1500 ft
(QNH 1026 mb) (QNH 1026 mb)

Weather VMC Nil Sig VMC Slight Haze

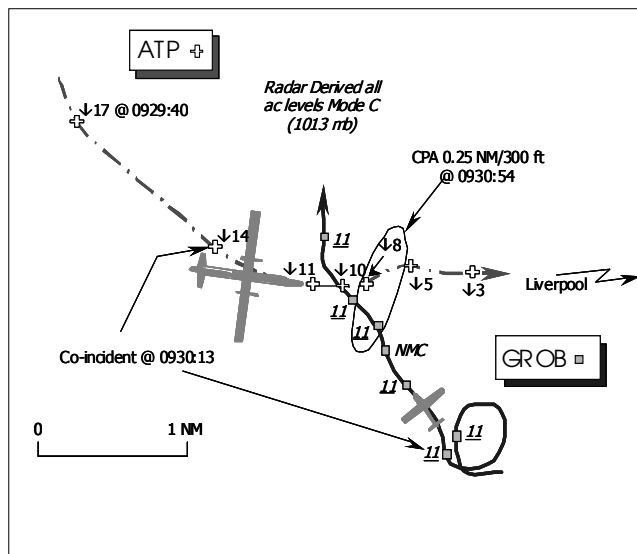
Visibility: 10 km 8 km out of sun

Reported Separation:

60 m H/50-60 ft V 500 ft V

Recorded Separation:

0.25 NM H/300 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BAe ATP PILOT, the PNF in the LHS, reports that he was on final approach to RW09 at Liverpool - John Lennon International, flying at 118 kt and in communication with Liverpool TOWER on 126.35 MHz. The assigned squawk of A5466 was selected with Mode C; TCAS was

fitted. About 3 NM from touchdown, heading 090°, at 1200 ft QNH (1025 mb) a light ac (LA) "infringed" their approach path which resulted in TCAS enunciating an RA - "Traffic, Traffic Descend". He complied with the RA and descended 100 ft as the LA – a white Grob -

passed about 60 m astern and 50-60 ft above his ac with a "low" risk of a collision. The LA was in sight throughout until it drew aft and passed obliquely astern from R-L; he believed that the Grob pilot also had them in sight all the time.

He added that the Grob pilot had been instructed by ATC to hold S of the RW centreline.

THE GROB TUTOR PILOT reports his ac has a predominantly white colour scheme, but HISLs were on whilst inbound to Woodvale through the Liverpool CTR, VFR and in receipt of an ATS from Liverpool APPROACH (APP) on 119.85 MHz. The assigned squawk of A7375 was selected with Mode C; neither TCAS nor any other form of CWS was fitted.

Heading 330° at 110 kt, he was under a VFR clearance through the CTR routeing Ellesmere Port - West Bank of the Mersey to leave the CTR at SEAFORTH VRP. An ATP was being vectored by APP for a LLZ/DME approach to RW09, but when the ATP crew requested and was granted a visual approach, he was instructed to hold his position, about 2 NM S of the extended centreline to RW09, at about 3-4 NM from the RW threshold. ATC requested him to report when visual with the ATP, which he did, whereupon he was 'cleared' to pass behind the ATP - which was now at 3 NM finals - toward SEAFORTH. The ATP was about 1 NM to the E and approximately 500 ft below his ac as it descended on a visual approach to RW09, when he passed behind it crossing the extended centreline to RW09. No avoiding action was required and he assessed the risk as "nil". He opined that this was not "an Airprox as such and seems to have resulted from his transponder generating a traffic advisory on the ATP's TCAS".

THE LIVERPOOL APPROACH CONTROLLER (APR) reports that the ATP was on finals for RW09 with the Grob holding on the S bank of the Mersey to transit from Ellesmere Port to SEAFORTH. The Grob pilot reported visual contact with the ATP and was instructed to pass behind. The ATP pilot then commented about the Grob passing close above and behind his ac. She believed the Grob pilot was visual with ATP at the time and maintaining his own separation.

ATSI reports that this incident occurred within the Class D CAS of the Liverpool CTR/Manchester CTA. In accordance with MATS Part 1, Page 1-3,

traffic information was passed by APP to the pilot of the inbound ATP, about the Grob holding S of the FAT, before he was transferred to TOWER. The Grob pilot was informed about the ATP, reported visual with the traffic and was cleared to pass behind it. It might have been beneficial if the ATP pilot had been advised that the Grob was no longer holding but had his ac in sight and would be routeing behind it. However, this would not have affected the reported TCAS RA.

THE GROB TUTOR PILOT'S UNIT comments that the Grob pilot was visual with the ATP through-out so there was no danger of a collision. The apparent change of intentions of the ATP crew, who were visual with the Tutor throughout, caused a reduction in the planned lateral separation which resulted in the TCAS RA. It appears that there was no danger of an accident and this was purely an electronic warning of the proximity of the Tutor.

UKAB Note (1): Analysis of the Liverpool RTF tape transcripts reveals that there was a fault with some time inject signals on the recording device, consequently, the timings of some transmissions cannot be positively ascertained. Just after 0923:10, the Grob pilot was cleared by APP to route toward the S bank of the River Mersey, VFR not above 1500 ft QNH (1026 mb). Meanwhile the ATP continued inbound under radar vectors from APP until 0926:10, when the ATP pilot reported that *"we are visual we could continue visually to the field"*. Whence, APP instructed the ATP crew, *"Roger then you're cleared the visual approach not below 2500 ft until coasting in over the Wirral"*, which was acknowledged by the crew. APP then advised the Grob pilot, that there was *"a change of plan can you just hold on the S bank there's an ATP inbound from Wallasey on a visual approach you'll be after him"*. The Grob pilot acknowledged, *"roger holding S bank...just to advise to the S of the extended line"*. At about 0929, APP passed traffic information to the ATP crew, *"you may see Grob traffic holding just S of about a 2 mile final not above 1500 ft"*, which the ATP crew acknowledged *"roger"*. APP then rescinded a 2500 ft minimum altitude restriction and with the ATP on a reported L Base, instructed the crew to switch to TOWER. About a min later in compliance with an earlier request, the Grob pilot reported to APP he was visual with the ATP. Whereupon at about 0930, APP instructed the Grob pilot *"behind the ATP you can cross to the N*

and...follow the W bank of the Mersey.." adding Cct traffic information about a TB10. The Grob pilot acknowledged and read back this instruction " *roger following the W bank behind the ATP towards SEAFORTH [VRP]*".

Meanwhile at 0929:40, the ATP crew checked in with TOWER reporting "*just by Bromborough L base 09*". TOWER instructed the crew to "*..continue approach with departing traffic ahead*". At 0930:50, the ATP crew reported, "*we have a TCAS descend descend [sic]...it's a light ac we have him in sight no problem he's gone over the top of us*". TOWER acknowledged the report "*Oh right he's supposed to be holding S in fact with APPROACH*" and cleared the ATP crew to land. The pilot of another ac No 2 to the ATP – the TB10 - turning base leg was also informed about the Grob by TOWER, "*be advised there's..currently a light ac just crossing the centreline by the W bank heading northbound*". Whereupon the other pilot stated "*..that one has just gone down our RHD side now do you know who he is*"? The ATP pilot then added later when short finals "*he actually passed just behind us but he was pretty close*".

Shortly after 0934:10, the Grob pilot reported clearing the CTR at SEAFORTH and switched to Woodvale without any further comment about the occurrence.

UKAB Note (2): The Clee Hill radar recording clearly illustrates this Airprox. At 0930:13, the Grob is shown leaving its visual holding pattern of a tight RHD orbit at 1100 ft Mode C - equating to about 1490 ft QNH (1026 mb) - on a track to pass astern of the ATP and in conformity with the instruction issued by APP. The ATP descends through 1100 ft Mode C [1490 ft QNH] in the Grob pilot's 12 o'clock at a range of 0.88 NM when both ac are shown at the same level. However, the CPA occurred at 0930:54, when the Grob passed through the ATP pilot's 3 o'clock at a range of 0.25 NM and 300 ft above the ATP, which was descending through 800 ft Mode C (1013 mb) – about 1190 ft QNH (1026 mb).

HQ PTC comments that the Tutor was clearly proceeding in accordance with a valid VFR clearance. Where such routes impinge on IFR procedures there will be a recurrent risk of unnecessary TCAS alerts.

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 was an unusual encounter insofar as both pilots were complying with CAS clearances issued by ATC, both had been passed traffic information about each other and both had each other's ac in sight throughout. Yet an Airprox had still occurred, so members pondered on the reasoning behind this report from the ATP pilot. Evidently the Grob pilot had been instructed to hold VFR within Class D airspace awaiting the ATP to pass to the N - on finals for RW09 - after the latter's pilot had elected to change to a visual approach. Nevertheless, the ATSI adviser explained that this flight was still – technically – IFR and ATC would not normally effect separation between IFR and VFR flights in Class D airspace – rather traffic information is provided to enable VFR pilots to fly clear of IFR flights. The ATP pilot had been informed by APP that the Grob was holding, when both pilots were on the same frequency and both were aware up until that point what each other was doing as a result of the traffic information conscientiously issued by APP. However, it was evident to the members that once the ATP crew had switched to TOWER (leaving the Grob with APP) they were no longer able to hear any instructions passed between APP and the Grob pilot. It would appear from the RT transcript, that the TOWER controller was not aware that APP had instructed the Grob pilot "*behind the ATP you can cross to the N [of the centreline] and...follow the W bank of the Mersey..*". This close to the visual Cct, members thought that APP should have informed TOWER that he had allowed the Grob to 'cross' the FAT behind the ATP so that TOWER in turn could pass traffic information to the latter's crew. Several pilot members opined that if the ATP pilot had known that the Grob had been instructed to pass astern of his ac it would have reassured him that the LA had not "*infringed*" his approach path, but was merely complying with his ATC clearance. Indeed some suggested this was the cause of Airprox, but, whilst it might have been cited as a contributory factor, other members concurred with the ATSI

assertion that this would not have prevented a TCAS RA.

The RA was evidently a result of the proximity of the Grob to the ATP at the time. Having been cleared to cross astern of the ATP the crux of the issue was whether the Grob flew close enough to the airliner to cause its pilot concern for the safety of his ac. It was not clear if the ATP pilot had filed the Airprox because of the TCAS RA – not necessarily a reason for filing an Airprox on its own - or because the hold had been too close to the FAT, or whether he suspected that the Grob pilot had left the visual hold of his own volition in perceived contravention of his ATC clearance. All were feasible but the ATP pilot's comment that the Grob had "*infringed*" his approach path added weight to the latter. However, the real concern here was that a TCAS RA had resulted at all. TCAS will only resolve conflicts in the vertical plane and here the ATP was just approaching the limiting height below which TCAS RAs are inhibited. CAT pilot members explained that this was usually in the order of 1100 ft and prevented RAs from being enunciated in close proximity to the surface where a descend RA could be highly undesirable. Some members wondered why the ATP pilot had followed the RA when he said he could see the Grob throughout; CAT pilot members were quick to point out that SOPs varied from company to company and here the airline's policy may have been strict compliance with an RA regardless – the trend now was to follow the RA, resolve the conflict, and ask questions later. The reason for this was that the RA may have been generated as a result of the proximity of another unseen ac – not the Grob that the pilot could plainly see in this instance. Though the Grob pilot had cited this occurrence as a TCAS generated Airprox, he would not know how close he could pass to the ATP before it triggered an RA. This question had exercised military flight safety staffs in the past and resulted in widespread advice to fast jet crews to give airliners as wide a berth as possible to prevent just such an occurrence as here. Even when flying outside CAS, FJs climbing fast at a high RoC below airways, but with no intention whatsoever of entering CAS can generate RAs in CAT ac within. This lesson also applied equally to any other pilot - civilian or military - flying close to a TCAS equipped airliner, inside or outside CAS. Effecting visual separation is common practice when dealing with a mix of IFR and VFR traffic as

here - a commercial helicopter pilot member said he had heard on several occasions Heathrow ATC inform crews of approaching ac that they may receive a TCAS indication from helicopters in the vicinity. Some controller members thought it was probably only referring to TAs and given when ac are below the height on short finals where an RA would be inhibited. The advice to all pilots here – military or civilian - is give a wide berth to CAT ac when taking visual separation against them to avoid causing an RA. Unfortunately, with so many variables it was impossible to quantify the minimum distance with any certainty and the Board was unable to provide any more definitive advice than that.

Neither the ATP crew nor the Grob pilot had done anything wrong in the Board's view and the latter had complied exactly with his ATC clearance and was aiming to pass astern of the ATP – unbeknownst to its pilot. A long discussion ensued as to whether it was appropriate for the Grob pilot to fly as he did, but in this context no visual separation minima are specified. The radar recording revealed that the ATP passed through the Grob pilot's 12 o'clock at a range of 0.88 NM and never got closer than 0.25 NM to the airliner whilst on a heading to pass astern. Some pilots thought this entirely satisfactory in the circumstances but evidently this was close enough to trigger the RA. Here, as the ATP was still able to land from this approach, members noted it was a recoverable situation - but others might not be and there is certainly potential for situations such as this to cause significant disruption in the busy terminal environment. A helicopter pilot also mentioned that passing close astern to larger ac can also present difficulties associated with 'Wake Vortex', which can have a very significant effect on LA. Whilst this is sage advice - the business of the UKAB was to consider what actually happened – not what might have happened in different circumstances. A wide majority of members believed that the Grob pilot had passed perfectly safely behind the ATP, nevertheless he had set up the geometry of the encounter. In complying with his ATC clearance it was the Grob pilot who judged when it was best to leave the hold and the Board reasoned that it was his chosen flightpath behind the ATP, which triggered the RA and was the cause of the Airprox. However, the Grob pilot could not be held accountable for the sensitivities of TCAS equipment – he would not necessarily know even

if it was fitted. This was not a criticism, but a self-evident fact. Furthermore, with both pilots aware of each other's ac and in sight throughout, given the separation that pertained the Board agreed unanimously that no risk of a collision had existed.

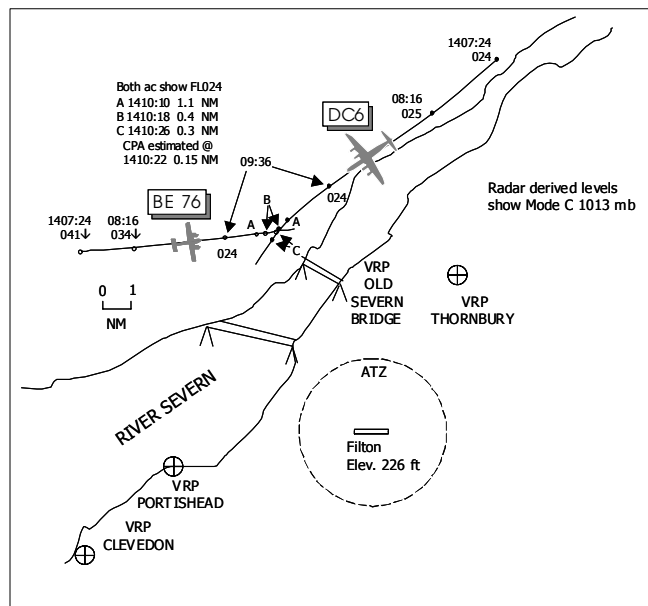
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Grob pilot flew behind the ATP close enough to trigger a TCAS RA.

Degree of Risk: C.

AIRPROX REPORT NO 37/02

Date/Time: 3 Apr 1410
Position: 5138 N 0241 W (8 NM NW Filton - elev 226 ft)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: BE76 DC6
Operator: Civ Trg CAT
Alt/FL: ↓2000 ft 2000 ft
(QNH 1005 mb) (QNH 1006 mb)
Weather VMC HZBC VMC HZBC
Visibility: 5000 m 7 km
Reported Separation:
0 ft V 0.25 NM H 200 ft V >500 ft H
Recorded Separation:
0 ft V 0.15 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BE76 PILOT reports conducting a final instrument rating check flight from and to Exeter via Filton and in receipt of a RIS from Filton RADAR on 122.72 MHz. The visibility was 5000 m in haze 500 ft below cloud, the ac was coloured white/red with anti-collision and strobe lights switched on. Filton ATC were vectoring him for an ILS to RW 09 descending to 2000 ft QNH 1005 mb at 120 kt and he was squawking an assigned code with Mode C. As he was levelling at 2000 ft, he sighted a DC6 in his 11.30 position range 0.5 NM on a converging heading at the same level. No avoiding action was taken owing to the late sighting and because his heading was taking him clear of the conflict; the DC6 was seen to cross L to R, passing 0.25 NM horizontally with no vertical displacement. After he had told ATC that he

wished to file an Airprox, the APR informed him that the conflicting traffic was working Cardiff ATC and that the DC6 pilot had seen him. The Filton APR had been busy on the landline and apologised for not 'calling' the traffic. The late sighting was compounded by the poor in-flight visibility and further restricted by the erected IF flying screens. He assessed the risk of collision as medium to high.

THE DC6 PILOT reports flying an ad-hoc public transport freight flight inbound to Cardiff at 200 kt and 2000 ft QNH 1006 mb and in receipt of a RIS, he thought, from Cardiff RADAR on 125.85 MHz squawking 7000 with Mode C. The visibility was 7 km in haze in VMC, the ac was coloured white/green and both anti-collision lights were switched

on; strobe lights and TCAS were not fitted to the ac. The flight deck crew on this occasion consisted of three ranked captains and was conducted under VFR outside of regulated airspace. He was tracking along the western shore of the Severn Estuary heading SW positioning for a visual join via Cardiff Docks. When he was passing abeam the Severn Bridges VRP he was informed by ATC of local traffic which was spotted visually as a BE76 by the crewmember occupying the middle seat (P3) which affords a slightly elevated viewpoint compared with the two pilots' seats. P3 stated that no conflict existed and although the PIC, the PF, did not see the other ac, it was agreed that there was no threat and the flight continued without interruption. No deviation in flight path was required nor was made and it was estimated that the BE76 passed 200 ft below and 500 ft horizontally clear. The crew were not made aware of any Airprox until they were contacted by the UKAB approx 1 week later.

UKAB Note (1): The Filton METAR shows EGTG 1350Z 29006KT 5000 HZ SCT025 15/09 Q1005=

ATSI reports that the Filton APR described his workload as moderate at the time of the incident and that due to a shortage of support staff there was no ATS Assistant (ATSA) available to support him in the Approach Control Room. Consequently, there was nobody to assist him by making a number of operational telephone calls that were required.

In accordance with local procedures, the BE76 had been accepted for a training detail at Filton. Subsequently, Bristol (Lulsgate) Approach identified the ac to Filton, when it was still W of Bristol Airport, at FL 80. It was agreed, between the two units, that the BE76 would be instructed to turn L heading 360° and to descend to an altitude of 3000 ft. Accordingly, when the BE76 established communication with Filton Approach, at 1403, the pilot reported passing 6500 ft for 3000 ft. The flight was informed it was identified and would be provided with a RIS, whilst being vectored for an ILS Approach to RW 09. The APR explained, that, because the flight was too high to route direct to final from R base, his plan was to vector the BE76 through the RW 09 ILS and position it to the N of Filton, initially on an easterly track. He could then instruct it to turn onto a DW heading once it had lost sufficient height to make

an approach. The pilot was informed accordingly and further descent to 2000 ft was issued.

In accordance with his plan, at 1406, the Filton APR instructed the BE76 to turn R heading 090°. He said that, as he issued the turn, he looked ahead at the ac's projected track and did not see any traffic likely to conflict with the flight. Shortly afterwards, the pilot of the BE76, having established that he was eighteen miles from touchdown, requested an extension of two miles to his routeing. No further calls were made to, or received from, the BE76 until the pilot reported, at 1411, that he believed that he had just had an Airprox with traffic, at 2200 ft, crossing from L to R.

The Filton APR admitted that, having agreed the distance from touchdown with the pilot of the BE76, he had turned his attention to the traffic situation elsewhere on his radar display. This had resulted in him having to make a telephone call to Colerne, about a possible infringement of their airspace by a helicopter in communication with Filton, and controlling two ac, which were inbound to Bristol Airport. These two flights required co-ordination with Bristol Approach. He explained that the telephone call, reference these two flights, was long and protracted as he was passing the information through an ATSA at Bristol, who in turn had to try and pass the details on to the busy Approach Controller. The Filton APR conceded that, in the process, he had not monitored the BE76 as closely as he should, whilst providing the ac with a RIS and, therefore, he did not notice the conflicting traffic. Consequently, he was unable to pass the requisite TI. The MATS Part 1, Page 1-41, states that: "*A Radar Information Service (RIS) is an air traffic radar service in which the controller shall inform the pilot of the bearing, distance and, if known, the level of the conflicting traffic. No avoiding action shall be offered. The pilot is wholly responsible for maintaining separation from other ac whether or not the controller has passed traffic information.*" The APR commented that, had an ATSA been available in the Approach Control Room, he would have utilised this person to carry out the telephone call to Bristol, allowing him more time to monitor the radar display.

The traffic sighted by the pilot of the BE76 was a DC6 which had contacted Cardiff Approach at 1407 whilst inbound from Coventry VFR. The ac

was allocated a Cardiff squawk and informed that the service being provided was a FIS. The radar recording shows that, when the BE76 was instructed to turn R onto heading 090°, the DC6 was still squawking 7000, in the Gloucester vicinity, close to another ac. The Filton APR said that, with hindsight, the DC6 was probably showing on his radar display, at the time, but there was nothing to indicate that it would be tracking away from the Gloucester area towards his traffic. Its allocated Cardiff squawk did not appear until 1408:16 i.e. two minutes after the easterly heading was issued to the BE76. At 1410:10, the DC6 reported at 2000 ft and was advised, by Cardiff, to *"keep a good look out there is aircraft in your vicinity no no height information believe it's a it's a Beech Seventy-six Duchess working Bristol"*. The pilot of the DC6 acknowledged the call but made no comment about the traffic, although during a later telephone call between Filton and Cardiff, the latter controller advised the former that the DC6 had reported sighting the BE76.

The APR was undoubtedly distracted at the time of the incident by the telephone calls he had to make. In view of this incident, and another, which occurred in similar circumstances during April 2002, it has been decided, by ATC Management, that priority is to be given to ensuring that an ATSA is available in the Filton Approach Control Room when rostering support staff.

UKAB Note (2): The Cleve Hill radar recording at 1409:36 shows the BE76 about 4 NM W of the Old Severn Bridge VRP steady tracking 085° squawking 4571 and just levelling-off at 2400 ft Mode C (2200 ft Filton QNH 1005 mb) with the DC6 in its 1130 position range 4 NM tracking SW indicating the same level. The subject ac both continue to converge on a line of constant bearing and by 1410:10 are 1.1 NM apart. 8 seconds later the DC6 is just about to cross 0.4 NM ahead of the BE76 and during the next radar sweep crosses the Beech rapidly L to R, showing again at 1410:26, still at the same level 0.3 NM SSW of the Beech. CPA is estimated to occur at 1410:22 with the DC6 in the BE76's 0130 position range 0.15 NM (275m).

UKAB Note (3): CAP393 Air Navigation- the Order and the Regulations Schedule 5 Article 15 Radio and radio navigation equipment to be carried in aircraft, para 2 Table states: -

Airborne collision avoidance system- All aeroplanes registered in the United Kingdom, wherever they may be, and all aeroplanes wherever registered when flying in the United Kingdom, powered by one or more turbine jets or turbine propeller engines and either having a maximum take-off weight exceeding 15,000 kg or which in accordance with the certificate of airworthiness in force in respect thereof may carry more than 30 passengers.

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.

This had been a close encounter in Class G airspace with both crews responsible for maintaining their own separation from other traffic. The Filton APR was providing a RIS to the BE76 pilot whilst giving him radar vectors towards an instrument approach but no TI was given. The BE76 pilot had reported a late sighting from his cockpit although members agreed that the lack of TI from the Filton APR had compounded the incident. The DC6 crew, flying VFR and in receipt of a FIS from Cardiff, had visually acquired the Beech after receiving radar derived TI. However, the Cardiff RT transcript timings revealed the TI was given to the DC6 crew when the ac were about 1 NM apart which led some members to believe that it had been a late sighting from the DC6 cockpit also.

As to risk, there were two differing viewpoints which promoted a lengthy debate with some members believing that there had been a possible risk of collision. Pilots questioned the CRM within the DC6 cockpit as it appeared not to have been effective enough during this encounter; either the P1 or P2 should have seen the BE76 during their lookout scan whilst flying VFR. As it was, only the person seated in the P3 (elevated) position spotted the BE76 and he said that no avoiding action was required. This raised the possibility that the DC6 'crew' had seen the BE76 effectively too late to take any avoiding action, passing just 200 ft above and 500 ft horizontally from the

Beech. Meanwhile the Beech pilot had seen the DC6 in his 1130 position, converging, too late to avoid and he had watched it pass about 0.25 NM away on his RHS at the same level. Effectively, in the absence of other safety nets - STCA and TCAS - it was more by luck that the geometry of the encounter had produced a miss. This view was not shared by others who believed that both crews had seen each other, albeit late, and had quickly judged that they were not going to collide but had simply flown closer to each other than was desirable. The recorded radar had shown the subject ac passing on converging/crossing tracks <300 m apart indicating the same level.

In the end, although not unanimous, the majority of the Board were persuaded that both crews had, after seeing each other, quickly realised that they were not going to collide but had then flown close enough to each other to the extent that safety had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sightings by both pilots compounded by lack of TI by Filton APR to the BE76.

Degree of Risk: B

AIRPROX REPORT NO 38/02

Date/Time: 14 Apr 1243 (Sunday)

Position: 5112 N 0114 W (Threshold RW 26 Popham - elev 550 ft)

Airspace: FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Extra E230 C207

Operator: Civ Pte Civ Pte

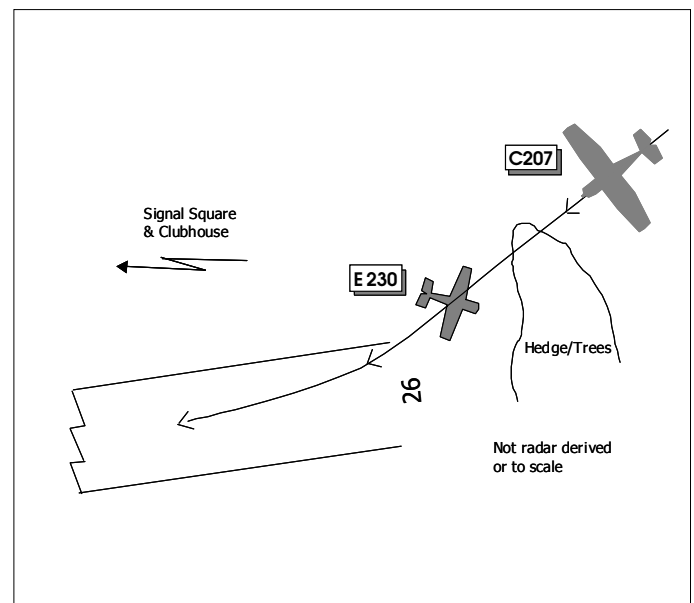
Alt/FL: on ground 15-20 ft aal↓

Weather VMC CLBC VMC CLBC

Visibility: >10 km NK

Reported Separation:
5-8 ft V 15-20 ft V

Recorded Separation:
not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EXTRA E230 PILOT reports awaiting departure at the holding point for RW 26 at Popham with his ac heading approx 120° whilst communicating with Popham RADIO on 129.8 MHz. A C207 was seen to fly a very low unstable off-set approach towards the RW which led to its pilot pulling up at low airspeed and high AoA to miss a small hedge adjacent to the threshold; the Cessna then passed directly overhead his ac with a clearance estimated to be 5-8 ft. During a

subsequent RT exchange with the Popham A/G operator when he reported the Airprox, it was evident that the C207 pilot had considered his approach, including him narrowly missing a collision, as perfectly normal. He assessed the risk of collision as very high.

THE C207 PILOT reports flying inbound to Popham from Southampton and in receipt of an A/G service from Popham RADIO on 129.8 MHz.

He was making a normal 'cranked' approach to RW 26, a low flat approach starting at 95 mph over the forest and trailing off to 75 mph over the threshold as the ac creates a lot of momentum even with full flaps. To minimise the last minute turn onto the RW C/L, he would normally overfly the corner of the hedge between the airfield and the adjacent property at approx 10-15 ft in order to land as soon as possible and facilitate braking to avoid a RW overrun situation - he had completed over 225 landings at Popham. On the day in question, there were several ac waiting on the taxiway near the end of the RW, not at the hold which is some 250 m away near the signal square. He overflew these ac, which he opined a regular visitor to Popham would know was a normal everyday event, with about 15-20 ft clearance and performed a normal landing. Whilst taxiing in he heard a discussion between the A/G operator and the pilot of an ac who was obviously displeased with his approach and vertical displacement. He subsequently spoke to the radio operator and other pilots at the clubhouse who all saw his arrival and judged that it had been normal throughout. He thought that the reporting pilot would have flown a similar flight path when he had arrived at the airfield earlier and consequently would have known that arriving ac would overfly any ac that were awaiting departure. He opined that if the reporting pilot was not comfortable with this fact, he should not have taxied to the threshold area and should have remained at the marked holding point. Possibly, the reporting pilot may have perceived that the Cessna he saw on finals was a C152 or 172 but when he was overflown may have mistaken the size of the larger C207 as a smaller Cessna being flown at a lower level. Also, in order to have hit this holding ac he would have to have flown through the hedge at the end of the airfield because of his flat flight path and the airfield surface slopes downwards quite substantially from the threshold; he landed about 70-100 m beyond the holding ac. He believed this incident had been a non-event; he had been fully aware of the situation, had known exactly what he was doing and had left enough margin in hand to cover any event that might occur during the latter stages of his arrival. He had not needed to take any avoiding action and there had been no risk of collision.

UKAB Note (1): During a telephone conversation with the Popham A/G operator he had said that on

the incident day, an advertised 'fly-in', he had positioned himself, as usual on these occasions, on the S side of the RW at the airfield boundary W of the threshold. This temporary location affords a good head-on view of the RW 26 off-set approach and the threshold area and had become his 'normal' 'fly-in' location, preferable to the normal location within the clubhouse. He had seen the subject Extra E230 taxi up to the end of the RW, as well as several other ac, to await departure, holding in a position beneath the off-set approach path which 'aims' approaching pilots at a point to W of the threshold before they have to turn R onto the RW C/L for landing. The C207 was seen to carry out a normal approach, passing about 30-50 ft over the E230 before touching down. The marked hold is about 120 m to the W of the 26 threshold, N of the RW near the signal square/clubhouse but ac normally taxi closer towards the RW threshold stopping 50-60 m from the RW end and just clear of the off-set final approach track. The marked holding point is in its original position, dating back over 10 years, when the airfield only had 1 RW and there were trees along the northern edge of the airfield boundary.

UKAB Note (2): Popham is not listed in the UK AIP. This unlicensed airfield is referred to within various Flight Guides available to pilots. Pooleys Flight Guide for Popham remarks *"Approaches to Rwy 26 marked with a large White arrow to avoid overflying filling station at eastern end.* The RAF Flight Information Publication Minor Aerodromes for Popham quotes Aerodromes Special Warnings *"Local thld gradient Rwy 08 1% down, 26 3.3 % down"* and remarks *"Avoid overflying the bungalow and garage at the East end of the A/D (approach marked with thld arrows).*

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Pilot members were surprised at the C207 pilot's approach technique, as described from his CA1094 report. Best practice for a short field landing would normally be a stabilised approach at the recommended 'short field' speed, slightly steeper than normal; a low flat approach was not the best way to reduce stopping distances. That aside, of more concern was the practice of ac

taxying to position themselves close to the RW threshold underneath the offset final approach path and being overflown by landing ac; it was this manoeuvre by the Extra pilot that had led to the Airprox. It appeared that engine 'run-ups' could be carried out at the marked hold, which is well clear of the threshold area. However, pilots then tended to move towards the threshold, anticipating entry and use of the full length of the RW available, particularly the initial downward slope. It was thought that visiting pilots may be unaware of the adverse safety implications involved in taxying beyond the holding point and by simply 'following the leader', they could end up in what is seen as an unsafe position beneath the approaching/landing traffic. Common practice had rendered this situation 'normal', but pilots should be aware of the implications of such actions at an unlicensed airfield. There was always the possibility of an ac undershooting on its approach and possibly colliding with any obstacle short of the RW. An A/G operator has no authority to exercise positive 'control' over ac and ultimately pilots are responsible for the safety of ac movements and should be aware of all 'local procedures' before commencing their flight. Members thought that those responsible for

airfield management at Popham should carry out a risk assessment on their flying operations as part of their 'Duty of Care' to the public.

Turning to risk, the C207 had carried out a low flat approach over ac positioned near the RW threshold with 15-20 ft clearance, accepting this as normal practice. The view from the Extra cockpit was of an approaching Cessna on an unstable flight path which eventually passed 5-8 ft above it. Although the E230 pilot had placed himself in that position, he believed himself to be at the holding point. The Board agreed that the whole scenario of ac approaching to land directly over another ac on the ground was unsafe and that the low vertical displacement that resulted in this case put the safety of both ac at risk.

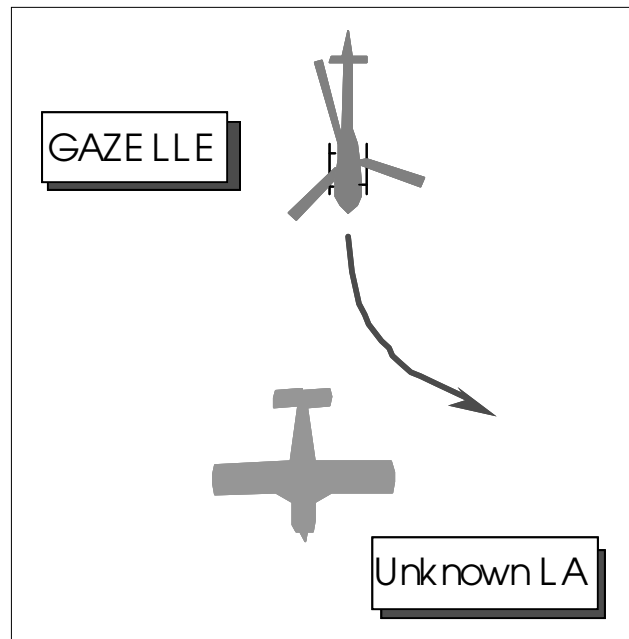
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The E230 pilot taxied beyond the holding point and positioned his aircraft beneath the marked approach path to RW 26.

Degree of Risk: B

AIRPROX REPORT NO 39/02

Date/Time: 14 Apr 1119 (Sunday)
Position: 5340 N 0201 W (4 NM S of Hebden Bridge)
Airspace: London FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Gazelle Untraced
Operator: JHC NK
Alt/FL: 2500 ft NK
(QNH)
Weather VMC CLOC NK
Visibility: >10 km NK
Reported Separation:
NR NK
Reported Separation:
Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GAZELLE PILOT reports that he was returning from Leuchars to Shawbury VFR, heading 180° at 125 kt and in receipt of a 'Limited' RIS from Leeds APPROACH (APP) on 123.7 MHz. The assigned squawk was selected with Mode C and the HISL was on. APP passed him a squawk and frequency for Manchester APPROACH, whom he was instructed to call and who apparently had been passed his flight details. He was 'heads-in' the cockpit for less than one minute whilst the specified Manchester squawk and frequency were selected. When he looked up and before he could establish communication with Manchester, a light single engined high wing monoplane (LA) was spotted in his 12:30 about 50 m away at the same altitude on a similar heading, but flying at a slower speed. He immediately turned hard L to avoid the LA. No assessment of the minimum separation was given, but he opined that if avoiding action had not been taken he would have collided with the LA, which had white wings and a black tailplane.

The initial call to Manchester APP was then made – after which he tried to report the Airprox on RT, but the controller stated that because he was VFR he was unable to accept the report. When he

landed, he telephoned the Leeds APP controller who assured him that neither a squawk nor primary contact that could be associated with the LA was visible on his display at the time of the Airprox.

LEEDS ATC reports that the Gazelle pilot contacted Leeds APP on 123.75 MHz at 1106, in transit to Shawbury at 2500 ft QNH, requesting a RIS. APP assigned a squawk of A2674 and upon identification placed the flight under a limited RIS because of the helicopter's low altitude - radar coverage to the SW is poor below 3000 ft ALT. The controller passed details of the flight to Manchester APP and then handed over the position to another controller when the helicopter was about 10 NM E of POLE HILL, southbound. As the Gazelle's track took it close to the eastern side of the Manchester CTR at 1119, the oncoming controller instructed the helicopter pilot to squawk A7000 and to contact Manchester APP on 119.4 MHz. However, the Leeds APP controller omitted to inform the pilot that the radar service was terminated when the flight was transferred. No other radar contacts - either primary or secondary - were observed on the Leeds radar in the Gazelle's vicinity at any stage. Consequently,

there was nothing to indicate the presence of another ac at the time of Gazelle's transfer to Manchester APP.

AIS (MIL) report that they have been unable to ascertain the identity of the reported ac. A C150 is shown at an earlier time, but of a different colour scheme; the reporting Gazelle pilot is adamant that this Cessna is not the ac involved in the reported Airprox, which occurred later.

None of the LATCC (Mil) radar recordings illustrate this encounter. Leeds and Manchester ATSUs were subsequently contacted and requested to review their recordings. Leeds reported that although the Gazelle is shown the reported ac is not. Manchester reported that a faint primary return was just visible for a few moments but a track could not be determined. Therefore, in the absence of radar data, aerodromes in the vicinity that operate ac of a similar description were contacted during procedural tracing action. Despite exhaustive enquiries this proved fruitless.

UKAB Note: Tracing action was terminated by the UKAB on 26 Jun 2002. Therefore, the reported LA remains untraced.

ATSI comments that when the Gazelle pilot called Manchester APP he passed his intended routing and, in return, received the Manchester QNH. The pilot then advised that he wished to file an Airprox which the Manchester APP controller wrongly took to be a criticism of the service provided. The controller did not realise that the Airprox occurred at the time of the frequency change and was still in the process of identifying the helicopter; he explained that as the helicopter was operating VFR it was the pilot's responsibility to maintain an adequate look-out.

No ATC causal factors have been identified and Manchester ATC have reminded their controllers that they may find situations when a pilot simply wishes to report a set of circumstances on their frequency, which might not be connected with the service provided or the situation pertaining at the time.

JHC comments that this Airprox highlights the need for lookout, especially when operating single pilot. This was compounded by the pilot switching between frequencies for the respective ATSUs, in an area of poor radar performance. It

is unfortunate that the LA could not be traced. With hindsight, it may have been advisable to increase lookout between changing frequency and then the transponder code, but this Airprox resulted from a momentarily higher workload for the single pilot of the helicopter.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was unfortunate that it had not been possible to identify the reported ac and with only the Gazelle pilot's report and that of Leeds ATC to draw on, the picture was far from complete. However, from the information provided by the reporting pilot it appeared to the members that the helicopter was in an overtaking situation where the reportedly slower untraced LA had right of way. Whilst it was not feasible to ascertain the untraced ac's speed, the apparent differential was probably not great – members thought at most a 30 kt overtake – so from the Gazelle pilot's perspective the untraced ac could have been in his field of view for some time whilst apparently on the same heading. Such essential actions as frequency selection and transponder setting have to be accomplished at some time and will inevitably effect lookout scan, but even a period of 'heads-in' the cockpit for less than one min demanded a concentrated and disciplined lookout beforehand, which the Gazelle pilot probably did. The Army pilot member had stressed that this was a very experienced pilot, but the tail-on aspect, reported black and white colour scheme - probably on a steady bearing with little perceptible rate of change – had all apparently conspired to mask its presence from him. Though the helicopter pilot had sensibly sought a RIS from Leeds APP, the controller was clearly unable to provide details of any traffic if he could not see it on his display and it was apparent that he had no other known traffic in the area. The report from Leeds ATC had confirmed that nothing was evident at the time and indeed, neither the LATCC (Mil) nor the Manchester radar recordings showed any evidence of another ac. However, there was an ac there, despite it going undetected on radar and fortunately the Gazelle

AIRPROX REPORT No 40/02.

pilot saw it. This incident was a salutary lesson to all pilots on the limitations of radar detection and to expect the unexpected even when a radar service has been requested as radar will not see everything in the FIR. Members agreed therefore that by chance, the unfortunate distraction of the frequency change had come at precisely the wrong moment in this overtaking situation and although he may have been effecting a well disciplined lookout, this Airprox had resulted from a late sighting by the Gazelle pilot. HQ JHC comments were nonetheless well founded and the army member advised that pertinent topics such as 'division of attention' and 'see and avoid' will be reinforced to all aircrew.

That the Gazelle pilot did not succeed in obtaining the right response when he called Manchester was unfortunate and not indicative of the norm, as had been explained by ATSI in their report, but again if they could see nothing there was little assistance that they could provide. All this was

not apparent to the Gazelle pilot at the time when he was suddenly confronted with the unknown LA at close quarters, which required robust avoiding action. Doing nothing was not an option and if he had not turned hard L when he did the two ac might have collided. However, he did see it in time to turn away and thereby alter his flight path sufficiently to remove the risk of a collision, but according to his report it was a close call nonetheless. With no other information to the contrary, the Board concluded that the safety of the subject ac had been compromised.

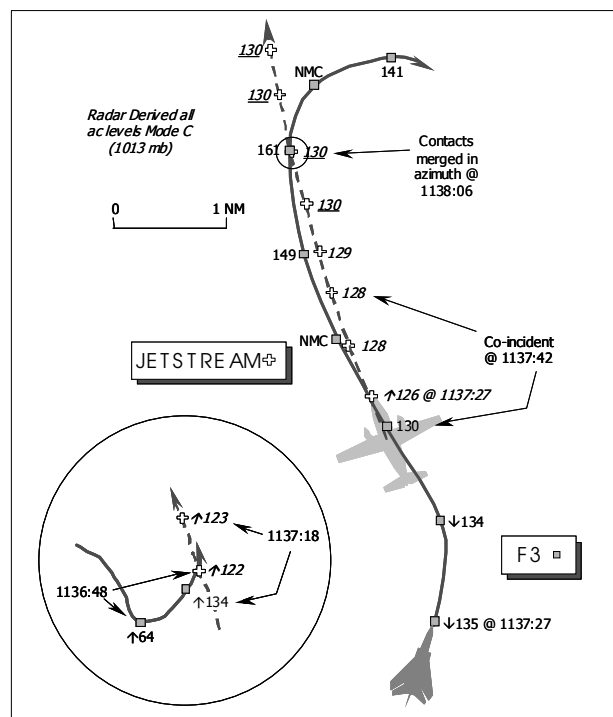
PART C: ASSESSMENT OF CAUSE AND RISK

Late sighting by the Gazelle pilot in an overtaking situation.

Degree of Risk: B.

AIRPROX REPORT NO 40/02

Date/Time: 15 April 1140
Position: 5408 N 0025 W (12 NM W of Flamborough Head)
Airspace: Vale of York AIAA (Class: G)
Reporting Aircraft Reported Aircraft
Type: Jetstream 32 Tornado F3
Operator: CAT HQ STC
Alt/FL: FL 120 12000 ft (RPS)
Weather VMC VMC CLAC
Visibility: 10 km 'Unrestricted'
Reported Separation:
600 ft H 1500 ft V, 1000 ft H
Recorded Separation:
200 ft V @ 1¼ NM H
3100 ft V @ merge



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JETSTREAM PILOT reports his ac has a white colour scheme with red & blue stripes and red engine nacelles; all available ac lighting was on including HISLs and landing lights. He was flying from Humberside to Aberdeen – on an IFR FPL - at 180 kt, under a RIS from PENNINE RADAR and squawking A6321 with Mode C; TCAS is not fitted. Heading 350°, NW of OTR climbing through FL 120, shortly after initial contact with PENNINE, the controller reported fast moving traffic 1000 ft above his ac and directly astern that was not in contact with PENNINE. The climb was immediately stopped, he levelled his ac at FL 130 and asked the controller what the best avoiding action was, but this could not be established with PENNINE because the radar returns had merged. About 1 min afterwards, the other ac – a Tornado F3 - was first spotted at 3 o'clock about 500 yd away in a hard R turn, about 600 ft above his ac.

As the jet approached from astern he was unable to assess the risk, but he added that as the F3 pilot was not on the PENNINE frequency he had to assume (although unlikely) that the jet pilot was not visual with his ac. After landing he discussed the situation with Humberside ATC and the F3 pilot who had opined that there had been no risk to his Jetstream.

THE TORNADO F3 PILOT reports his ac is camouflage grey, but HISLs were on whilst conducting general handling in the Vale of York AIAA. He was not under any form of ATS or ADS, but squawking A7000 with Mode C.

Flying at 350 kt at 6500 ft Barnsley RPS, heading 150° just E of Linton-on-Ouse, an AI radar contact was detected about 20-25 NM away. The contact was in a shallow climb as he flew past about 3 NM to the W of it on a southeasterly heading. To ensure that their general handling was conducted well away from airway L975 he then turned onto N, regaining AI radar contact on the other ac at a range of about 5 NM and acquiring it visually shortly afterwards about 6000 ft above cloud. The other ac – a Jetstream with red engine nacelles - was about 1500 ft below his ac and separated laterally by about 1000 ft so he was not directly above it. He then overtook the Jetstream about 1500 ft above it and offset by

1000 ft to the W in a climbing attitude, maintaining a northerly heading at a safe distance and visual throughout.

He stressed that as he was flying in the same direction as the Jetstream - after the turn to stay N of L975 - he had taken the opportunity to identify the contact. Realising that it was a civilian ac he deduced it would be transiting through the area and thus no longer a further "factor" to his sortie in this busy class G Airspace. Had it been an RAF Jetstream, it might have been conducting general handling and so might have posed a threat. He added that the Vale of York AIAA was busy and he had encountered numerous Tucanos prior to seeing the Jetstream, but took sufficient, safe separation against it and there was no risk of a collision.

UKAB Note (1): The Claxby radar recording shows the F3 squawking A7000 southeast bound passing W of the Jetstream before turning northbound at 1136:48, indicating FL 64 unverified Mode C (1013 mb). The Jetstream is shown steady northbound climbing slowly as reported. The F3 climbs above the Jetstream before descending back through FL 135 at 1137:27, as the jet turns in astern of the turbo-prop that is climbing through FL 126 Mode C. The F3 closes from astern descending to a minimum of FL 130 at 1137:42, at a range of 1.25 NM - some 200 ft above the Jetstream as it climbs through FL 128. The Jetstream levels at FL 130 two sweeps later, before the contacts merge at 1138:06; meanwhile the F3 is shown to have climbed to FL 161 as the jet overtakes the Jetstream some 3100 ft above it and hauls off to the east in a descending R turn.

UKAB Note (2): A review of the PENNINE RADAR RT transcript reveals that the Jetstream crew made their initial call at 1137:10, climbing to FL 185 and passing FL 125. The controller immediately responded, *"there's high-speed traffic just turned climbed through your level closing from behind you a thousand feet above at the moment...about a mile behind you"* adding, *"stop your climb I suggest, he's now only 600 feet and closing rapidly from behind"*. The Jetstream crew acknowledged and queried *"do you suggest*

any avoiding action?". To which the controller advised "Yeah he's right on top of you now...your blips have merged...I can't get any height readout from him at the moment what's your level?" At 1138:00, the pilot responded "130 levelling", before the controller advised that the F3 Mode C was now garbling at about "..150", adding that the jet "could be just pulling in front of you in...about your half past twelve one o'clock in a right turn I think". The Jetstream crew then reported visual contact, "..we've got him he's just going into our four o'clock and...diving back down". After confirming that the F3 had "..turned well clear heading south now passing FL 87 descending", the controller advised the Jetstream crew to recommence their climb to FL 185.

ATSI reports that there were no apparent ATC causal factors. The Jetstream crew established communication with PENNINE RADAR at 1137:10, in the climb to FL 185 routeing OTR - NEW - SAB inbound to Aberdeen. At this point the F3 – squawking A7000 - had already passed W abeam the Jetstream and was now turning in behind and towards it. Without time to establish the radar service required, the controller reacted quickly and passed traffic information to the Jetstream crew. This was followed by a suggestion to stop the Jetstream's climb, but it would appear that the pilot did not hear this call as he requested avoiding action. By this time the respective radar contacts had merged and avoiding action was not possible. However, traffic information continued to be passed on what the controller could see on his display within the constraints of SSR label overlap.

Although the Humberside RT recording was not available, the PENNINE controller suggests that Humberside had earlier passed traffic information to the Jetstream crew about the F3, as the jet passed clear on the beam and below it. The Jetstream was apparently transferred to PENNINE 'clean', only after the tracks had crossed and before the F3 had turned back towards the civil ac.

There was not much more either ATSU could have done, considering the speed of the F3 and its sudden turn back toward an ac it had already passed when some 6000 ft below it.

THE F3 PILOT'S UNIT comments that this crew was operating under VFR conditions in an AIAA.

Having decided to visually identify the ac, they could possibly have given it a wider berth to avoid any unnecessary concern; they have been debriefed on this point of airmanship.

The airspace where aircrew can operate freely is shrinking rapidly and Class G airspace is vital to all aircrew. Both military and civil aircrew alike, must be aware that when transiting through these areas they may encounter other ac engaged in training exercises; they must be prepared to maintain an effective lookout and take avoiding action if appropriate.

HQ STC comments that the F3 crew was conducting general handling in a Class G AIAA. On observing stranger traffic the crew decided to identify the ac to ensure their mutual safety. As they got closer, the F3 crew initially believed the stranger was an RAF Jetstream and so closed to positively identify the ac, while observing the standard safe minimum separation distance of 1000 ft, which has to be accorded to military ac. If the stranger had been positively identified as a civilian earlier, then the F3 should have pulled away with greater separation. However, there was never any risk of a 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, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members could not understand why the F3 crew had closed on the Jetstream. In view of the considerable amount of publicity which had apparently been circulated to military fast jet crews, extolling them to stay well clear of civilian ac because of the potential to induce unwarranted TCAS RAs, this Airprox appeared at first sight to have been an intentional intercept of a civilian ac proceeding about its lawful occasions in the FIR. The STC member's view, was that all ac flying in the FIR should expect to encounter military FJs and furthermore should expect to be visually identified. This caused members concern. They asked if the FJ pilot was aware of the effects that his actions had on both the other crew and the

controller. The F3 pilot had said he was not aware that it was a civilian ac at the time and here the Board acknowledged the reportedly similar livery of this Jetstream to the standard colour scheme used on RAF ac of the same type, might possibly have misled him until he spotted the red engine nacelles close in. His purpose in identifying the contact had been to ascertain whether it would pose a further problem to his sortie. He thought an RAF Jetstream could start manoeuvring, which a civilian ac was unlikely to do. However the Board concluded that this logic was flawed; equally, a civilian Jetstream might begin manoeuvring e.g. taking avoiding action. Some pilot members thought there was no need to close on the Jetstream at all – if the F3 pilot wanted to do 'general handling' in a clear area then it would have been better to turn away from the contact rather than point right at it and overhaul it from directly astern. A long discussion ensued on the reasons for approaching an ac in this manner and the STC member explained that this was the method that was taught to Air Defence crews for Visual Identification (VID). Tactics were no business of the Board, but here, closing from directly astern gave the Jetstream pilot no opportunity to spot the fighter whatsoever until it had overtaken him; additionally it placed the PENNINE RADAR controller in a very difficult position, because whatever he did the F3 was always going to close. Members were reminded of a similar situation which occurred in Airprox 206/00, where the operating authority (a different Command to that of the F3) had placed clear-cut minima on their pilots not to encroach within 5 NM or 5000 ft of a civilian ac. Members asked if different rules applied in this case. It was explained that although it varied between Commands, in general STC crews were prohibited from closing within 5 NM of ac known to be civilian; if it was an unknown ac – as here – the minimum horizontal separation to be accorded was 3000 ft. He added that there were no separation minima specified for civil ac against one another and that the military parameters were inherently safer. This raised a basic question. How could crews obey the 5 NM rule if they had to get closer first to determine whether the other ac was military or civilian? Some members believed that if identification (using an ATSU or ADGE Unit if need be) had not been positively established at 5 NM, the crew should haul off and not get any closer. Here, the F3 crew

thought it was a military Jetstream and so pressed on in. The STC member added that these issues were being addressed and that he anticipated a more restrictive rule, additionally preventing Air Defence crews from closing on military training or unidentified ac. It was likely that in future, closure for visual identification would be limited to FJ against FJ, but this issue was still undergoing final consultation. The Chairman opined that these procedures seemed in need of review; rules should be written in a way that made them easily understood and achievable by all concerned. Although some members were moved to make a recommendation on this point, it was clear that action was already in progress within the Command to resolve this issue.

It was evident that when the Jetstream had been with Humberside ATC the F3 was not in conflict whilst it was well below, heading SE. Hence the situation developed during transfer of the ac to PENNINE RADAR, when that controller was suddenly confronted with an unknown ac climbing rapidly toward the Jetstream from directly astern. The NATS advisor stated that NATS SSR equipment could not cope with rates of climb/descent in excess of 10,000 ft/min (neither could TCAS II Version 7) - the equipment 'logic' perceived such rapid rates as an 'error'. Hence, following the turn about by the F3 northbound behind the Jetstream, the rapid 7000 ft climb from FL 64 to FL 134 in 30 sec (about 14,000 ft/min) would have been undetected and thus not displayed to PENNINE RADAR until the RoC had reduced. Sympathy was expressed for the PENNINE controller who, apart from passing traffic information alerting the Jetstream pilots to the situation, was otherwise powerless in a close quarters overtaking situation such as this. If he had proffered an avoiding action turn he could have inadvertently turned the Jetstream into the F3 unexpectedly. His instruction to the Jetstream crew to level their ac was about as effective avoiding action as could be passed at the time after spotting that the F3 Mode C was now indicating above the Jetstream. Hence members concluded there was little more the controller could have done; he had spotted the hazard and reacted well, providing pertinent traffic information. The Board judged that this Airprox was caused by the F3 crew, who flew sufficiently close to cause concern to the Jetstream pilot and PENNINE RADAR controller.

With regard to risk, however, the Board agreed that though unbeknown to the Jetstream pilot at the time, the F3 pilot was in visual and AI radar contact with the other ac throughout and had got no closer than either 1.25 NM or 3100 ft when he overtook the other ac. He was always in a position where he could have afforded greater separation if needed, consequently the Board agreed that no risk of a collision had existed in the circumstances that pertained here.

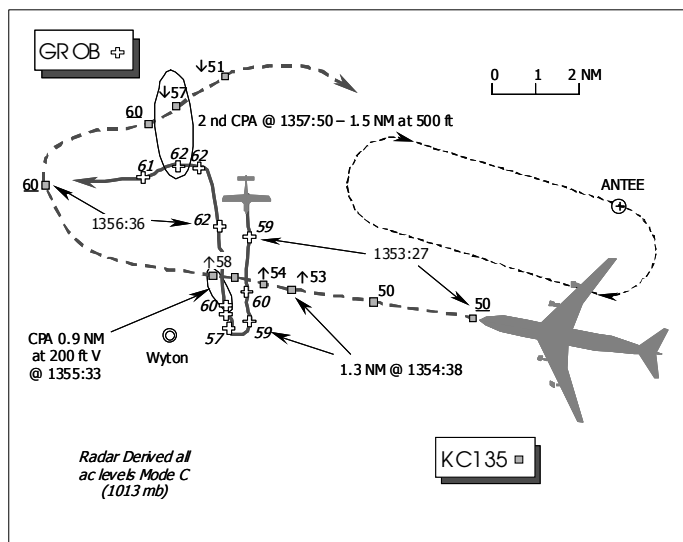
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tornado F3 crew flew sufficiently close to cause concern to the Jetstream pilot and PENNINE RADAR controller.

Degree of Risk: C.

AIRPROX REPORT NO 41/02

Date/Time: 26 March 1355
Position: 5225 N 0010 W (2 NM NE of Wyton - elev 135 ft)
Airspace: London FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: KC 135R Grob Tutor
Operator: Foreign Mil HQ PTC
Alt/FL: ↑FL 60 ↑FL 60
Weather VMC CLAC VMC NR
Visibility: NR 30KM +
Reported Separation:
 ¼ NM H 500 ft V, 1 NM H
Recorded Separation:
 200 ft V, 0.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KC 135R PILOT reports that his ac is camouflaged grey, but upper and lower HISLs, navigation and landing lights were all on whilst inbound to Mildenhall under a RAS from Lakenheath APPROACH. The assigned SSR code was selected with Mode C; TCAS is fitted.

He was established in the ANTEE [288R MLD 11d] RHD TACAN hold at 200 kt, about 2000 ft above cloud in VMC at FL 50 and endeavouring to resolve an undercarriage malfunction. Whilst flying outbound heading 288° at 15 DME, TCAS showed traffic at 10 o'clock - 3 NM away. A low wing, single engine light ac (LA) was then sighted just starting a R turn away from his ac, so he turned R 10° to avoid it. Then, the LA made an

aggressive 360° turn, he thought, which resulted in a TCAS RA, demanding a climb as the LA closed to about 0.25 NM off the port wing at the same altitude. He initiated a 1500 ft/min climb and banked R at 45° AOB to avoid the LA, before he was instructed by APPROACH to climb to FL 60 and proceed to CHIPP [107R MLD 11d] on the opposite side of the airfield. Upon steadying E for CHIPP, the same LA seemed to carry out a "slice-back" which "set off" his TCAS again - the RA demanding a "descend/adjust vertical rate" at an increased ROD before it changed to a climb as the LA closed again to about 0.25 NM.

Lakenheath had VFR traffic everywhere but no traffic information or avoiding action had been

proffered by APPROACH. He opined that although the weather was "VFR" (sic) on top of broken cloud at 4000 ft with excellent visibility, conducting "aerobatics over a published fix is not smart". It did not appear to him that the other pilot was looking out and clearing the airspace during his aerobatics.

UKAB Note (1): The KC135 pilot's initial report – in an unconventional format - was not received by the UKAB until over 3 weeks after the event. This stated that a HATR (Hazardous Air Traffic Report) had been filed with Lakenheath ATC and HQ USAFE. Unfortunately, Lakenheath ATC had not impounded any RT recordings and an internal investigation has not been conducted. Fortunately, AIS (Mil) were able to identify the reported ac promptly within 3 days of notification, because LTCC radar recordings are held for 30 days before reuse. Thus it was not until about one month after the occurrence that the reported Tutor pilot was notified of the Airprox.

THE GROB TUTOR PILOT, a QFI, reports his ac has a white colour scheme, but the HISL and landing light were on throughout the sortie. He was not under an ATS but a squawk of A7000 with Mode C was selected and he was 'listening-out' on a PTC 'quiet' frequency. Whilst supervising a student conducting a general handling test in class G airspace, he spotted the KC135. As far as he could recall he ensured that his ac was kept a safe minimum of 1 NM horizontally and/or 500 ft vertically from the KC135, which appeared to be flying in a large E-W racetrack and therefore returned to the same area several times. He kept the KC135 in visual contact throughout, but at most he was only using the same area for about 10 min before his sortie profile required him to conduct a practice forced landing to a field, before recovering to Wyton. He added that minor changes were made to his flightpath to ensure that a conflict did not develop, whilst still allowing his student to follow the sortie profile. The risk of a collision was "nil". Nevertheless, a reminder has been circulated to all Wyton aircrew of the Mildenhall holds, with advice that ac should be given as wide a berth as possible to avoid TCAS 'alerts'. However, he stressed that this area is used for general handling by up to 15 Tutor ac from Wyton and a large number of GA ac operating under VFR.

UKAB Note (2): The UK Mil AIP at AD2 – EGUN –1 –18, in effect on the day of the Airprox, specified that the Mildenhall RHD ANTEE hold was orientated on a QDM/QDR of 108°/288° [now 101°/281°] between 11 - 16 NM DME. It is used as the hold for ILS & TACAN approaches to RW11 and flown at a maximum of 6000 ft ALT. Furthermore, it is used as the intermediate approach fix for TACAN RW11 and the hold for the MAP for RW29 at 2500 ft ALT.

MIL ATC OPS reports that HQ STC was not informed about this incident until some time after the event. HQ3AF subsequently advised that Lakenheath ATC had not impounded any RT recordings nor did they conduct an internal investigation. Consequently, there is little information available to report upon or provide constructive comment.

The Lakenheath APPROACH controller could not recall the event with any accuracy. However, the ATC facility watch log contains the following entry:

"Advised by [KC135 C/S]...holding at ANTEE FL 50, 10 mile legs, RIS, gear problem. VFR traffic issued 10 miles NE at FL 50. ARRIVAL asked if he could accept a climb. Pilot concurred and reported receiving numerous TCAS alarms, within vicinity. We directed ac to hold at CHIPP, to work his gear issue. As [the KC135] turned toward CHIPP, VFR traffic climbed and turned toward [the KC135 which] descended on his own to FL 50 and [then] informed ARRIVAL he was climbing back up to 60 and proceeded direct CHIPP. He informed RAPCON he would be filing a HATR on the VFR ac."

The Chief Controller contends that traffic information was passed to the KC135 crew about the Tutor until the KC135 pilot received the TCAS RA. Apparently, at this time the KC135 pilot advised Lakenheath that he would file a HATR, however, it was made clear that he did not regard the RAPCON to be at fault so no further action was taken by Lakenheath ATC.

A further memo was added in the log to the effect:

"No HATR was filed [with Lakenheath]...RAPCON [who] provided all the service that they could. [The Unit] was unaware that a HATR was filed;

[until subsequently advised by HQ3AF/HQSTC so] the tape was not saved. It was assumed that the pilot decided the HATR was unnecessary."

Lakenheath ATC reports that the KC135 crew was in receipt of a RIS, not a RAS as the pilot reported. However, with no tape transcripts this cannot be confirmed. It appears from the log entry, as though traffic information was passed to the KC 135, although whether information on the Tutor was part of that, cannot be confirmed. Under a RIS there is no compunction for a controller to provide separation against traffic, only information on observed conflicting tracks, this appears to have been done. Without the necessary tape transcripts and controller's report further investigation is impossible.

UKAB Note (3): The Debden radar recording at 1353:27, shows the KC135 outbound heading 288° level at FL 50 Mode C, with the Tutor at R 12:30 - 5.5 NM, squawking A7000 and indicating FL 59 unverified Mode C. The Tutor continues southbound crossing ahead of the KC135; the LA ascended to FL 60 at a range of 3 NM, where the KC135 pilot reported the TCAS TA and subsequent sighting occurred. The Tutor makes a tight R turn of over 180°, descending to its minimum observed level during the occurrence of FL 57 and then reverses the turn L onto 350° and ascends to FL 60. Meanwhile, the KC135 is shown in the climb. The CPA of 0.9 NM and 200 ft occurred at 1355:33, as the KC 135 climbed through FL 58 and passed through the 12 o'clock of the Tutor, which then begins to draw aft of the tanker. The 45° AOB avoiding action R turn reported by the KC135 pilot is not evident on the recording and it is difficult to reconcile a climbing RA in this situation. At 1356:36, the KC135 is level at FL 60 and shown turning about through N – probably in response to the instruction from APPROACH to set course for CHIPP – as the Tutor maintains its northerly track. The second encounter occurs as the Tutor steadies westbound indicating FL 62 - the 2nd CPA at 1357:50, is 1.5 NM and 500 ft - as the Tanker descends through FL 57, apparently in response to the RA, before it turned L away from the Tutor.

HQ 3AF comments that after notification of a HATR Lakenheath ATC Facility Orders require tapes to be held for 30 days; however, if no request for further action is received by the unit, the tapes are automatically recycled. In this case,

because of the late filing of the HATR, both USAFE and HQSTC tasked Lakenheath in early May, well after the 30 day period had expired. Nevertheless, it seems that as a result of a misunderstanding the tape was not impounded in the first place so even had all actions been taken promptly, the tape would still not have been available. It is unfortunate that the ATSU failed to realize that, despite the KC-135 reporting that his intended HATR did not reflect adversely on them, they should have carried out an investigation without delay, without which the precise details of the incident cannot be ascertained.

Although the incident took place in Class G airspace, the position of the ANTEE hold is published in RAF FLIPS; the Mil AIP and TAP Charts. Moreover, as the hold is used predominantly by large, comparatively slow manoeuvring ac, the advisability of carrying out general handling in its vicinity must be questionable. As a result of the incident a number of USAFE procedures have been reviewed.

HQ PTC comments that the Tutor QFI was able to keep the KC135 in sight throughout the encounter at a sufficient distance not to cause him any concern. The latter was, for quite justifiable reasons, flying well outside the hold which is, in any case, outside regulated airspace. We therefore believe that the unit's measured response, as endorsed by HQ EFT, is correct.

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 was unfortunate that the KC135 pilot and his organisation, had taken so long to forward the initial report into this incident, which had not been filed in accordance with promulgated UK procedures. The Board was briefed by the HQ 3AF adviser that the USAF format HATR must be filed within 24 hours and here that was not done. It was emphasised that Lakenheath RAPCON does follow established procedures and the Board was advised that the RAPCON does, as a matter of course, retain RT recordings for a minimum of 30 days in accordance with JSP 318A procedures.

The HQ PTC member emphasised that Wyton had promulgated a reminder to their crews about the various holds, but members were conscious that these IFR holds are only shown on the respective Terminal Approach Charts and under the Lakenheath entry in the UK Mil AIP - they are not depicted on VFR charts. Locally based operators would be expected to be familiar with IFR holds in their vicinity, but not elsewhere and their promulgation in the AIP did not guarantee exclusive use to anyone of the Class G airspace contained therein. Any view to the contrary would show a lack of understanding about the UK airspace structure, but nonetheless the tanker pilot's view that "*aerobatics over a published fix is not smart*" was valid and operating in the vicinity of a known hold could be viewed as questionable airmanship. However, the radar recording revealed that the KC135 pilot had flown a very wide racetrack pattern - significantly outside the published hold parameters - and the Grob was nowhere near the ANTEE 'fix' at the time, but about 2 NM NE of his base at the moment of the first encounter. Members did not think this was unreasonable. The KC135 pilot's statement that the Grob pilot did not appear to be looking out and clearing the airspace during his aerobatics was apparently incorrect as the Grob pilot reported he had the KC135 in sight throughout.

In Class G airspace where see and avoid predominates as the means by which pilots flying under VFR separate themselves from other traffic, some members wondered if the KC135 pilot was familiar with UK airspace and, more specifically, flying operations in the 'Open FIR'. The HQ3AF

adviser was unable to provide a positive answer on this point, but thought that the tanker pilot may have been surprised to encounter so much uncontrolled VFR traffic in the vicinity of the IFR ANTEE hold. Furthermore, he could not confirm if compliance with a TCAS RA was one of the specified occurrences which demanded the filing of a HATR. It did not seem to members that a climb RA could have occurred during the first encounter with the Grob and the subsequent minimum separation evinced by the radar recording of 0.9 NM and 200 ft as the KC135 flew past the LA and climbed to its level, seemed to bear out the Grob pilot's contention that he had remained a reasonable distance from the tanker. During the second encounter an even greater margin existed and it was evident that either the passage of time or the size of the Grob had distorted the KC135 pilot's appreciation of how close the Grob had come to his jet. Given that the Grob pilot had the tanker in sight throughout and had remained a minimum of 0.9 NM away the Board concluded unanimously that this had been a routine encounter between IFR and VFR traffic in the FIR, where no intrinsic risk of a collision had existed. Accordingly, they judged it to be a sighting report.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Sighting Report

Degree of Risk: C.

AIRPROX REPORT NO 43/02

Date/Time: 16 Apr 1716

Position: 5139 N 0243 W (10 NM NW Filton - elev 226 ft)

Airspace: FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: JS31 PA28

Operator: Civ Comm Civ Trg

Alt/FL: ↓3000 ft 4000 ft ↑
(QNH 1016 mb) (QNH 1016 mb)

Weather VMC CLBC VMC CLOC

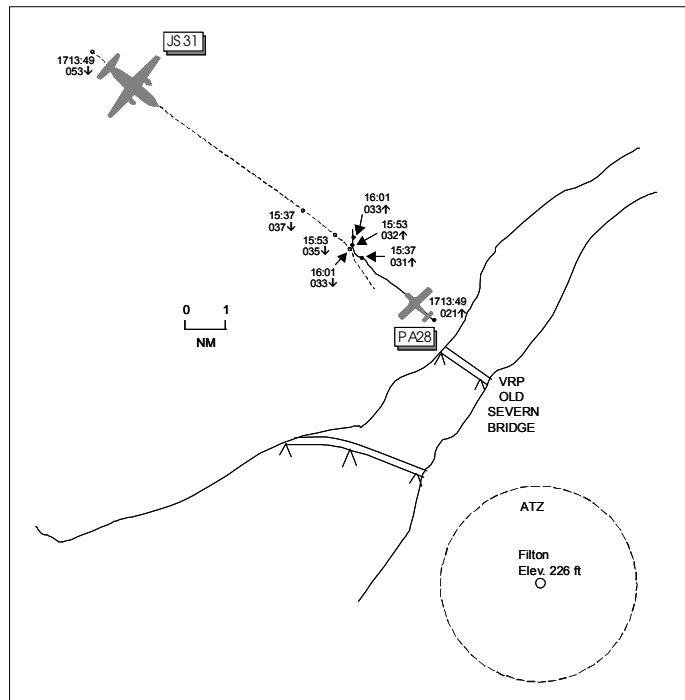
Visibility: 20 km 10 km

Reported Separation:

200 ft V 0.25 NM H 500 ft V 2 NM H

Recorded Separation:

nil V 0.25 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JS31 PILOT reports flying inbound to Filton at 220 kt squawking 5427 with Mode C and in receipt of a RAS from Filton RADAR on 122.72 MHz. The visibility was 20 km 1500 ft below cloud in VMC, the ac was coloured white with three coloured stripes, anti-collision and strobe lights were switched on and TCAS was not fitted. Approaching the Old Severn Bridge on a radar heading of 130° and descending through 3500 ft for 3000 ft Filton QNH (1016 mb) in accordance with his ATC clearance, the controller told him about conflicting traffic in his 12 o'clock. Simultaneously, he saw a PA28 in his 12 o'clock range 0.5 NM and about 300 ft below; the co-pilot, the PF, turned R to avoid the PA28 as its pilot also commenced a R turn at the same time. The PA28 was seen to pass 200 ft below and 0.25 NM clear on his LHS and he assessed the risk of collision as high.

THE PA28 PILOT reports flying a local instructional training sortie from Filton squawking a discrete code with Mode C and in receipt of a FIS from Filton on 122.72 MHz. The visibility was 10 km in VMC, the ac was coloured white with two blue stripes and his anti-collision light was

switched on. He was demonstrating climbing flight to his student, with particular emphasis on the use of the mnemonic 'DABLE' in which the 'L' is for lookout, involving a weave of the ac's nose to starboard (as in this case) followed by a return to the original heading. As he was talking through this procedure with the student and passing 4000 ft QNH, he thought, he heard ATC inform another ac on frequency, the subject JS31, of his position. This alerted him to the JS31's presence which he acquired visually about 3 NM ahead. He turned R simultaneously as the JS31 turned away and it was seen to pass about 2 NM clear on his LHS and 500 ft above. He did not consider the risk of collision as high, nor think any more of the encounter at the time, as his preventative early avoiding action was considered to be part of normal daily operations in the training environment. He had been surprised that the other pilot had filed a report although he thought an earlier warning from ATC, particularly as both ac were transponding, could have prevented this incident. He did not recall being advised by ATC of the JS31 but he always listened closely to the RT to give himself better awareness of other

traffic, even if the transmissions are not specifically addressed to his ac.

ATSI reports that the Filton APR described his operational position as 'busy' at the time of the incident, not only because of the number of ac on the frequency but also because of the number of telephone calls he had to make. He added that, due to staffing issues, he did not have the services of an ATS Assistant (ATSA) to assist him with his task.

The weather observation, current at the time of the incident, was reported as: Surface wind 230°/06 kt, Visibility 15 km, Nil weather; Cloud scattered at 5000 ft.

The PA28 established communication with Filton APPROACH, at 1708, routeing VFR to the N, squawking its Filton allocated SSR code, and was placed under a FIS. The pilot reported his intention of operating to the N of the Severn Bridges, between 1500 and 5000 ft.

In accordance with agreed procedures between Filton and LACC, the JS31 was transferred to Filton APPROACH, under the terms of a 'Silent Release', at RADNO, descending to FL 110. The Filton APR identified the ac on its initial call, at 1708, and informed the pilot that he would provide a RAS, whilst vectoring the flight for an ILS Approach to RW 09. The JS31 was cleared to descend to FL 40 and placed on a radar heading of 165°, to position it towards L base. The APR commented that he had anticipated that this heading would keep the ac clear of the PA28. Further descent to 3000 ft was issued at 1711. Shortly afterwards, TI was passed to another ac, under a FIS, about the PA28, giving its position as *"east of the old bridge by a couple of miles"*.

The Filton MATS Part 2, Page 1-9, states that *"Subject to ATC operations at the time, departing ac will be offered runway 27 and arrivals will be offered runway 09"*. Consequently, the JS31 was, initially, positioned for RW 09. However, owing to a departure from RW 27, plus an inbound from the E, it was decided, between the ADC and the APR, that the JS31 would be vectored to RW 27. The pilot was informed accordingly, and, at 1713, was instructed to turn L heading 130°, to position towards a downwind leg. The radar recording timed at 1713:54, just after the JS31 had made the L turn, shows this ac at FL 53, with the PA28

at FL 21 (2200 ft QNH 1016 mb) i.e. 3200 ft below it. Both ac are on conflicting, reciprocal, tracks, 11.6 NM apart. The APR explained that he did not notice the potential confliction between the subject ac adding that, for the next 2 minutes, he was busy controlling other traffic inbound to Filton and carrying out telephone co-ordination. This involved a call from Bristol Airport concerning an inbound and a protracted discussion with the ADC about the RW in use, with particular reference to an inbound ac at a range of 15 NM for RW 27 and cct traffic downwind for RW 09. Consequently, the APR admitted that he did not monitor the progress of the JS31 until, at 1716, he realised from his radar display that the Jetstream was in close proximity to the PA28, which he assumed would have been further E than it actually was. He immediately informed the JS31 pilot that *"there's traffic in your twelve o'clock manoeuvring er general handling VFR at three thousand feet"*. The pilot replied that he was visual with the traffic. The APR explained that when he noticed the situation, the SSR labels of the subject ac were overlapping and it was not possible to determine their exact position relative to each other. Therefore, he had not issued avoiding action instructions.

UKAB Note: The Clee Hill radar recording shows the JS31 steady tracking SE bound at a RoD calculated as 750 ft/min with the PA28 flying in the opposite direction climbing at about 500 ft/min. At 1715:37 the PA 28 is seen to turn about 20° L passing FL 31 with the JS31 1.8 NM to its NW descending through FL 37. Sixteen seconds later, whilst the Jetstream is descending through FL 35, the PA28 has commenced a R turn 0.57 NM ahead indicating 200 ft below. The CPA occurs between radar sweeps, the radar at 1716:01 shows the PA28 now tracking N, having passed the JS31, which has turned 20° R, 0.34 NM S of the PA28; both ac indicate the same level - FL 33. It is estimated that horizontal separation reduced to within 0.25 NM shortly before 1716 as the subject ac passed abeam each other.

The MATS Part 1, Page 1-40, states that: *"A Radar Advisory Service (RAS) is an air traffic radar service in which the controller shall provide advice necessary to maintain prescribed separation between aircraft 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. Where time does not permit this procedure to be adopted, the controller shall pass advice on avoiding action followed by information on the conflicting traffic. Even though the service is an advisory one, controllers shall pass the 'advice' in the form of instructions". The JS31 was, subsequently, vectored for a visual approach number two to a Citation, its pilot making no further comment, on the frequency, about the encounter with the PA28. No TI was passed to the PA28 pilot, although he later reported that he had become aware of the JS31 when ATC warned its pilot about his presence. The MATS Part 1, Page 3-23, provides advice and guidance to controllers on the safe integration of VFR flights, with the IFR flow, in the vicinity of aerodromes. It states that: *"Although in Class D, E, F and G airspace separation standards are not applied, ATC has a responsibility to prevent collisions between known flights and to maintain a safe, orderly and expeditious flow of traffic. This objective is met by passing sufficient traffic information and instructions to assist pilots to see and avoid each other".*

The APR mentioned that, prior to the Airprox, his workload had increased because of the number of co-ordination telephone calls he had to make/receive. He commented that, if an ATSA had been available to assist with these calls, he would have been better able to concentrate his attention on the traffic situation at the time. This, he believed, would have allowed him to monitor the progress of the JS31 and take appropriate action with respect to the PA28.

The provision of an ATSA in the Approach Control Room, would, undoubtedly, have helped the APR Controller carry out his tasks. In view of this incident and another, which occurred in similar circumstances during April 2002, it has been decided, by ATC Management, that priority is to be given to ensuring that an ATSA is available in the Filton Approach Control Room when rostering support staff.

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.

This had been an encounter in Class G airspace with both pilots responsible for maintaining separation from other traffic. The JS31 pilot saw the PA28 late, after receiving TI from the Filton APR whilst the PA28 pilot had estimated seeing the JS31 about 3 NM away. However, members believed that this had been a situation involving late sightings by both crews, as they had seen and turned simultaneously. Also, the JS31 was in receipt of a RAS from Filton Radar following a radar vector under which service he would expect to receive timely TI and advisory avoiding action. However, the Filton controller had been busy and only noticed the confliction as the subject ac radar labels merged; he only passed TI to the JS31 crew. Members agreed that the Filton APR had not fulfilled the terms of the RAS 'contract' with the JS31 crew and this had been a part cause of the incident.

Looking at the risk element, late as it was, the TI from the Filton APR was given in sufficient time to allow the crew to see the conflicting PA28 and effect a R turn to avoid a collision; the PA28 was seen to pass 200 ft below and 0.25 NM clear on their LHS. For his part, the PA28 pilot was receiving a FIS from Filton and had heard the Jetstream pilot's transmissions which alerted him to its presence and intentions; he saw it and also turned R to avoid. Members wondered about the discrepancy in distances reported by the PA28 instructor when he first sighted the JS31 and his estimated separation from it. He had reported seeing the JS31 3 NM ahead and had watched it pass 2 NM clear on his LHS after turning simultaneously with the Jetstream. The RT transcript had shown the TI being passed to the Jetstream crew when the ac were within 1 NM of each other and the recorded radar had revealed a CPA of 0.25 NM. Members agreed that the distances estimated by the PA28 instructor had been inaccurate and the available information corroborated the JS31 pilot's estimates. Without the benefit of STCA and TCAS, the see and avoid principle had worked but unintentionally the subject ac had flown into close proximity. The Board concluded that both crews had taken appropriate action to ensure that they were not going to collide but nevertheless had flown close

enough to one another to the extent that safety had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

- a. Late sightings by both pilots.
- b. The Filton APR did not fulfil the terms of the RAS.

Degree of Risk: B

AIRPROX REPORT NO 44/02

Date/Time: 14 Apr 1451 (Sunday)

Position: 5102 N 0143 W (3 NM SE Salisbury)

Airspace: FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Rollason Condor PA28R Arrow

Operator: Civ Pte Civ Pte

Alt/FL: 1700 ft 2000 ft ↓
(QNH 1013 mb) (RPS 1009 mb)

Weather: VMC CBL VMC CBL

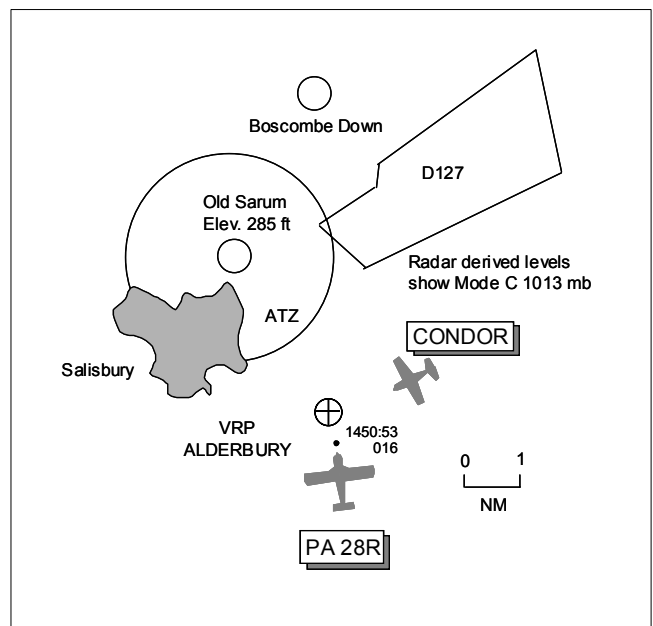
Visibility: 15 km 10 km

Reported Separation:

100 ft V 50 ft H 200-250 ft V

Recorded Separation:

not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ROLLASON CONDOR PILOT reports heading 260° at 1700 ft QNH 1013 mb and 95 kt en route from Popham to Devon and he was listening out with Old Sarum RADIO on 123.2 MHz. The visibility was 15 km 3000 ft below overcast cloud in VMC, the ac was coloured white with red/orange/yellow trim lines, twin fuselage strobe lights were switched on and no transponder was fitted to the ac. When passing Alderbury VRP both he and his PPL passenger commented on how visible the IOW Needles were when he spotted a PA28R in his 10 o'clock, he thought <500 m away, at about the same level. He watched it for 1-2 seconds and realised that the bearing aspect was constant and that a risk of collision was high. He initiated a steep descending L turn whilst keeping the other ac in sight which passed 100 ft above and 50 ft ahead

routing towards Salisbury. He could read the registration of the PA28R which appeared not to have seen him as it did not wing-waggle or turn to indicate acknowledgement of a visual sighting. He estimated that only 6 seconds had elapsed between his first sighting of the PA28R until it had passed and he believed it was only their avoiding action that had averted a collision.

THE PA28R ARROW PILOT reports flying between Sandown and Old Sarum at 130 kt and he was in receipt of an A/G service from Old Sarum RADIO on 123.2 MHz. The visibility was 10 km 1000 ft below cloud in VMC, the ac was coloured white with strobe lights switched on and he was squawking 7000 with Mode C. He was tracking Northbound from the Bournemouth (BIA) NDB towards Alderbury VRP to follow the

standard Old Sarum joining procedure flying at about 2500 ft RPS (1009 mb), he thought, eventually to position for a crosswind join for RW 06 LH. As Boscombe Down was not active there was no requirement to be below 1100 ft at the VRP. Passing 0.5 NM SE of the VRP, having commenced descent, heading 340°, he saw a low wing single-engined ac below him in his 2 o'clock, range 1 NM. He stopped his descent at 2000 ft RPS and passed virtually overhead the other ac, he estimated 200-250 ft above whilst his PPL passenger thought 150-200 ft. Although he had been surprised to see another ac flying on that particular heading routeing to the SE of Alderbury, as he thought it had been outbound from Old Sarum, he had maintained good visual contact and separation with it throughout. He assessed the risk of collision as low.

UKAB Note (1): Met Office archive data shows the Portland RPS 1400-1500 UTC 1009 mb.

UKAB Note (2): Analysis of the Pease Pottage recorded radar was rather inconclusive. A 7000 squawk is seen between 1448:12 and 1448:36 initially 6 NM S of Alderbury VRP steady tracking 010° maintaining FL 017 before fading 1 NM later. This radar contact is believed to be the PA28R which pops up for only one further radar paint at 1450:53, as shown on the diagram, SE abeam Alderbury now indicating FL 016. The Condor is not seen at any time on recorded radar and its position shown on the diagram is not derived from radar data and is for pictorial presentation purposes only.

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 radar video recordings.

Members were surprised that the subject ac had been flown so close to each other in such good weather conditions but it was apparent that each pilot held a different view of the incident. From the Condor cockpit, the pilot had temporarily distracted himself from keeping up with his lookout scan by directionally concentrating/

focussing his attention towards the IOW (approx 8 o'clock position). It was then that the PA28R had suddenly appeared in conflict, a combination of a white ac against an overcast cloudy background, without warning, even though he was listening out on the Old Sarum frequency. Members believed that he should have broadcast his flight details as a warning to any other ac inbound to or departing from the airfield via the VRP. However, that aside, it was clear that this had been a late sighting of the PA28R and this was a part cause of the Airprox. Meanwhile, the PA28R pilot had seen the Condor, he estimated 1 NM away, and had continued towards Old Sarum whilst flying overhead the other ac, avoiding it by about 200 ft, he thought, by arresting his descent. The radar recording, although not showing the Condor at all, had revealed the Arrow at 1700 ft Mode C 5-6 NM to the S of Salisbury, and one further response near Alderbury at 1600 ft Mode C which indicated that both ac would have been flying at similar levels. Taking these facts into account, members believed that the PA28R pilot, on sighting the Condor when he said he did, should have manoeuvred his ac to avoid it by a much greater margin and, in not doing so, he had flown unnecessarily close to the Condor, sufficient to cause its pilot concern. This was also a part cause of the Airprox.

Opinions were divided when it came to assessing the risk. From the Condor pilot's view of the incident, he had seen the conflicting Arrow late, judged what action was needed to avoid it and had done so by turning sharply L and descending; it appeared to him that the Arrow pilot had been unsighted throughout and that it was his own actions alone that had resolved the encounter and that his safety had been compromised. The Arrow pilot's view was that he had seen the Condor which he avoided by passing 200 ft above maintaining visual contact throughout. Although the PA28R pilot had flown close to the Condor, some members concluded from what the former had said that he was always in a position to remove any risk of a collision. This, combined with the Condor pilot's positive actions, persuaded the majority of the Board that in the end any risk of collision had indeed been removed; a minority remained unconvinced.

PART C: ASSESSMENT OF CAUSE AND RISK

Degree of Risk: C

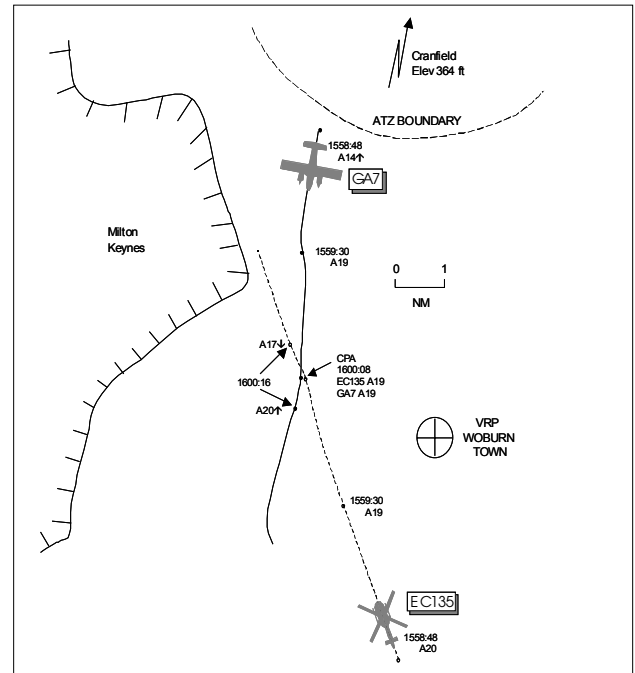
Cause: The PA28R pilot flew sufficiently close to cause concern to the Condor pilot, who saw the PA28R late.

AIRPROX REPORT NO 45/02Date/Time: 19 Apr 1600Position: 5200 N 0039 W (4 NM SSW Cranfield - elev 364 ft)Airspace: FIR (Class: G)Reporting Aircraft Reported AircraftType: EC135 GA7Operator: Civ Pte Civ PteAlt/FL: 2000 ft 2300 ft
(QNH 1022 mb) (QNH 1022 mb)Weather VMC HZBC VMC HZBCVisibility: 5-7 km 12 kmReported Separation:

0 ft V 150-200 m H 50-100 ft V 100 m H

Recorded Separation:

nil V <0.1 NM H

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE EC135 PILOT reports flying with 2 crew en route from Hayes to a private site in Yorkshire heading 340° at 130 kt, 2000 ft Cranfield QNH 1022 mb and in receipt of a FIS from Cranfield APPROACH on 122.85 MHz squawking 7000 with Mode C. The visibility was 5-7 km in haze below cloud in VMC, the ac was coloured silver/blue and his anti-collision and 2 strobe lights were switched on. He had contacted Cranfield APPROACH after leaving the Luton CTR and requested TI and a FIS as he planned to fly to the W of the Cranfield ATZ via Milton Keynes. He, the PNF, suddenly saw a twin-engined ac less than 0.5 NM away approaching quickly from the R 1 o'clock position at the same level; it was obviously on a collision course. The PF and it appears the conflicting ac's pilot also must have visually acquired each other

at about the same time, as the PF turned hard R to pass behind the GA7 and commenced a descent as its pilot turned R and climbed. He estimated that he missed the GA7 by about a couple of hundred metres and it was the closest encounter that he had ever experienced in 23 years of commercial flying.

THE GA7 PILOT reports flying solo on departure from Cranfield to Elstree at 130 kt and in receipt of a FIS from Cranfield TOWER on 122.85 MHz squawking 7000 with Mode C. The visibility was 12 km in haze below cloud in VMC, the ac was coloured white/blue and his strobe lights were switched on. Just as he levelled off at 2300 ft Cranfield QNH (1022 mb), he saw a helicopter slightly L of his 12 o'clock about 100 m ahead and

50 ft below, it almost filled the windscreen; he executed an immediate level turn to the R to avoid it. The helicopter pilot had been talking to Cranfield ATC and had reported level at 2000 ft passing 4 NM abeam the airfield but had not requested a service even though its track was passing close to the RW 22 climb out path. At the time of the incident, he was heading 180°, flying into sun in hazy conditions and he assessed the risk of collision as high.

ATSI reports that the GA7 departed from RW 22 at Cranfield cleared VFR on track to Elstree. At 1557:30, the EC135 called and was told to standby. When asked to pass his details, just over a minute later, the EC135 pilot reported that he was en route from Hayes to Leeds at 2000 ft and would be passing 4 NM W of Cranfield. He commented that because *"there's so much noise on your radio"* he would QSY and just maintain a listening watch. The controller advised that it would quieten down shortly and placed the flight under a FIS. At 1600, the controller advised the EC135 pilot that he had it in sight and to report leaving the frequency. Approximately half a minute later, the EC135 pilot reported the Airprox.

MATS Part 1, page 3-23, states: *"Although in Class D, E, F and G airspace separation standards are not applied, ATC has a responsibility to prevent collisions between known flights and to maintain a safe, orderly and expeditious flow of traffic. This objective is met by passing sufficient traffic information and instructions to assist pilots to see and avoid each other. It is accepted that occasionally when workload is high, the traffic information passed on aircraft in Class F and G airspace may be generic rather than specific"*. Furthermore, MATS Part 1, page 2-1 states: *"Aerodrome control is responsible for issuing information and instructions to aircraft under its control to achieve a safe, orderly and expeditious flow of air traffic and to assist pilots in preventing collisions between...aircraft flying in, and in the vicinity of, the aerodrome traffic zone"*.

Although providing a FIS, the controller told neither the GA7 about the EC135 nor vice versa. Both flights were VFR and, therefore, the pilots were responsible for maintaining their own separation, nevertheless, it is assessed that the Cranfield controller might reasonably have been expected to pass TI under these circumstances.

At the time of the Airprox, the controller was operating the aerodrome and approach frequencies in a bandboxed mode and reported traffic levels as 'light to medium'.

UKAB Note: Analysis of the Debden and Stansted radar recordings at 1558:48 shows the GA7 2 NM SW of Cranfield steadying on a nominal track of 185 and climbing through an altitude 1400 ft Cranfield QNH (1022 mb) with the EC135 5.1 NM to the S, tracking 340° level at 2000 ft QNH. The GA7 continues to climb until levelling off at 1900 ft QNH at 1559:30. The subject acs' tracks cross 4 NM SSW of Cranfield at 1600:08, as the radar returns merge (<0.1 NM apart), both ac indicate 1900 ft QNH. Eight seconds later the EC135 indicates 1700 ft QNH descending, 0.5 NM N of the GA7 now showing 2200 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.

It was clear from what the pilots had said that this Airprox had been caused by late sightings from both cockpits. The EC135 pilot had called on the Cranfield frequency after the GA7 had been cleared for take-off so had missed his departure call and was eventually provided with a FIS. The GA7 pilot had heard the call from the helicopter but it appeared that he had misunderstood the EC135 pilot's intentions to 'pass to the W of the airfield' as a position report. The GA7 pilot had then departed southbound VFR and into conflict. However, members acknowledged that on this track he had flown into sun in hazy conditions which would have contributed to the late sighting. Looking at the whole situation, members agreed that the Cranfield ATCO had been the only person who knew the full 'traffic picture' but he had not passed TI to either pilot and this had also contributed to the incident.

Turning to risk, both pilots agreed that they had seen each other late, yet there appeared to have been enough time to take effective avoiding action - the EC135 had turned R and descended

whilst the GA7 had also turned R and climbed. These actions had been enough to prevent a collision but had put the two ac into close proximity. The Board agreed that this had been an encounter where the pilots' actions had been 'just in time' but they had passed close enough to the extent that their safety had not been assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sightings by both pilots.

Degree of Risk: B

Contributory Factors:

- Lack of TI to either pilot by Cranfield ATC
- Hazy, into sun flight condition for the GA7 pilot.

AIRPROX REPORT NO 47/02

Date/Time: 22 April 1210

Position: 5534 N 0057 W (119° ST ABBS
47nm)

Airspace: Scottish FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: DHC8 SHAR FA2

Operator: CAT CINC FLEET

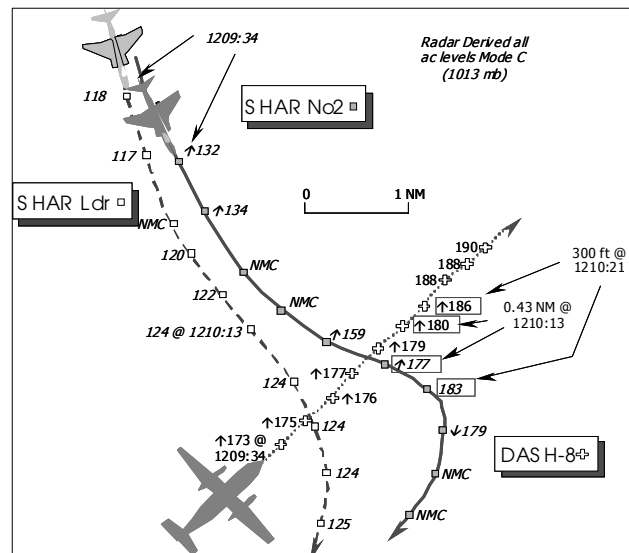
Alt/FL: FL 170↑ 18000 ft
(QNH)

Weather IMC IN CLOUD VMC

Visibility: NR 15 NM

Reported Separation:
100 ft V 1.8 NM H

Recorded Separation:
0.43 NM H, 300 ft



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DASH-8 PILOT reports that he was outbound from Newcastle to Stavanger, heading 035° at 165 kt, climbing through FL 170, IMC, under an ATS from ScACC. Traffic information was received about unidentified traffic, which was "found" on TCAS when selected, 4100 – 5100 ft below his ac at about 10:30 – 10 NM away, which seemed to be on an opposite track. The observed traffic then changed direction and started to climb and further traffic information was received from ATC that the unknown ac was closing. TCAS enunciated "TRAFFIC", followed shortly afterwards by an RA commanding a 2000 ft/min climb, which he complied with immediately, by

selecting maximum rpm and power. The other ac, which was not acquired visually, passed 100 ft directly below his ac - according to TCAS. Shortly thereafter, ATC advised he was clear of the traffic. He assessed there had been a risk of a collision.

THE SEA HARRIER (SHAR) FA2 PILOT reports that he was flying as No2 of a 2-ship FA2 section, under an ADS from the ship's fighter controller (FC) during the second phase of his carrier's (CVS) Basic Operational Sea Training (BOST) 'work-up'. This was within a promulgated exercise area – CVOA-1 – the subject of a NOTAM. His section was tasked by the ship's FC to 'Visually

Identify' (VID) an unknown northbound ac, S of but heading toward, the Exercise Area. They were expecting to intercept a Falcon EW ac, which had been tasked to participate within this work-up serial as the 'exercise enemy' ac. Though No2 in the section, he was acting for this VID as the leader. The SHAR pair headed S at 18000 ft FORCE (ships) QNH, descending to remain VMC. SHAR AI radar contact was established with the other ac – subsequently identified as the subject DASH-8 - which did not deviate from its course flying just below a sheet of cloud on a northerly heading. A beam intercept was achieved from the NW, and the section approached the other ac low, in the other pilot's 9 o'clock. He gained visual contact – but did not specify the range – and identified and reported the ac to be a DASH-8. When he recognised the ac was a DASH-8 and not the anticipated Falcon target he immediately hauled off and commenced a hard R descending turn to increase vertical and horizontal separation, rolling out heading SW away from the DASH-8. The minimum separation noted on his AI radar was 1.8 NM – he thought. The DASH-8 was flying a very similar profile at a similar speed to the expected Falcon ac and was approximately the same size. He emphasised that throughout the VID evolution, both ac in the section were 'controlled' by the ships FC.

THE SCACC TAY SECTOR CONTROLLER

reports the DASH-8 crew made their initial call on frequency passing FL 136 for FL 230 and were told to squawk A7440 [UKAB Note (1): Cited in the UK code allocation plan at ENR 1-6-2-6 as allocated to ScACC for UK Domestic traffic). The flight was identified, the Mode C verified and the crew advised they were under a RIS. Shortly afterwards, traffic information was passed on an unknown ac - possibly a pair – seen on the Great Dun Fell radar 12 NM N of the DASH-8, heading S. An update was passed when the unknown ac had closed to a range of 5 NM - indicating FL 135 unverified Mode C. The DASH-8 crew replied that they "have it on TCAS"; traffic information was passed again as the unknown ac passed beneath the DASH-8 indicating about FL 135. At the time he thought that separation had not been eroded below 5000 ft.

THE SHIPS FIGHTER CONTROLLER (FC)

reports that he was providing tactical control and a RIS to three SHAR FA2 ac during an Air Defence Exercise (ADEX) – scheduled between 1215 –

1315 UTC - as part of the ship's aviation 'work-up'. Neither the ship's communications nor the ship's radar are recorded.

This section of 2 SHAR ac was operating as a Combat Air Patrol (CAP) approximately 25 – 35 NM SSE of the ship, against a 'threat', consisting of 2 Falcons and 2 Hawks. The ship was within CVOA-1 - a NOTAM'd area over the sea N of 56°N located E of Edinburgh - and the raid was expected at any time within a one hour period. A Sea King AEW ac was also airborne as a backup FC unit.

On commencement of the first raid, the SHAR section was committed S against two unknown contacts to the S of the ship at a range of about 50 NM, their mission to identify visually the unknown ac. The closest of the two contacts was northbound 15 – 20 NM from the SHAR section with a further group 30 – 35 NM away from the CAP also tracking in a northerly direction. The SHAR section had good AI radar contact from the initial commit to the intercept and reported the unknown ac's altitude; he could not remember what it was, but it was not confirmed by the AEW Sea King from the other ac's Mode C indication. Initially, he was unable to get a Mode A readout on any of the contacts, but as the SHAR section approached the closer of the two – the DASH-8 - he got an SSR Mode A readout indicating Teesside Approach, but it was also garbled, leading to a lack of confidence in its reliability. The SHAR section then reported that the contact was identified as a DASH-8 and pushed on to the S to intercept the next unidentified group, which was subsequently identified as the Falcon/Hawk raid.

ATSI reports that the DASH-8 departed from Newcastle on a direct track, through Class 'G' airspace, outbound for Stavanger. Communication was established with the ScACC TAY SC at 1205:40, as the flight was climbing through FL 136 for FL 230. The DASH-8 was identified and placed under a RIS. The crew responded "*thank you*" to the type of service but did not provide a full read back as is required by CAP 413 – the Radiotelephony manual. At 1208:10, the TAY SC asked the DASH-8 crew to report their flight conditions, who responded that they were about to enter IMC. The SC then passed traffic information to the effect that there were at least 2 ac at 10:30 – 12 NM, heading S, with unverified Mode Cs indicating respectively FL

145 and FL 138. The GDF radar recording indicates that, at the time, the DASH-8 was passing FL 160. The 2 unknown ac – the SHAR Section - were squawking A0021 – to indicate fixed wing ac receiving a service from a ship; if they had continued on their southerly track, they would have passed behind the DASH-8. The pilot of the DASH-8 acknowledged the traffic information and reported: *"... we have him on the TCAS."*

The DASH-8 and the 2 SHAR, which were in a slow descent, continued to converge until 1209:30, when the SC updated the traffic information, *"...that traffic is now in your nine o'clock range of five miles."* The DASH-8 crew replied, *"Track seems to be below"*, whereupon the controller advised *"yes indicating one three five unverified."* The radar recording, at 1209:39, shows the closest SHAR – the No2 - indicating FL 131 Mode C, in the DASH-8's 10 o'clock – 4.5 NM, turning L directly towards it. The following SHAR – the Ldr - continues on a track to pass behind the DASH-8 and its Mode C readout does not exceed FL 125 throughout the encounter. At that stage the DASH-8 was passing FL 174. The radar returns and Mode C readouts from both jets become intermittent thereafter, probably due to SSR garbling and a rapid climb executed by the (closest) No2, but it is possible to establish that the jet passed very close beneath the DASH-8 before making a tight R turn to join up with the lead SHAR again. At 1210:30, the SC advised the DASH-8 crew, *"... traffic now passed underneath you heading south at the moment"* to which the pilot replied, *"Yeah er checked we er got er information from TCAS to er start er climb...."*

[UKAB Note (1): The No2 SHAR passed through the DASH-8's 8 o'clock at a range of 0.6 NM climbing through FL 159 Mode C (1013 mb), 2000 ft below the DASH-8 indicating FL 179. The CPA occurred, subsequently at 1210:13; at this stage the SHAR was 0.43 NM astern of and 300 ft below the DASH-8 with both ac now heading away from each other at right angles. As separation in range continued to increase, the No2 SHAR ascended to FL 183 – still 300 ft below the DASH-8 that is by then passing FL 186 - before descending in a R turn to rejoin the other SHAR. The Section continues S, toward another ac, squawking A4644 - a code allocated to ScATCC (Mil) – which is northbound, about 14 NM SSW of the DASH-8.]

On the date of the Airprox, a NOTAM (Ref. H1267) was in force, stating the following :

"Fixed and rotary wing acft operating from a ship. Intense aerial activity taking place in an area [UKAB Note – CVOA-1] bounded by 5600N 00230W – 5650N 00230W – 5650N 00030W – 5600N 00030W – ORIGIN. SFC to FL240."

The Airprox occurred about 25 NM S of this area and the DASH-8's projected track would have taken it virtually through the southeast co-ordinate of the promulgated area.

The Tay SC fulfilled his responsibilities under the terms of the RIS provided. From the information available, it would appear that the No2 SHAR's rapid climb was not captured on the ScACC radar and this is borne out by the fact that the STCA did not activate. The following is a quote from the ScACC unit report : *"Post incident replay of the radar recording shows that the Mode C height readouts of the military targets were intermittent on the Lowther and Great Dunfell radars. When the DASH-8 was passing FL176, the simultaneous highest military level was shown as FL148. After this, Mode C appearances for the military aircraft were intermittent but one track – the one which climbed towards the DASH-8 – was more scant than the other(s). Following four primary paints with no height readout, a fifth paint showed an unverified level of FL183, indicating a rate of climb of some 4000 fpm towards the DASH-8."*

On 27 August 2002, ScACC TOI 82/02 was issued. This extended a procedure, detailed earlier in TOI 73/02 (Effective 12 July 2002), whereby ScATCC (Mil) have undertaken to provide specified civil flights with a radar service. The DASH-8's route is among the flights listed.

THE SHAR FA2 PILOT's SHIP comments that a full investigation has been carried out into this occurrence, which occurred in class G airspace during an Air Defence Exercise with the reporting ac approaching the ship coincidentally from the same direction the planned exercise 'raids' were expected. The jets were operating under VFR in visibility reported as greater than 10 NM. The SHAR Section had been tasked to intercept and VID the unknown ac; with AI radar contact on the reporting DASH-8 throughout, so there was no actual risk of collision, although the Dash 8 pilot would not have realised this at the time. It was

an unfortunate coincidence that the ac flown by the reporting ac was similar in size and shape to the expected opposition, resulting in the FA2s closing to a minimum range nearer than desirable for the VID. Instantaneous readout of SSR Mode A and Mode C data is not available to the FC onboard the CVS. If it was, then the DASH 8 might have been recognised earlier as a possible civilian track and height separation built into the intercept. This unit firmly believes that no risk of a collision existed, but stands ready to act on the findings of the AAIB.

UKAB Note (2): MILITARY FLYING REGULATIONS - JSP318 RN REGS 12205 – states:

INTERCEPTING CIVILIAN AIRCRAFT – AVOIDANCE CRITERIA

"1. Fixed wing aircraft may be required to fly intercepts against unknown targets of opportunity, for example, when conducting radar check test flights. Whenever possible, the intercepting ac should be in receipt of a radar service to permit intentions to be ascertained by the target aircraft's controller through co-ordination. All such manoeuvres are to maintain a vertical separation of 5000 ft or 'break off' by a minimum of 10 NM to ensure 5 NM lateral separation is always maintained".

AAIB conducted a field investigation into this Airprox but their comments were still awaited when this Airprox was considered by the Board

C in C FLEET advised that the HQ was awaiting the AAIB report before issuing further comment.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac. A transcript of the TAY Sector frequency, radar video recordings, reports from the air traffic controller and fighter controller involved, together with reports from the appropriate ATC authority and CVS.

Members noted that the AAIB had elected to conduct a field investigation into this Airprox – in parallel with the Board's assessment process and recognised fully the difficulties which confronted the CinC Fleet member.

The Chairman opened the debate with a resume of the main aspects of this Airprox; the SHAR FA2 pilot had been tasked by the CVS to execute a VID - an intercept - of the unknown contact, which the ship was unable to determine beforehand as an exercise player. The No 2 SHAR subsequently closed on the DASH-8 (with AI radar) and made visual contact before passing behind and below it, while climbing rapidly. Minimum separation came shortly after that (0.43 NM and 300 ft below) – apparently inside that permitted under the rules specified in JSP318 at Note 2. During the intercept the DASH 8's crew was responding to a TCAS climb RA induced by the SHAR's climbing manoeuvre. Some military members opined that in the current security posture which prevailed CAT crews should expect to be intercepted and the Board readily understood the operational rationale for this. However, this Airprox occurred during a planned air defence exercise in UK Class G airspace. Whilst the Board accepted it was entirely necessary to conduct such VID training, the evolution had to be conducted with safety in a manner which caused the least disruption to other airspace users and it was suggested that the rules governing such evolutions should protect the CAT pilot from events as happened here. The CinC Flt member believed that this was not an Airprox; others opined that this report would not have been filed if the DASH-8 had not received a TCAS RA. The majority of members, however, disagreed; alerts generated in the DASH-8 cockpit by TCAS (an RA) whilst being intercepted and flying IMC in cloud, warranted further examination.

A NOTAM had been issued which, some members thought encompassed the ADEX related here, but the CinC Flt member said this was not the case. Though CVOA-1 had been promulgated this was merely for localised ac operations in the vicinity of the carrier such as circuits, practice approaches and test flights by helicopters and jets, which occurred during the work-up phase and did not relate to this ADEX scenario. Members were surprised at this declaration, and pointed out that operators could be conscientiously endeavouring to avoid the NOTAM'd area and stay out of the navy's way but still find themselves caught up in exercise activity. Whilst it was not realistic to NOTAM the whole of the N Sea for this exercise members felt, nonetheless, that the NOTAM was misleading if the exercise was not intended to be confined to the area promulgated.

The debate turned to the ability of the ship's air direction organisation to determine what other ac were operating in the area. From the ship's comments the FC was unable readily to identify the DASH-8 as non-exercise CAT traffic, because he was unable to interrogate directly an ac's Mode A/C - and monitor it continuously from his control position. Possessing such capability would have shown the DASH-8 was under an ATS from ScACC and probably non-exercise traffic, which subsequently proved to be the case. Members were amazed that the ship's FC did not have suitable equipment to perform the SSR identification task, moreover, that the Sea King AEW - airborne as a standby FC platform - was entirely ineffective in this scenario. A civilian ATCO member asked what steps had been taken beforehand by the Navy to obtain flight data to prevent what had occurred here. Members were very surprised when the CinC flt member explained that the ship was unable to access the UK ASACS data from CRC Buchan - within whose Area of Responsibility (AOR) this Airprox occurred - via LINK or CROSSTEL communications systems. The Board was aware that the CRC at Buchan would have had a recognised air picture of their airspace and access to track identities, including that for the DASH-8. The CinC Flt member pointed out that the DASH-8 was not flying on an established route. However, others observed that this was a scheduled flight which took place several times daily between the UK and Norway, where no direct route within CAS existed. One member pointed out that the FC had reported a squawk allocated to Teesside; others familiar with the manner in which such ADEXs are conducted believed that this code might have been retained by one of the Falcons inadvertently after departing from Teesside, after being switched to ScATCC (Mil). It was explained that the Falcons did use various tactics when conducting such ADEXs to confound the ship's action information organisation and disguise their true identity and role. In the event the reported garbled Teesside squawk was not the DASH-8.

Having been tasked, the FA2 section had quickly established AI and visual contact on the unknown ac, so they were able to prosecute the intercept to a range where they could visually identify it. The FA2s were under a RIS according to the FC, where no separation would be provided, however, tactical direction could be applied if required. Therefore, it was up to the pilots to maintain

appropriate separation. An aircrew adviser qualified in AD operations thought this had been a benign intercept, not conducted in an overtly zealous manner. Nevertheless, civilian controller members were concerned at the RoC used in the final stages of the intercept, where the No2 FA2 was shown to have climbed nearly 5000 ft in a little under 3 NM. This led to the TAY SC's incorrect assessment of the minimum separation that pertained. There was nothing more the SC could have done in the circumstances and, equally the DASH-8 pilot had no choice but to comply with the TCAS RA, which apparently took him into the sheet of cloud. Some wondered how the No2 SHAR pilot had remained VMC if the DASH-8 pilot reported being in cloud, but evidently the former was still able to see the other ac. The NATS adviser explained that the STCA did not trigger because of poor SSR data induced by the RoC which entirely removed one of the safety nets. As an aside it was noted that ScATCC (Mil) now provide a RAS to these scheduled flights in the FIR.

The range at which the No2 FA2 pilot had realised the ac was not the 'enemy' Falcon for which they were searching was not evident. The rules quoted for naval pilots intercepting civilian ac specified that "*All such manoeuvres are to maintain a vertical separation of 5000 ft or 'break off' by a minimum of 10 NM to ensure 5 NM lateral separation is always maintained*". This prompted one member to ask how could RN crews obey the 5 NM rule if they had to get closer first to determine whether the other ac was military or civilian? Some members believed that if identification had not been positively established at 5 NM, the pilot should haul off and not get any closer as was apparently laid down by JSP318. The CinC Flt member explained that the rule in JSP318 applied only if the contact to be identified was known to be a civilian ac from the outset - if not (as here) the intercepting pilots could continue to much closer ranges. However, the 5NM/500ft limitation had been cited by COMNA in another Airprox (206/00) where a naval pilot had been judged to have breached the rule. Members asked what minima were used by the RAF and the STC member explained that intercepts on known civilian ac were prohibited. In cases where the identity of an ac was unknown, the minimum separation to be accorded was a 1000ft 'bubble'. Some civilian members found the short range at which the FA2 pilot had identified the DASH-8

difficult to reconcile – they thought a Falcon to be so dissimilar in size, shape and speed. A FJ member thought otherwise, explaining that size was irrelevant and that speed could be used to confuse ‘attackers’, making it understandable that the pilot had closed as he did. What did seem apparent from all of this was that the rules on ‘VIS Ident’ by military pilots on unidentified ac in peacetime, should be clear and not open to interpretation as had been the case in this Airprox. ‘Vis Ident’ exercises had to be practised but with due consideration to other airspace users, particularly airliners. In this context highly dynamic manoeuvres in the latter stages of a ‘Vis Ident’ will trigger collision warnings in TCAS equipped ac. A review was therefore recommended. Following this wide-ranging and lengthy debate it was concluded that the Airprox was caused during the intercept to identify the DASH-8 visually, by the No2 SHAR FA2 pilot who flew close enough to cause concern to the DASH-8 pilot. With regard to the risk of a collision, the SHAR FA2 pilot was always in a position to keep clear of the other ac and had prosecuted this intercept in a ‘controlled’ manner, albeit energetically. However all this was unbeknown to the DASH-8 pilot who was oblivious until he saw the No2 on TCAS and responded to the RA. Hence the Board agreed with the CVS’s view and concluded unanimously that no risk of a collision had existed.

It was apparent that the CVS had been operating in isolation in the N Sea, without any method of obtaining accurate flight information about other legitimate airspace users. Although a safety cell was tasked for a later part of the work-up and was aboard, it was explained that it was not tasked for this particular ADEX. However, no more complete

an air picture would have been available to the cell either. It seemed to members that the sophisticated equipment and communications available to the ASACS, could be used to advantage to help prevent a recurrence. Members ventured that if a safety controller was located at a CRC to oversee an exercise – as routinely occurs for OST in the Plymouth Sea areas overseen by Plymouth RADAR – with the ability to intervene to prevent unwarranted intercepts on CAT ac, this would be a great advantage. The Board concurred and recommended further, that the RN considers the feasibility of including an independent air safety cell ashore for each RN AD exercise at sea, within UK airspace.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: During an intercept to identify the DASH-8 visually, the No2 SHAR FA2 pilot flew close enough to cause concern to the DASH-8 pilot.

Degree of Risk: C.

Recommendation:

- a. The MOD considers a review of the rules for Visual Identification by military air defence ac in UK airspace.
- b. The RN considers the feasibility of including an independent Air safety cell ashore for each RN AD exercise at sea, within UK airspace.

AIRPROX REPORT NO 48/02

Date/Time: 18 Apr 1408

Position: 5139 N 0208 W (3.25 NM WSW
Kemble - elev 435 ft)

Airspace: FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Pilatus B4 Glider Hunter T7

Operator: Civ Pte Civ Pte

Alt/FL: 3500 ft 3000 ft ↓
(QFE NK mb) (QFE NK mb)

Weather VMC CLOC VMC CLBC

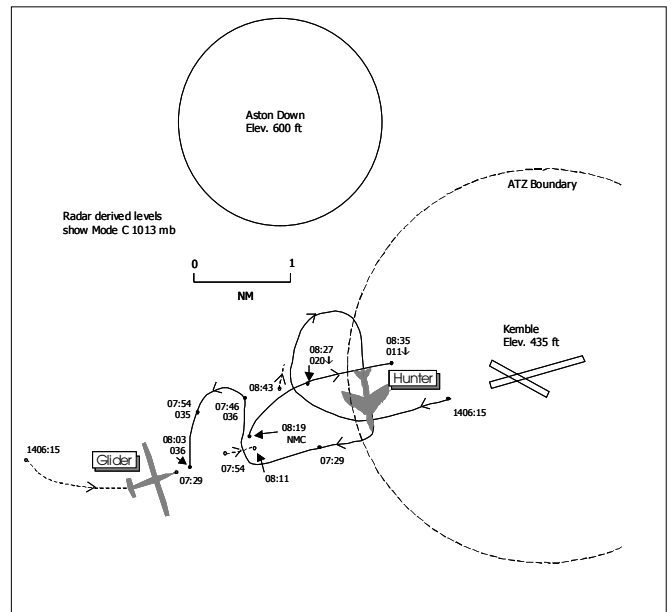
Visibility: 20 NM >10 km

Reported Separation:

50 ft V 100-150 ft H 150 ft V 200 ft H

Recorded Separation:

not recorded

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE PILATUS B4 GLIDER PILOT reports flying a local sortie from Aston Down heading 090° at 85 kt and at 3500 ft QFE, he thought. The visibility was 20 NM in VMC and although he was clear of a cloud layer to his N by about 500-1000 ft horizontally, its base was estimated to be at 2500 ft. The glider was not fitted with lights or a radio. He first saw the conflicting ac, a single engined military jet with large air intakes, about 2 NM ahead and below climbing rapidly which then contacted the cloud face about 1 NM ahead and it continued to fly along the cloud occasionally entering billows, passing about 600 ft to his port at the same level. A minute or so later, he heard the jet ac approaching; it appeared about 100-150 ft to his port and 50 ft above, 10° R wing down, in a diving attitude to pass ahead. He threw the stick forward and opened the airbrakes to avoid. This encounter had badly shocked him. He did not notice the time or exact position, although he normally positioned himself 4 NM from Kemble and Aston Down airfields, but he had returned rapidly to Aston Down for landing. He assessed the risk of collision as very high.

THE HUNTER PILOT reports flying solo on a local sortie from Kemble and was in communication with Kemble TOWER on 118.9 MHz. The visibility was >10 km in VMC, the ac

was camouflaged green/grey and his upper and lower anti-collision lights were both switched on. He was preparing to renew his Display Authorisation over Kemble Airfield and was holding after take-off to allow another ac to depart the Kemble cct. As part of his preparation, he climbed to check the cloud base upwind of the cct (3000 ft QFE) to confirm whether he could fly a full display sequence. On reaching the cloudbase he turned R and started to descend back toward the cct at 300 kt. He sighted a glider in his 2 o'clock range 600 yd in a level L turn, slightly nose-down, and below. Judging that he would pass above it, he took no positive evasive action other than to roll his wings level and pull slightly to arrest his RoD. He momentarily lost sight of the glider as it passed close on his RHS, by about 150 ft vertically and 200 ft horizontally, before he then rolled to the R back towards Kemble. It was obvious that their flightpaths were divergent and there had been, in any case, no time for action. He went on to complete his display and landed 10 minutes later but did not file a report as he judged this sighting in the 'open' FIR to be of no consequence. The view from the cockpit to his R was limited owing to the side-by-side seating and he did not assess the risk.

UKAB Note (1): The UK AIP at ENR 2-2-2-3, promulgates the Kemble ATZ, active 0900–1700 (0800-1700 in Summer), as a circle radius 2 NM centred on 514005N 0020322W, from surface to 2000 ft above the aerodrome elevation of 435 ft. Kemble is an unlicensed Civil Aerodrome providing AFISO on 118.9 MHz with A/G 'Kemble Radio' available when AFISO not in operation.

UKAB Note (2): The UK AIP ENR 5-5-1-1 promulgates Aston Down as a Glider Launching Site for winch and aerotow launches where cables and tug ac may be encountered up to 3000 ft agl, during daylight hours.

UKAB Note (3): Met Office archive data shows the QNH for the Kemble/Aston Down area as 1014 mb. No METAR was available for Kemble but Lyneham (10 NM SE Kemble) shows EGD L 181350Z 22013KT 9999 FEW022 FEW027TCU BKN230 12/04 Q1014 BLU TEMPO SCT018 WHI= Gloucestershire (14 NM NW of Kemble) shows EGB J 181350Z 23005KT 9999 -RA SCT018CB SCT024 BKN035 10/04 Q1015=

UKAB Note (4): The Clee Hill radar recording at 1406:15 shows the Hunter as a primary only return departing Kemble, initially tracking straight ahead after departure from RW 26; 16 seconds later, the Hunter is seen to commence a RH orbit. At the same time, a primary only return, believed to be the Pilatus glider, is seen 5.5 NM WSW of Kemble in a L turn eventually steadying onto a 080° track as the Hunter commences its orbit. At 1407:29 the glider fades from radar 4 NM WSW of Kemble with the Hunter 1.5 NM ahead commencing another R turn. At 1407:46, the Hunter is seen to reverse into a L turn and commence squawking 7004 indicating 3600 ft Mode C. 8 seconds later the glider reappears on radar still tracking 080° before fading again at 1408:11. The Hunter fades from radar at 1408:03 tracking S as it crosses 0.55 NM behind the glider eventually reappearing at 1408:19 as a primary only return to the N of the glider's last observed position. The Airprox is not seen but is believed to occur during this 16 second 'blind' period. The Hunter shows for 2 more radar sweeps at 1408:27 (2000 ft Mode C) and at 1408:35 (1100 ft Mode C) in a R turn towards Kemble before fading at 1408:35 (GS calculated as 360 kt) whilst the glider reappears 8 seconds

later 2.8 NM W of Kemble now tracking 010° towards Aston Down.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was clear from both pilots' reports that this had been a close encounter in Class G airspace. The Pilatus glider pilot had seen the Hunter earlier, prior to the Airprox, as it climbed out from Kemble but had then become unsighted and was surprised by its sudden re-appearance closeby after he had heard it approaching from behind him. Unlike the glider pilot, the Hunter pilot saw the glider for the first time as he approached it from its rear quarter, some 600 yd away. It was this late sighting of the glider by the Hunter pilot that had caused the Airprox. Both pilots had been going about their legitimate business in their usual manner, but some members thought that the glider pilot, who was operating upwind of the glider site, would have been better advised to operate clear of the extended C/L to Kemble's main RW. However, flying operations from both airfields were known to be less than ideal owing to other adjacent airspace constraints and the Board were informed by a BGA member that parties from both airfields were actively discussing local procedures to improve flight safety.

Looking at risk, some members believed that the geometry of the Hunter's flight path had been purely fortuitous in that he had seen the glider too late for much positive action, and that there had been an actual risk of collision. The majority of members did not share this view. Clearly the glider pilot had seen the Hunter after the danger point, as it passed him by 100-150 ft on his LHS, 50 ft above with a high overtaking speed (too late for his avoiding action to have been effective). However, the Hunter pilot had seen the glider in just enough time quickly to assess that the ac were not going to collide and momentarily adjust his flight path. Nevertheless, in doing so the Hunter pilot had passed close to the glider, at a distance that was less than ideal, to the extent that the safety of both ac had not been assured.

PART C: ASSESSMENT OF CAUSE AND RISKDegree of Risk: BCause: Late sighting by the Hunter pilot.**AIRPROX REPORT NO 49/02**Date/Time: 3 May 1130Position: 5558 N 00358 W (Cumbernauld Aerodrome - elev 350 ft)Airspace: ATZ (Class: G)Reporting Aircraft Reported AircraftType: Grob Tutor Robinson R22Operator: HQ PTC Civ PteAlt/FL: 400FT NR

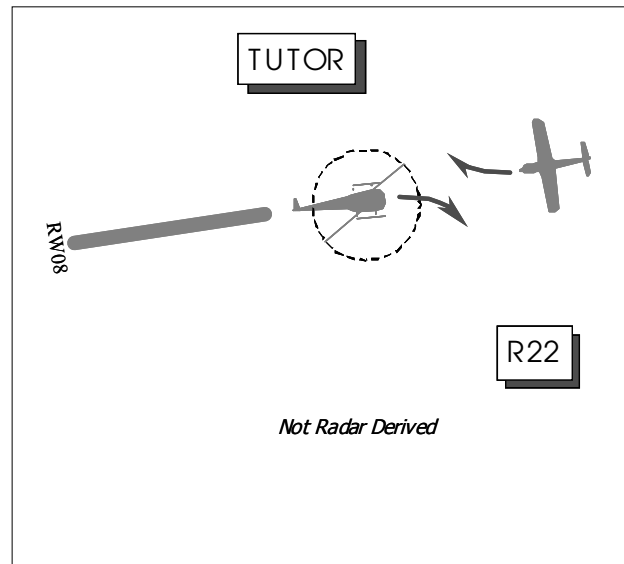
(QFE 1006 mb)

Weather VMC CLBC VMC CAVOKVisibility: 10 km 10 kmReported Separation:

200 ft 600 ft H

Recorded Separation:

Not recorded

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE GROB TUTOR PILOT, a QFI flying with a student, reports his ac has a white colour scheme, but the landing light and HISL was on whilst circuiting RHD to Cumbernauld RW26RHC at 70 kt and in communication with Cumbernauld RADIO on 120.6 MHz. After initially sighting the R22 helicopter on the ground whilst downwind, he was heading 260° in a straight descent on short finals when the helicopter took off and headed towards his ac. To avoid it he overshot and rolled right as the helicopter passed down his port side, about 200 ft below his ac with a "high" risk of a collision. He added that his workload at the time was high, whilst teaching the student to fly the final approach.

UKAB Note (1): The UK AIP at AD 2-EGPG – 1-1 (dated 21 Feb 02), promulgates the Cumbernauld ATZ as a circle radius 2 NM, centred on RW08/26, from the surface to 2000 ft above the aerodrome elevation of 350 ft and active in Summer from 0730 – 1900. Cumbernauld INFORMATION was

promulgated as providing an AFIS during those times. Cct direction on RW26 is RHD. On 8 Jul 2002 a permanent NOTAM was issued, belatedly revising the service provided from AFIS to that of an A/G communications service – which was being provided at the time of the Airprox.

THE ROBINSON R22 PILOT reports that his helicopter has a white & blue livery and the red anti-collision beacon was on whilst departing from Cumbernauld in CAVOK conditions. When he arrived earlier he had landed on RW08. He opined that whilst requesting "flight information and departure instructions", his concentration lapsed and he did not appreciate that the RW had changed to RW26 whilst he had been refuelling. Consequently, he executed his take-off on RW08. At 30 kt, climbing outbound, he saw a single-engined LA about 750 ft away just left of the nose, he turned R to avoid the other ac whose pilot also turned R as it passed about 600 ft away to port.

He added that it was "totally his fault and can only apologise", he heard all the calls but whilst "doing the read back it just did not sink in". He opined that it would not happen again.

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

THE CUMBERNAULD A/G STATION OPERATOR reports that he was providing an A/G communications service. At 0958 the R22 arrived at Cumbernauld on RW08. The helicopter pilot set down at the fuelling area and refuelled his helicopter. During this time the runway in use changed to RW26 RHD Cct. At about 1115, the R22 pilot called for start, radio check and aerodrome information. The R22 pilot readback the runway in use as RW26 RHD Cct, was advised that the Grob Tutor was R base turning final and then that the Tutor was finals for RW26. The Tutor pilot called final as the helicopter lifted outbound from RW08 into the approach path of the Tutor. Another helicopter pilot - an R22 instructor shutting down on the main apron - spotted the conflict and made a transmission to the R22 pilot before he could pass avoiding action himself. Both the Tutor and the R22 pilots broke R to resolve the conflict. Although the Tutor pilot made a remark on the RT, the R22 pilot gave no reply and departed to the S.

UKAB Note (3): The Cumbernauld weather was reported as surface wind: northerly, variable < 5 kt; Vis: > 10 km Nil Wx; cloud base: > 2000 ft.

HQ PTC comments that this was clearly an alarming encounter for the Tutor pilots and an object lesson in "expecting the unexpected". However, the consequences could have been considerably more serious had the Tutor been flown solo by a low-hours student.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, a report from the Air/Ground Station Operator and a report from the appropriate operating authority.

The Board commended the R22 helicopter pilot's frank and honest report and it was evident that his own inattention to the aerodrome information

transmitted to him was the root cause of this Airprox. Unfortunately, the Cumbernauld A/G Stn frequency recording was not available, but there was no reason to doubt that the R22 pilot had been told by the A/G operator that the runway in use was RW26. That he used the wrong runway subsequently was surprising since the A/G operator reported the helicopter pilot had read back the runway in use correctly; here the pilot appears to have been going through the motions of the readback, but not assimilating in his mind what he had been told and then made an unthinking reply. Members were quick to point out that automatic responses such as this – a classic human error of not listening properly to what has been said - can have serious consequences and defeat the whole purpose of the readback. This Airprox was a good illustration of what can happen as the result of such errors. The Board agreed unanimously that the cause of this Airprox was inattention by the R22 pilot, who took off from the wrong runway into the path of the Grob on final approach.

The members were concerned that having departed in the wrong direction there was little to prevent this error developing into something more serious. The A/G operator was unable to step in before the other R22 instructor pilot, who showed commendable awareness, transmitted a warning to the subject R22 pilot. This intervention by the instructor on the ground showed astute airmanship and great presence of mind, but it was unclear if it was this warning alone which drew the Grob to the attention of the departing R22 pilot; the latter might have been aware of its presence in the Cct from RT calls. Moreover, on finals, the Grob was at a vulnerable stage of flight and all this had taken place within a very short period and in relatively close proximity to the ground where both pilots were constrained in their ability to manoeuvre their ac. Nonetheless, the helicopter pilot did see the Grob on finals and had sufficient time to turn R to avoid it. Fortunately, the Grob instructor had spotted the helicopter when it took off and was able to assess the situation quickly and take prompt avoiding action himself by turning R to avoid the helicopter when it flew towards his ac. Although the exact geometry could not be determined with certainty without a radar recording, both pilots had turned R away from each other during this close encounter. For these reasons the Board concluded that the avoiding action taken had

removed the actual risk of a collision, but the safety of the ac concerned had certainly been compromised.

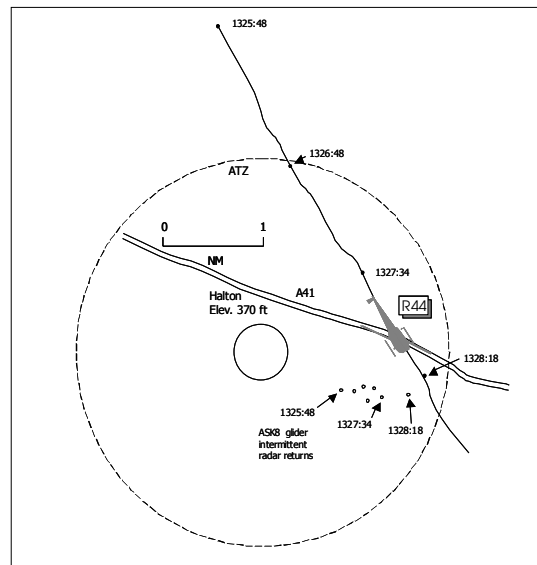
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Inattention by the R22 pilot, who took off from the wrong runway into the path of the Grob on final approach.

Degree of Risk: B.

AIRPROX REPORT NO 50/02

Date/Time: 8 May 1328
Position: 5147 N 0042 W (1.5 NM ESE Halton - elev 370 ft)
Airspace: ATZ (Class: G)
Reporting Aircraft Reported Aircraft
Type: ASK8 Glider R44
Operator: Civ Club Civ Pte
Alt/FL: 900 ft 1500 ft
 (QFE 1005 mb) (QNH NK mb)
Weather VMC CLOC VMC CLOC
Visibility: 30 km >10 km
Reported Separation:
 nil V 100m H not seen
Recorded Separation:
 <0.25 NM



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ASK8 GLIDER PILOT reports heading 090° at 45 kt and 900 ft Halton QFE 1005 mb on a solo local sortie from Halton; he was listening out with Halton RADIO on 130.42 MHz. The visibility was 30 km 1000 ft below broken cloud in VMC and the ac was coloured green with cream wings and tail. He had been ridge soaring and was on an easterly 'beat' when he sighted a red helicopter 100 m on his LHS, flying straight and level, overtaking him at the same level; it had approached from behind, his 'blind' region, and was converging with his extended track. He took no avoiding action as the risk had passed at the point of first sighting but it appeared from the close separation distance that the other pilot was not aware of the proximity to his ac. The helicopter had come from within the Halton ATZ

but had not made an RT call and it appeared to be following the A41 road which was on its L.

THE R44 PILOT reports flying en route from a private site at Macclesfield to Denham at 1500 ft altitude and 95 kt squawking 7000 with Mode C and he was receiving a FIS from Cranfield on 122.85 MHz then Denham on 130.72 MHz. The visibility was >10 km in VMC the helicopter was coloured red and his anti-collision light was switched on. He had completed the 1094 report form after being contacted by UKAB one week after the incident but he had not seen any glider in the Halton area.

UKAB Note (1): During a subsequent telephone conversation, the R44 pilot had thought that he had flown well clear of the Halton ATZ as he flew

the route regularly, 3 times a week, and always planned to stay just to the W of the Luton CTR (5 NM E of Halton). However, he was apprised that the recorded radar had shown his ac track through the ATZ and had subsequently routed SSE bound until fading from radar on landing at Denham. He had sighted 2 other ac flying a similar route on that day but remembered that there had been a large thunderstorm over Milton Keynes which he had avoided so he may have drifted further off his intended track towards Halton. He had been carrying 2 passengers, 1 of which acted as an observer, but no one had seen any gliders at all. He was further apprised of the need to call Halton to obtain information on their activity before entering the ATZ or to remain clear if unable to do so.

UKAB Note (2): The Heathrow radar recording at 1325:48 shows the R44 squawking 7000 with NMC 3.3 NM N of Halton steady tracking 150° with an intermittent primary only return, believed to be the ASK8 glider 1 NM SE of Halton; the R44 enters the ATZ 1 minute later. The glider slowly tracks nominally ESE bound fading at 1327:34 1.3 NM SE of Halton in the R44's 1 o'clock range 1.2 NM. At 1328:18 the glider reappears for one sweep, the R44 is passing 0.25 NM to its NE still tracking 150°. CPA is believed to occur shortly afterwards but it is not recorded owing to the lack of any radar returns from the glider until well after the R44 has left the ATZ.

UKAB Note (3): The UK AIP at ENR 2-2-2-2 promulgates Halton as a government aerodrome with an ATZ as a circle radius 2 NM, centred on RW02/20, from the surface to 2000 ft above the aerodrome elevation of 370 ft and active in summer, from 0600 – 1800 or Sunset - daily. The A/G station – Halton RADIO – is promulgated as operating on 130.425 MHz within the above hours.

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

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

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

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

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

Furthermore, 2.7.2.4 stipulates that:

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

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 reminded of the old adage "aviate, navigate and communicate". After avoiding weather in the Milton Keynes area, the R44 pilot had been unaware of his penetration of the Halton ATZ although his familiarity with the planned route should have raised his situational awareness to the active gliding site, owing to its close proximity to his intended track just to the W of the Luton CTR. This inadvertent entry into the ATZ had put the R44 into conflict with the ASK glider and had caused the Airprox. Moreover, the helicopter pilot had not seen the glider at all which had been on a slow converging/crossing easterly course for over 2.5 minutes prior to the incident.

Turning to risk, the radar recording revealed the subject ac closing to within 0.25 NM of each other before the glider faded to the SE of Halton. The glider pilot had been surprised by the sudden appearance of the R44 from behind, 100 m on his LHS at the same level, partly owing to his

expectancy that any transiting ac would call on the Halton frequency that he was monitoring. However, this expectation was reliant on the R44 pilot being aware of his position, and then making the appropriate RT calls, neither of which held true. Nevertheless, the glider pilot's understandably late visual acquisition of the helicopter had enabled him quickly to judge that the risk had already passed, at this point of first sighting, owing to the geometry of the encounter. He had then watched the helicopter as it overtook him to his L. Members agreed that although the subject ac were not going to collide, these 2 ac had managed to fly into such close proximity,

before the glider pilot's lookout alone had revealed the potential conflict, to the extent that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The R44 pilot entered the Halton ATZ inadvertently and flew into conflict with the ASK8 glider, which he did not see.

Degree of Risk: B

AIRPROX REPORT NO 51/02

Date/Time: 9 May 1343

Position: 5438 N 0145 W (7 NM NE of TILNI)

Airspace: London FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Jetstream 41 Hawk

Operator: Civ Comm HQ STC

Alt/FL: FL 170 FL 165

Weather VMC VMC CLBL

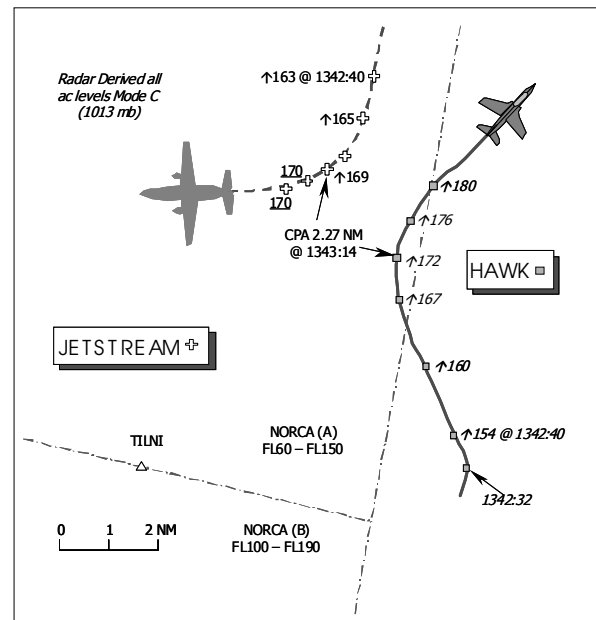
Visibility: Not reported 12 km

Reported Separation:

1½ NM Not seen

Recorded Separation:

2.27 NM H/300 ftV



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JETSTREAM 41 PILOT reports he had departed Newcastle outbound to Birmingham and was in receipt of a RAS from PENNINE RADAR on 128.675 MHz. The assigned squawk of A3731 was selected with Mode C, but TCAS is not fitted. He was cruising in level flight at FL 170, heading 195° at 218 kt when PENNINE instructed him to turn R from 195° onto 225°, initially to avoid 'pop-up' traffic – he thought. A further turn was issued - making a total of 90° in all - and ATC advised that military traffic – a black Hawk jet - had

passed down the port side at the same level separated by - at most - 1.5 NM. The Hawk was seen and the risk assessed as "medium", but the situation had been "exacerbated" by the controller's misleading call of traffic at "left...2 o'clock", which had been passed twice.

THE HAWK PILOT reports his ac has a black high conspicuity colour scheme and the nose-light and HISLs were on, whilst outbound from Leeming under a RAS from Leeming APPROACH

(APP) on 337.82 MHz. He emphasised a RAS - instead of a RIS - because of the layered structure of the cloud and at the time of the Airprox he was about 10,000 ft above cloud and 4000 ft below the next layer with an in-flight visibility of 12 km. The assigned squawk of A4621 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted.

He took off from Leeming RW34 and climbed at 250 kt; his outbound route passed through the northern portion of the Northern Off-Route Co-ordination Area (NORCA - A) [base FL 60 – FL 150] and whilst climbing through – he thought - FL 70, APP instructed him to turn R from 350° onto a heading of 020° to avoid NORCA traffic. On a heading of 020°(M) he believed he was maintaining a parallel course to the NORCA, but displaced about 2 NM E of the eastern NORCA boundary, so he climbed quickly to get above its upper limit. At this point no additional information had been issued by APP about the previously mentioned ac or any other NORCA traffic, or, that the Jetstream might have climbed above it. About 13 NM NW of Teesside, once well clear above the NORCA – he thought at FL 160 – and still climbing, he simultaneously called APP to advise that he was clear above the NORCA and turned L onto 350° - his desired course. On completion of the L turn, APP instructed him to turn hard R onto 090° for avoiding action against the previously reported ac, which was now apparently at FL 165. He complied immediately, turning hard R at 3-4 G onto 090° (M). Shortly thereafter he was advised he could turn L and resume his own navigation; by then he was climbing through FL 180, but despite an extensive search the Jetstream was not sighted. He emphasised that he had remained clear of the NORCA - horizontally or vertically – throughout, but did not assess the risk.

MACC reports that the Jetstream crew was cleared outbound from Newcastle by PENNINE RADAR climbing to FL170, routing via the NORCA to POL to join CAS inbound to Birmingham. The Jetstream crew was informed that they would receive a RAS. The NORCA is designed to match the climb and descent profiles of ac into and out of Newcastle and hence has a variable base and upper vertical limit. On this occasion the ac performed better than the controller expected and climbed above the FL 150 upper limit of that section of the NORCA. The

PENNINE Controller observed a fast moving ac to the east of the NORCA heading in the opposite direction but parallel to it and climbing. The ac was displaying a ScATCC (Mil) squawk and so the controller telephoned them to execute co-ordination. ScATCC (Mil) Controller 2 (CON 2) informed the PENNINE controller that though expected, the ac was not yet on his frequency and was still working Leeming.

The Jetstream crew was instructed to turn so as to maintain 5 NM horizontal separation, before the controller attempted to contact Leeming, but he was unable to make contact before the incident occurred.

The Hawk was by this stage above the vertical limit of the NORCA, (FL 150) and was observed to make a L turn, whilst continuing to climb. This L turn took the Hawk directly into conflict with the Jetstream at the same level. The controller instructed the Jetstream to turn onto W and again passed traffic information. The Hawk turned sharply to the R and passed an estimated 2.3 NM from the Jetstream and 300 ft above it.

UKAB Note (1): The PENNINE RADAR transcript reveals that the controller advised CON 2 that the Jetstream was climbing to maintain FL 170. After their flight conditions were ascertained as VMC, avoiding action was passed to the Jetstream crew at 1342:30, *"..turn right now heading...onto...1 correction 225 traffic left ...your 2 o'clock (sic) range 6 miles indicating FL 157"*. The Jetstream pilot acknowledged immediately *"okay the heading is 225 you've rather confused me...left 2 o'clock don't really work?"* PENNINE responded, *"[C/S] traffic indicating FL 170 now left 2 o'clock (sic) range 3 miles continue the right turn onto west"*. Whereupon the Jetstream crew *advised "Okay we're turning onto west but there is no left 2 o'clock do you mean left 10 o'clock or right 2 o'clock?"* The traffic information was then confirmed at *"...your left 10 o'clock"* whereupon the pilot immediately responded *"visual with the traffic"* and added it was a Hawk. The controller stated that he had *"tried to co-ordinate it but I couldn't get in on the phone just now indicating FL 170 going down your left hand side"*. A reply of *"that's no problem"* was given at the time, before the controller advised that the Hawk was *"...going down and behind you now.."* and that the crew should now resume their own

navigation. The crew acknowledged and added that *"...he was well clear of us..."*.

The PENNINE controller included contradictory information when passing traffic information to the Jetstream crew, the conflicting traffic described as being to the pilot's left and in his 2 o'clock, when it was actually to his left, 10 o'clock. This resulted in a short delay before the pilot sighted the jet, but the pilot had already begun to respond to the avoiding action turn and it is unlikely that this error influenced events.

It is acknowledged that ac frequently depart with other agencies' squawks selected due to the difficulties that they have in reselecting SSR codes in the cockpit. This significantly reduces the ability of other ATSU's to co-ordinate with Leeming. The PENNINE controller is aware that he should not have climbed the Jetstream above the NORCA, but once he had, all options to resolve the problem were severely hampered by this practice of squawking an inappropriate ScATCC (Mil) SSR code whilst under the control of Leeming APP. However, on this occasion if the PENNINE controller had been able to agree co-ordination with Leeming, unless the call prompted Leeming to update the traffic information, it is unlikely that it would have affected the outcome.

A visit to Leeming was arranged where controllers' awareness was raised on the issues facing civil controllers and pilots operating outside CAS. The meeting was intended to promote improved co-ordination between Leeming ATC/PENNINE RADAR and addressed the issue of operating in class G airspace on another ATSU's SSR code. The Manchester LCC Bulletin - Issue 5/02, also highlighted to PENNINE RADAR controllers the importance of keeping CAT inside the confines of the NORCA.

ATSI endorsed the MACC report.

MIL ATC OPS reports that the Leeming RT recording timings are about 1 min 48 sec ahead of the radar recordings. The APP controller (also acting as Leeming DIRECTOR) assessed his workload as *"medium"*. The Hawk departed Leeming to the N and was instructed by APP to climb to FL 240. The flight was identified and placed under a limited RAS as Leeming ATC were operating with SSR only. APP verified the Hawk's Mode C passing FL 60 and advised the pilot of

conflicting traffic observed within the NORCA – the Jetstream. At 1343:21, APP suggested a heading change whilst maintaining the climb, "[C/S] suggest right turn heading 020° to parallel NORCA. You have NORCA traffic currently 20 miles North of you climbing through FL 150". This put the Jetstream at and climbing above the NORCA upper limit - the Hawk pilot reported *"coming right 020°"*. About 48 sec later at 1344:18, - about 1342:30 GDF radar timing - the Hawk pilot advised APP "[C/S] coming back left 345 clear above the NORCA", which was immediately acknowledged by APP. Moments later the landline to PENNINE RADAR was opened by APP and there followed a period of overlapping transmissions between PENNINE and their traffic. Meanwhile, at 1343:34, Leeming SUPERVISOR (SUP) called Scottish MILITARY to handover the Hawk. After a short delay, <30 sec, communications between SUP and CON 2 were established at 1344:01; the SCATCC (Mil) controller (CON 2) had been conducting co-ordination. SUP started to pass the Hawk's details to CON2, *"west of Teesside 8 miles northbound...climbing FL 240 requesting FL 390...Radar Advisory"*, but it took further dialogue with Leeming APP to establish if the Hawk pilot still wanted a RAS. While this protracted exchange was taking place, events overtook the Leeming controllers; at 1344:48 APP said *.. "avoiding action turn right 020 traffic north 5 miles tracking south west indicating FL 165"*. The Hawk pilot acknowledged immediately *"020 [C/S]"*. Further avoiding action and traffic information was issued 22 sec later, *"[C/S] hard right turn heading 090° traffic now north-west 3 miles tracking south-west indicating FL 170"*, which the pilot again acknowledged. Meanwhile, before the handover was completed, CON2 told the SUP to call back when the Hawk was clear of the Jetstream. At 1345:37, APP advised the Hawk pilot that he was now clear of traffic and could resume his own navigation - the handover to ScATCC (Mil) was completed at 1346:08.

APP was aware of the potential confliction with the Jetstream in good time, although the radar recording indicates the traffic to be at a range of 17 NM - not 20 NM - when the *"suggested"* turn was given. A discrepancy of 3 NM is understandable given that APP was working SSR only. Equally, under these conditions it would have been difficult to assess the ac's rate of turn. SATCO Leeming reports that it is common practice

for station ac to expedite their climb above the NORCA to avoid restrictions and the controller was mindful of this when electing to turn behind the Jetstream that he thought would stay in the NORCA. *"Suggesting"* a turn is non-standard phraseology, however, clear reasons were given by APP and the pilot evidently understood and complied with the instruction. The regulations contained within the MIL AIP at ENR-5-2-5, state that the NORCA is only intended to provide **compulsory** standard separation from **participating** GAT and when required to avoid such traffic controllers will use the phrase "[C/S] to avoid civil traffic mandatory turn...". Furthermore, the MIL AIP stipulates that the *"Standard rules of RAS will apply against other [non-NORCA participating] traffic and crews have the option to elect not to take advisory turns provided against such traffic"*. Thus when the Jetstream climbed above the vertical limits of the NORCA this last caveat applied in the provision of a RAS to the crews of military ac. However, the Jetstream's level left APP with the difficult decision of what to do and the form of phraseology to use as there is no guidance to cover this eventuality. With hindsight, stopping the Hawk's climb 3000 ft below the Jetstream might have been better thereby effecting vertical separation.

The avoidance heading of 020° resulted in the Hawk diverging slowly from the eastern NORCA boundary and it appears as though APP was aiming to provide enough lateral separation to allow a climb 3000 ft above the Jetstream before turning the Hawk back on track. Analysis of the radar recording indicates that the Hawk did not complete the R turn to 020° before turning back L onto his desired course. Under RAS, JSP318A Section 235.110.1d stipulates that *"The pilot must advise the controller before changing heading or level"*. On this occasion the pilot elected to turn back onto track without first advising the controller thereby putting himself into conflict with the Jetstream. [UKAB Note (2): The pilot transmitted his intention as he turned] However, as soon as he was advised of the turn APP should have reassessed the situation and issued avoiding action instructions. There was no need to clarify the type of service the flight was under, which led to a delay before any avoiding action was issued. It could be surmised that the SUP was working from the heading 020° logged on the FPS information and was expecting the ac to

commence a turn at any moment, hence, the insistence to CON 2 that the ac was turning. Whilst in conflict this was not the best course of action and SUP should have given APP, who was obviously concentrating his efforts elsewhere, a specific directive. APP's initial avoiding action turn was not adequate - perhaps understandable given the limitations of SSR - but it was quickly reassessed and corrected.

It is evident from the tape transcripts that APP was also vectoring traffic for an instrument approach, which may have been a distraction. SATCO had directed his supervisors to facilitate breaks from console when traffic levels allowed. Consequently, APP was also covering the DIRECTOR position, which is generally the least busy, but it was not until the investigation into this Airprox that this HQ was aware of a potential manpower problem at Leeming.

There were 4 main aspects to this Airprox. First APP's apparent desire to climb the Hawk clear of the NORCA and a turn to achieve that climb. The use of *"Suggest"* by APP may have made this turn instruction ambiguous. Second, the Hawk pilot did not advise APP **before** initiating his turn but during the turn and despite being told the conflicting traffic was *"climbing through FL150"* and thereby climbing above the relative sanctuary of the NORCA. The NORCA is established to provide protection for CAT traffic remaining within its confines. Third, had the Jetstream remained within the NORCA this incident would not have occurred. Finally, and most seriously, APP did not recognise the significance of the Hawk's turn back onto planned track, albeit without prior notification, and did not react promptly to the resulting confliction. This was compounded by the SUP, who did not react promptly to the problem he had detected during the handover, and did not direct APP to initiate avoiding action.

UKAB Note (3): The Great Dun Fell radar recording shows the Jetstream some 1.6 NM W of the eastern NORCA boundary at 1342:40 and flying parallel to but above it, as it climbs through FL 163 Mode C; this was about 10 sec before Pennine RADAR passed the first avoiding action transmission to the Jetstream crew. The Hawk is shown passing FL 154 Mode C in the FIR, some 10 sec after the pilot advised APP he was turning L, but toward the Jetstream. The CPA is shown at 1343:14; the Jetstream at FL 169, some 300 ft

below the Hawk at FL 172 as the jet turns R, some 2.27 NM to the SE. At 1343:31, the Jetstream is shown westbound and level at FL 170, as the Hawk climbs through FL 180 northeast bound.

HQ STC comments that the NORCA is established to give a greater degree of 'protection' to CAT, over and above the conventional VFR 'see and avoid' rules that pertain in Class G airspace. By climbing above the NORCA, the Jetstream crew acknowledged they were prepared to accept reduced separation from military traffic than that pertaining in the NORCA. Military crews adapt their flight profiles to avoid CAT and the Hawk pilot having assiduously avoided the NORCA resumed his course clear above it. However, ATC had reported 'NORCA traffic' and thus the pilot understandably believed that by avoiding the NORCA he would also avoid the Jetstream.

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.

The PENNINE RADAR controller had climbed the Jetstream to FL 170 - above the upper limit of NORCA (A) - which it reached before the ac had passed TILNI; beyond this point the assigned level would have been within NORCA (B). MACC had postulated that the reason for this was that the controller had not taken account of the Jetstream's good climb performance. Members wondered whether the Jetstream crew had been aware that they had climbed out of the agreed sanctuary provided by the NORCA; this was not evident from the pilot's report, but presumably they were not, otherwise they would have questioned the situation. CAT pilot members thought they were probably just doing what they had been told to do. This concerned the panel who reasoned that the nature of any ATS provided was based on the airspace within which the ac was flying, and captains should always be aware of the latter. It was explained to the Board that considerable negotiation had taken place between civilian/military ATSUs and operators concerning CAT routeing between Newcastle and

the main 'spine' of CAS with the purpose of providing a greater degree of safety for GAT. The eventual outcome had been the NORCA, unique in UK airspace. Though still classified as Class G, the onus was on the crews of military ac flying through it to comply with compulsory avoiding action instructions under an obligatory RAS - effectively a RCS by any other name - to ensure that standard separation was maintained against participating CAT within it. This airspace was thus a very significant factor, as far as the Hawk pilot was concerned. He had been assiduously trying to stay outside the NORCA until able to get onto his desired course, in the mistaken belief that the Jetstream, which he had been given traffic information about, was staying inside it. Unbeknown to him the CAT ac had been allowed to climb above it, so negating any protection that the NORCA could provide. Military members were unhappy that such a situation could develop unchecked after all the work that had gone into the agreement.

Discussion then centred on the subject of discreet SSR codes displayed by ac not under the control of the ATSU to whom such codes are allocated. It had been highlighted within the MACC report that the PENNINE Controller's attempts at co-ordination were forestalled when he called CON2 instead of Leeming APP. Several civilian controller members voiced sympathy with this view, who themselves had faced similar problems. They thought the practice was at best misleading, and probably delayed resolution of this conflict unnecessarily. The Board was briefed that this method of operation had been established by fast jet operators over many years to assist pilots and was commonplace throughout the country when traffic was prenoted to an ATCC (Mil). The assigned squawk would be issued to the pilot for use before take-off so that it reduced his workload in the subsequent busy post take-off phase. However, the Hawk was with APP for an unusually long period and even if the squawk had been allocated at the start of the handover - as is common with an un-prenoted handover of OAT - the situation would have been similar. The associated difficulties encountered by other ATSUs who then wished to initiate co-ordination were understood by the Board, but it was not considered to be a fundamental factor here. As both ATSUs had met to discuss this topic the Board concluded it was best to let them decide how to resolve this issue.

The military ATC aspects had been amply covered in the comprehensive Mil ATC ops report. The Board recognised that the traffic information provided by APP to the Hawk pilot "*...you have NORCA traffic currently 20 miles North of you climbing through FL 150*", was undoubtedly correct at the time, but it would appear did not paint a clear enough picture to the Hawk pilot, who reports that he based his flight profile on climbing rapidly up above the NORCA. Evidently he had not assimilated that the "*...climbing through FL 150*", put the Jetstream above the very airspace he was trying to avoid. Perhaps, the description "*..NORCA traffic..*" had misled him to thinking it would not be a factor. Whatever, the traffic information conscientiously passed by APP probably had the opposite effect to that intended, insofar as it was ambiguous. Here was a salutary lesson to controllers on how a seemingly concise choice of words when working under pressure in an intense traffic scenario, could unintentionally mislead a pilot. Ideally, the Hawk pilot should have pre-notified his turn, but instead he reported turning back on course as he did so. At that point the Mil ATC Ops advisor believed APP had been lax in not issuing avoiding action immediately against traffic that should have been plainly visible to both him and the SUP. CON2 had spotted the problem and had proffered a solution, plainly reticent to accept the Hawk before the confliction was resolved, hence the protracted handover. The latter was also mooted as a factor and several members queried why Leeming APP was still providing a RAS in the MAS above the NORCA in ScATCC (Mil)'s 'territory'. The Mil ATC advisor emphasised that the hand-over had been started near to Leeming shortly after departure in a normal manner, but the delay had resulted because CON2 was coordinating – a higher priority than a handover. In the end – it would

appear under direction from SUP – APP eventually transmitted avoiding action, which the Hawk pilot vigorously complied with. Similarly, the PENNINE controller issued avoiding action after his initial attempts at co-ordination had been thwarted. The clock code error – clearly exposed here – is a common enough mistake in the heat of the moment, which should not occur. Although stressed by the Jetstream pilot, members thought it probably had little impact on the overall outcome apart from delaying the eventual resolution of the conflict. In the end, although the lead-in had been somewhat untidy both controllers had issued avoiding action instructions which had been complied with by both pilots. Hence the Board agreed that this Airprox was the result of a conflict in Class G airspace, above the NORCA, that had been resolved by all.

The minimum horizontal separation achieved by these combined – albeit somewhat delayed – actions was 2.27 NM according to the radar recording, less than half the specified minima. Nonetheless, positive action had been taken which had also enabled the Jetstream pilot – despite the ambiguous traffic information – to spot the Hawk as it passed clear to the E. Although members were surprised the jet pilot had not seen the Jetstream, the Board concluded the combined actions of all concerned were sufficient to remove any risk of a collision.

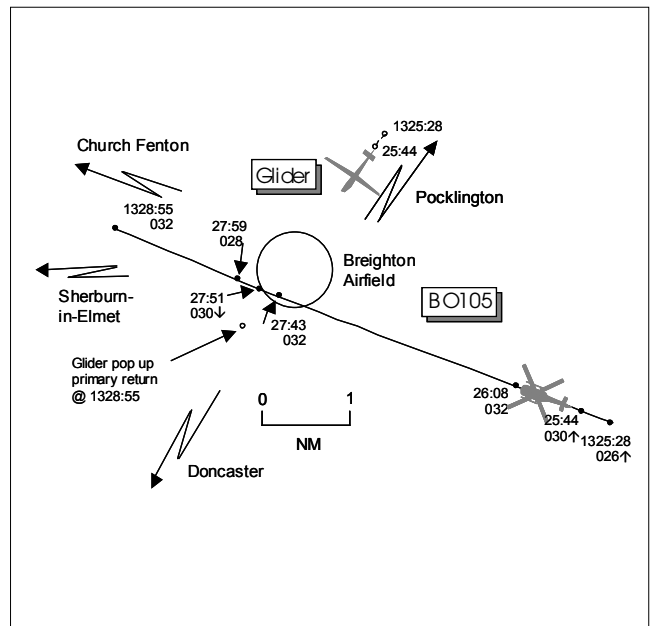
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in Class G airspace, above the NORCA, resolved by all.

Degree of Risk: C.

AIRPROX REPORT NO 53/02

Date/Time: 11 May 1328 (Saturday)
Position: 5348 N 0055 W (O/H Brighton Airfield)
Airspace: FIR/AIAA (Class: G)
Reporting Aircraft Reported Aircraft
Type: Bolkow105 ASW24 Glider
Operator: Civ Comm Civ Club
Alt/FL: 3000 ft 3500 ft
 (RPS 1007 mb) (NK)
Weather VMC CBLC VMC CBLC
Visibility: 35 NM 30 NM
Reported Separation:
 10-20 ft V 150 ft V
Recorded Separation:
 not recorded

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE BOLKOW105 PILOT reports heading 285° at 3000 ft RPS 1007 mb and 120 kt returning to Leeds/Bradford whilst in receipt of a FIS from Church Fenton on 126.5 MHz. The visibility was 35 NM 1000 ft below cloud in VMC, the ac was coloured yellow, strobe lights were switched on and he was squawking a discrete code with Mode C. The Vale of York was very busy with traffic in the good weather prevalent at the time. When passing overhead Brighton airfield, a white glider suddenly appeared almost directly ahead, about 50 ft away, crossing on a tangential track R to L at the same level. A rear crewmember, seated behind the pilot, saw the glider at the same time as he had leant forward and down to remove a map from a nav bag in front of him and thereby lowered his eye-level below the obscuring door frame. While he was dropping the collective and bunting the ac severely in taking avoiding action the rear crew member shouted "go down"; he estimated he passed 10-20 ft immediately below the glider. He opined that this had been a very late sighting. Despite there being two other crew members on board who were conversant with keeping a good lookout, these efforts were severely restricted to the R between the 1230 and 0600 positions because of the door frame.

THE ASW24 GLIDER PILOT reports flying a solo cross-country from Pocklington routing to his next turning point near Doncaster and he was communicating with other gliders on 130.1 MHz. The visibility was 30 NM 700 ft below and 1.5 NM horizontally from cloud in VMC. He had been using a thermal to the N of Brighton airfield and was in level flight just to the S of Brighton heading 200° at approx 3500 ft and 55 kt when he saw a yellow helicopter about 100 m away in his 9 o'clock which passed rapidly at high speed 150 ft below him, leaving no time to take avoiding action. He did not see the helicopter until the last few seconds as it had been slightly below the horizon and partially camouflaged by the numerous yellow oil seed rape fields in the area. He did not report the incident as he did not think the collision risk to be high. He was used to flying in close proximity to other ac especially when thermalling with other gliders. He opined that had the helicopter been at the same level, he would probably have seen it much earlier.

MIL ATC OPS reports the BO105 pilot initially called Fenton Approach Controller (APP), based at Linton on Ouse (LIN), on 126.5 at 1312:27, he was placed under a FIS and it was confirmed that he was 'on task'. He was passed traffic

information (TI) on a flying display at Sherburn and a MATZ crossing of Church Fenton was arranged for him. At 13:17:00 TI was passed to him on *'traffic 12 o'clock 3 miles manoeuvring'* and at 13:19:55 further TI was passed on *'... traffic east 2 miles manoeuvring no height - 2 contacts'* to which the pilot replied *'...possibly Brighton traffic we'll keep our eyes out'*. Some 4.5 minutes later (at 13:24:30) the BO105 pilot advised APP that he was not required on scene and would be turning towards Leeds climbing to 3000' (Barnsley 1007), returning to base. He reports level at 13:26:06 and 3 minutes 20 seconds later (13:29:26) reports the Airprox. Radio timings are approximately 1 minute ahead of the video recording.

LIN was operating the Watchman Radar with GCF Inhibit selected. This selection will give the best target detection in areas of ground clutter, however targets are subject to tangential fading. The Supervisor (SUP) states, however, that the BO105 was clearly showing on radar and had Mode 3/A with 'C' displayed. The unknown ac is reported as not showing on radar and even after deselecting the GCF Inhibit the SUP states that no return was observed. The video recording taken from the Claxby radar shows an intermittent contact to the N of the Airprox position slowly tracking S that may be the reported glider however it fades from radar approximately 2.5 NM NW of the BO105 and does not reappear until after the incident has occurred.

The SUP ascertained that the Airfield Operator at Brighton had observed this incident from the ground and reported that the Glider had tracked towards Pocklington Airfield. Pocklington were contacted and subsequently the pilot of the glider telephoned the LIN SUP at 15:49:16. It was established that his ac appeared to be that involved in the incident.

From an ATC perspective, there does not appear to be any obvious contributory flaws in ATC procedures or individual controller technique. Since the APP controller had been passing relevant TI to the BO105 it is likely that TI would also have been passed on the Glider, if the return had shown on radar.

UKAB Note: Analysis of the Claxby radar recording clearly shows the Bolkow helicopter tracking 290° through the Brighton airfield area

at FL 032 (3000 ft Barnsley RPS 1007 mb). At 13:27:51, as the helicopter passes overhead Brighton airfield, its Mode C shows FL 030 then FL 028 on two successive radar sweeps, which is believed to be the Bolkow pilot's avoiding action descent (RoD calculated to be 1500 ft/min). A primary only return, believed to be the ASW24 glider, appears momentarily between 13:25:28 and 13:25:44 2 NM NE of Brighton before fading, reappearing at 14:28:55 just S of Brighton before fading again. The Airprox is not seen on recorded radar.

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 BO105 pilot was in receipt of a FIS from Church Fenton, members noted that he was given radar derived TI during his transit eastbound through the Brighton area, which was far more information than he would normally receive on this type of ATC service. It was appreciated that the controller was probably being helpful as ever but this did 'muddy the waters' between the levels of service being provided and did little to clarify the situation with inexperienced pilots. In this case, it was only after the Bolkow had 'turned around' to track back through the same area towards Leeds that the conflict with a glider occurred, which was not showing on radar. Pilot members expressed some concern that the helicopter crew should have taken more positive steps to maintain a better lookout, perhaps by moving their heads, knowing that there was a reduced 'field of view' problem caused by the door frame. Taking the airframe obscuration part out of the equation and even though the visibility was exceptionally clear below cloud, the white glider would almost certainly have been difficult to see against the cloud layer. Adding to that, the situation was not helped as the yellow helicopter was probably 'hidden' against a backcloth of similarly coloured fields below it. It was clear to members that this had been a close encounter caused by very late sightings by both pilots.

Turning to risk the glider pilot saw the helicopter on his LHS 100 m away and watched it quickly pass beneath him, he estimated by 150 ft, with no time to take avoiding action. Meanwhile, the BO105 pilot saw the crossing glider just ahead at the same level and reacted by dropping the collective and bunting his ac to pass just 10-20 ft below it; pilot members praised the pilot's quick actions. Its rigid rotor design does allow this helicopter to carry out negative G manoeuvres (bunting) safely and the 'collective dump' had quickly reduced the engine/rotor generated lift vector, allowing the helicopter quickly to change its flight path downward. Even so, some

members thought that there had been an actual risk of collision, but this view was not shared with the majority of the Board. They believed that the Bolkow pilots' actions had been sufficient to remove an actual collision risk but in achieving this 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 55/02

Date/Time: 11 May 1545 (Saturday)

Position: 5153 N 0047 E (4 NM W of Colchester)

Airspace: FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: BO105 C152

Operator: Civ Comm Civ Trg

Alt/FL: 700 ft 1000 ft
(QNH 1014 mb) (QNH)

Weather: VMC HZBC VMC CBLC

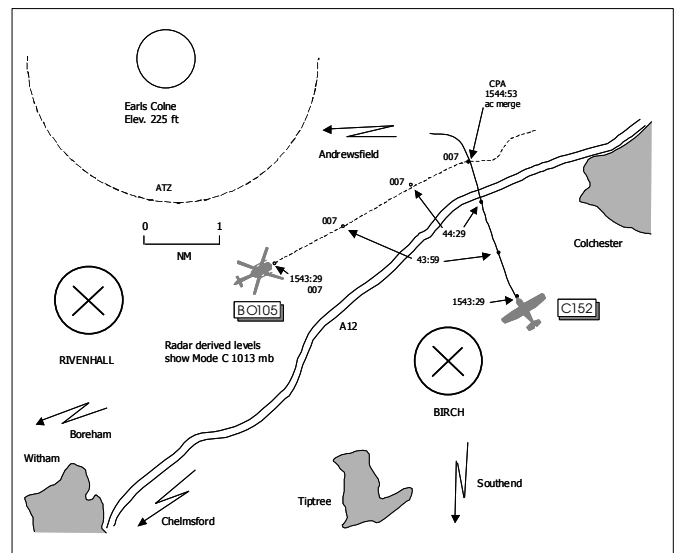
Visibility: 2500 m 8 km

Reported Separation:

nil V <30 m H not seen

Recorded Separation:

ac returns merge



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BO105 PILOT reports heading 068° at 700 ft QNH (1014 mb) routing from Boreham to a landing site near Manningtree at 130 kt squawking a discrete code with Mode C. Whilst he was making blind calls on the Wattisham APPROACH frequency 125.8 MHz (the unit was closed), he was also talking to his base operations on a discrete frequency. The visibility was 2500 m in haze, 100 ft below cloud in VMC. The helicopter was coloured yellow overall and his strobe, nav, anti-collision and landing lights were all switched on. Approaching Colchester, seconds

before the incident, his crew 'lookout' had seen nothing but suddenly a high wing Cessna appeared in his 1 o'clock range 200 m; he thought it had just descended from IMC and had broken clear of cloud as it had a slight nose-down attitude. It took no avoiding action which indicated that its crew were not looking out and probably still flying on instruments. He initiated a rapid R turn to avoid (90° AoB), passing <30 m behind the Cessna at the same level. He assessed the risk of collision as high.

THE C152 PILOT reports flying a local instructional sortie (1st flight) from Andrewsfield at 90 kt. Whilst in receipt of an A/G service from Andrewsfield RADIO, he was also listening out with Southend APPROACH. The visibility was 8 km below cloud in VMC and his transponder was u/s. He had been operating VFR in the Chelmsford area at about 2000 ft, but had moved further N and E to avoid his colleague who was flying an IMC sortie N of Southend; he was monitoring the movements of his colleague who was working Southend ATC. As he proceeded N bound, the weather deteriorated with a lowering cloudbase - about 1000 ft - and when he had reached the Colchester area he had turned W bound to recover to Andrewsfield. He had not seen a helicopter in the area and was unaware of any incident until being contacted by the UKAB. He opined that, in hindsight, he should probably have worked Southend when he had operated near Chelmsford and he also thought that had he been working the same unit as the reporting ac this Airprox may have been avoided.

UKAB Note (1): Met Office archive data reveals that a weakening cold front moved over the area toward the SE. Likely conditions in the Colchester area were surface wind N to NW 6 KT, visibility 5 km in haze, cloud broken/overcast base 1000 ft, the QNH was 1011 mb.

UKAB Note (2): Analysis of the Debden radar recording at 1543:29, clearly shows the BO105 2.7 NM NW of Birch disused A/D, tracking 065°, indicating 700 ft Mode C with a primary only return, the C152, 1.1 NE of Birch tracking 340°. Both ac continue on steady tracks, on constant relative bearings, until both ac returns merge at 1544:53 with the BO105 still indicating 700 ft Mode C. The next two radar sweeps (6 second intervals) shows the BO105 tracking about 090°, having executed a R turn, then turning L and indicating 600 ft Mode C. The L turn onto W towards Andrewsfield, as described by the C152 pilot, is seen to commence a further 6 seconds later.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

This had been an FIR encounter where both pilots, flying under VFR, were responsible for 'see and avoid'. However this incident does highlight the dangers of flying close to a low cloud base, a situation that does not leave much room for manoeuvre if needed. The BO105 pilot had seen the C152 very late, as it 'suddenly' appeared just clear of cloud, although this may have been because of the reported low visibility in the area. The C152 instructor, seated on the RHS, had not seen the helicopter at all approaching from his L although its yellow colour scheme would not have helped his visual acquisition in the prevailing hazy weather conditions. Members agreed that it had been these two non-effective 'sighting' elements by both pilots which had caused the Airprox.

The BO105 pilot had fortunately seen the C152, albeit very late in his 1 o'clock at a range of 200 m, and was able to execute a vigorous avoiding action manoeuvre towards it to the R and succeeded in passing behind it. Pilot members wondered why the BO105 pilot had not 'dropped the collective' to produce a rapid descent but this may have been precluded owing to the helicopter's low cruising level. Although the C152 pilot had not seen the conflicting helicopter, members agreed that the actions by the BO105 pilot had been sufficient to prevent a collision. However, both ac had flown into such close proximity before the conflict was noticed to the extent that their safety had not been assured.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A very late sighting by the BO105 pilot and a non-sighting by the C152 pilot.

Degree of Risk: B

AIRPROX REPORT NO 57/02

Date/Time: 12 May 1150 (Sunday)

Position: 5317 N 0055 W (1 NM E of Gamston
- elev 91 ft)

Airspace: ATZ (Class: G)

Reporting Aircraft Reported Aircraft

Type: CP301 C550

Operator: Civ Pte Civ Comm

Alt/FL: 1000 ft 1000 ft
(QFE NK mb) (QNH 1014 mb)

Weather VMC CBLC VMC CBLC

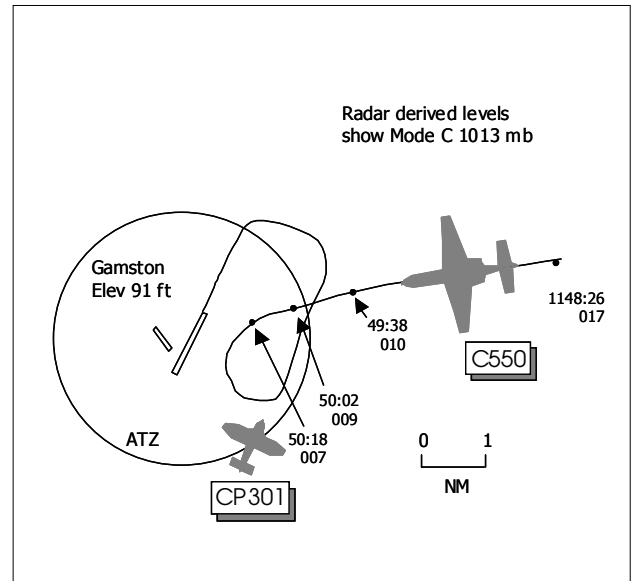
Visibility: 10 km >10 km

Reported Separation:

nil V 50-75 m H 200 ft V 1 NM H

Recorded Separation:

not recorded

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE CP301 EMERAUDE PILOT reports flying inbound to Retford/Gamston from Kemble and in receipt of an A/G service from Gamston RADIO on 130.47 MHz. The visibility was 10 km 1300 ft below cloud in VMC; the ac was coloured white/maroon and was not fitted with a transponder. He had carried out a D/W join for RW 21, reported on RT his D/W position and being visual with another ac ahead which had turned onto L base. He had previously heard the pilot of another ac (the reported C550) asking for joining instructions and report that he would be joining downwind, although it appeared he was unsure of the procedure. A few seconds later, whilst steady heading 030° at 60 kt and 1000 ft QFE, the C550 was seen approaching ahead at the same level on he thought an almost reciprocal but converging/crossing track. The C550 quickly passed about 50-75 m to his L, between him and another ac on base leg i.e. on the live side of the cct between the D/W leg and the RW. He took no avoiding action as the jet had approached too fast and he thought that it would have been very risky if he had been caught in the Cessna's jet wake.

THE C550 CITATION PILOT reports heading 260° at 180 kt inbound to Gamston from Germany and in receipt of a FIS, he thought, from Gamston RADIO on 130.47 MHz. The visibility was >10 km 1000 ft below scattered cloud in VMC

and he was squawking 7000 with Mode C. He had been 'cleared', he thought, by Gamston RADIO for a LH downwind join for RW 21 and was approaching Gamston at 1000 ft on the GAM VOR 080 R, the VOR being situated on the aerodrome. He saw a small low wing single engined ac in his 10 o'clock range 1 NM, in the 1st third of the LH downwind leg; he had not been informed of the traffic. He descended 200 ft and turned R then L to maintain separation, eventually joining LH downwind behind the CP301, passing almost over the RW and to the L of the Emeraude. He thought that there had been no risk of collision as he had visually acquired the ac and kept it in sight throughout.

UKAB Note (1): Met Office archive data shows the Retford/Gamston 1150 QNH 1013 mb.

UKAB Note (2): The UK AIP AD 2 EGNE-1-2 describes the Retford/Gamston ATZ as a circle radius 2 NM centred on the longest notified runway (03/21) 531650N 0005705W, from the surface to 2000 ft above the aerodrome elevation of 91 ft, with A/G service available during the promulgated hours in summer of Mon-Fri 0700-1700, Sat and Sun 0800-1700.

UKAB Note (3): The Rules of the Air Regulations 1996 Rule 17 Rules for avoiding aerial collisions

para. (5) Flight in the vicinity of an aerodrome states *'Without prejudice to the provisions of rule 39, a flying machine while flying in the vicinity of what the commander of the aircraft knows or ought reasonably to know to be an aerodrome, shall unless, in the case of an aerodrome having an air traffic control unit that unit otherwise authorises:*

a) conform to the pattern of traffic formed by other aircraft intending to land at that aerodrome, or keep clear of the airspace in which that traffic pattern is formed; and

b) make all turns to the left unless ground signals otherwise indicate.'

Rule 39 Flight within aerodrome traffic zones para. (2) states *'An aircraft shall not fly, take-off or land within the aerodrome traffic zone of an aerodrome to which this paragraph applies unless the commander of the aircraft has obtained information from the air/ground radio station at that aerodrome to enable the flight to be conducted safely'. Para. (3) states 'The commander of an ac flying within the aerodrome traffic zone of an aerodrome to which this paragraph applies shall;*

a) cause a continuous watch to be maintained on the appropriate radio frequency notified for communications at the aerodrome or, if this is not possible, cause a watch to be kept for such instructions as may be issued by visual means;

b) where the aircraft is fitted with means of communication by radio with the ground, communicate his position and height to the air/ground radio station at the aerodrome on entering the zone and immediately prior to leaving it.

UKAB Note (4): Analysis of the Claxby radar recording was rather inconclusive. The CP301 is not seen at any time on recorded radar and its position on the diagram is not derived from radar data and is for pictorial presentation only. At 1148:26 the C550 is seen 6 NM E of Gamston tracking 260° indicating 1700 ft Mode C; 40 seconds later the ac descends, levelling at 1000 ft Mode C at 1149:38. The C550 enters the ATZ at 1150:02, at 900 ft Mode C descending, levelling at 700 ft 16 seconds later whilst in a L turn 1 NM E

of the aerodrome. The Citation continues its L turn to track 030° downwind LH for RW 21.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was apparent that even before the Citation had entered the cct, its pilot had misunderstood the type of service being provided by the Gamston A/G operator; he erroneously thought he had been 'cleared' to join downwind for RW 03 and that he should have been told about the cct traffic. Normally, a pilot would monitor the frequency whilst inbound to build up a mental picture of ac in the cct area from their position report transmissions. However, members found it difficult to understand this pilot's course of actions in subsequently trying to join the cct. Although the radar recording does not show the Airprox 'per se', it did reveal the C550's flight path as it approached and entered the Gamston cct. The radar shows the C550 approaching Gamston from the E tracking towards the centre of the airfield (VOR location) and entering the live side of the LH cct to RW 03 across the downwind leg, before turning L through 230° onto the downwind leg to the E of the RW. In order to have joined D/W from his direction of approach the pilot would have to have turned sharply R, 'belly up' to the rest of the cct traffic onto the downwind leg. However, to comply with the requirements of the ANO Rule 17 to conform with the pattern of traffic formed by other ac in the cct (integrate safely) the pilot would be expected to join either directly D/W from the S, or onto L base, or to carry out a straight in approach or join overhead, above the cct, before descending into the crosswind leg of the cct whilst establishing the positions of the other ac visually in the traffic pattern. In not doing any of these, the C550 pilot did not integrate safely into the cct and this had caused the Airprox.

Turning to risk, there were two differing views of the encounter from each cockpit. The Emeraude pilot was surprised by the sudden appearance of the Citation as he had heard its pilot call and state his intention to join D/W; the C550 was seen to converge/cross ahead whilst he was D/W, on

almost a reciprocal track, passing 50-75 m away at the same level between him and the other ac on base leg and the RW. Meanwhile, the C550 pilot had seen the Emeraude in the D/W leg about 1 NM away and had descended and turned to pass ahead by 1 NM and 200 ft below, keeping the CP301 on LHS, but apparently he had not seen the other ac on L base to his R. The anomalies between the reported separation distances could not be resolved. However, the Board were clear that even though the C550 pilot had manoeuvred to ensure that the subject ac were not going to collide, by entering the active

cct without conforming to the normal cct joining procedures, he had compromised the safety of the CP301 and other cct traffic.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The C550 pilot did not integrate safely with ac established in the visual cct pattern and flew into conflict with the CP301.

Degree of Risk: B

AIRPROX REPORT NO 58/02

Date/Time: 16 May 1009

Position: 5439 N 0613 W (Belfast Aldergrove - elev 268 ft)

Airspace: Belfast CTR/ATZ (Class: D)

Reporter: Belfast ATC

First Aircraft Second Aircraft

Type: B737-300 Lynx AH Mk7

Operator: CAT HQ JHC

Alt/FL: Take-off Roll 150 ft
(QNH 1017 mb) (agl)

Weather VMC VMC CAVOK

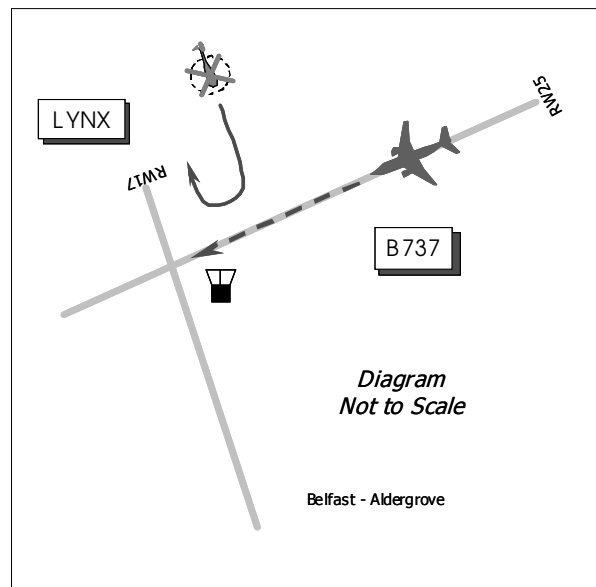
Visibility: 10 km >10 km

Reported Separation: ADC: 200 m H

Not reported 1000 m H

Recorded Separation:

Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BELFAST AERODROME CONTROLLER (ADC) reports that the Lynx helicopter was approaching the airfield from the N, VFR, as the B737 crew was instructed to 'line-up and wait' on RW25, before being given a heading to fly during their IFR departure. The Lynx pilot was then instructed to cross the airfield and cleared to cross RW25 to land in an area to the S of the runway. As the helicopter reached the northern airfield boundary the pilot requested confirmation of his runway crossing clearance, which was given, but as he watched the Lynx continue southbound he saw the helicopter turn sharply

away from RW25. He looked toward the runway threshold and saw that the B737 crew had commenced a take-off roll without his clearance and was halfway along the runway. As the B737 passed the Lynx the horizontal separation was about 200m, between the two ac before the B737 took off. No avoiding action or traffic information had been proffered.

THE B737-300 PILOT reports that he was departing Belfast ALDERGROVE for Liverpool - IFR. A clearance to 'line-up' on RW25 was misconstrued by the crew to be a 'take-off'

clearance. As the roll was commenced a Lynx helicopter was observed to fly along RW17 and bank sharply away. Immediately after departure the TOWER informed him of the unauthorised take-off, which was acknowledged.

He added that this was a training flight for the 'Captain under training' in the LHS and he was occupying the RHS as Captain of the ac. This sector was the 4th short sector – about 30 min flight time - of the morning, following a 0510 'report' for duty. On the turnaround at Aldergrove, a problem with the FMS fuel indication had been identified, which caused a short delay of 20 min. Whilst taxiing out before departure, the FMS was monitored for a recurrence of the previous problem. This, together with the simultaneous ATC instruction to "fly heading 170° after take-off/departure" and the line-up clearance he suggested were contributory factors, which resulted in the unauthorised take-off.

THE LYNX AH MK7 PILOT reports his ac has a grey/green camouflage scheme, but HISLs were on whilst inbound to Belfast Aldergrove in CAVOK conditions and in receipt of an Aerodrome Control Service from TOWER on 118.3 MHz. Heading 170° at 80-100 kt, he received a clearance to cross the active runway - RW25 - to his dispersal on the S side of the airfield. Crossing the northern airfield boundary, he saw an airliner – the B737 - which was starting to move from the threshold along RW25. He called TOWER to confirm that he had clearance to cross RW25, and the ADC reaffirmed that he did. At a height of about 150 ft, with 2-300 m to run to the active runway surface both he and his crew were positive that the jet was in fact rolling. Therefore, despite his ATC clearance he "*aborted*" his runway crossing and turned hard R 180° to avoid the jet and clear the area until the B737 had departed and any turbulence had dissipated. On completion of one orbit N of RW25, TOWER again cleared him to cross the active, which he did before landing in dispersal. He assessed the risk of a collision as "*low*".

UKAB Note: The Belfast Aldergrove weather was reported as: RW25; Surface wind; 180/8 kt; Visibility: 10 km QNH 1017 mb.

ATSI reports with transcript that whilst **taxying** to RW25 before departure the B737 crew was

instructed at 1007:40, to "[C/S] *line up and wait runway 25...*". In the same transmission, the ADC also passed a post departure instruction, "*...after departure turn left radar heading one seven zero.*" Both elements of the transmission were immediately read back accurately by the B737 crew - "*Line up and wait and er after departure turn left radar heading one seven zero [C/S]*". Nevertheless, after lining up, the flight took off without receiving a take-off clearance from TOWER. The ADC's attention was focused on the Lynx helicopter, which had been cleared to cross RW25 from N – S at 1008, "[C/S] *you're clear to cross the airfield to dispersal wind 150 degrees 11 knots*", which the pilot readback as "[C/S] *is clear to dispersal*". Consequently, the ADC did not become aware that the B737 was rolling until the Lynx was observed to turn sharply away to the R, while still N of the runway. The Aldergrove control tower is situated to the S of the runway, about three quarters of the way along the runway from the RW25 threshold.

Within his report, the B737 pilot opines that the combined instruction to 'line-up' together with the radar heading after departure, contributed to confusion on the flight deck which led to the unauthorised take-off. Similar events have occurred before and various steps have been taken to try and prevent a repetition. In particular, MATS Pt 1, page E (Attach)-6, stipulates that when using the 'line-up and wait' phraseology, the reason should be given "*if applicable*". On this occasion, if the ADC had advised the crew that the Lynx helicopter was about to cross the runway, it may have served as a further reminder that their take-off clearance had not been issued.

Also related to this topic, is the entry in MATS Pt 1, page 2-7, para. 13:

"If an aircraft is lined up on the runway and a revised clearance or post departure instructions need to be passed, the revised clearance or post departure instructions shall be prefixed with an instruction to **hold** position."

However, whilst it may have helped, when passing the post departure instructions, to reinforce in some way that the flight was to hold position when lined up, this particular guidance does relate to situations when ac are **already** lined up on the runway. Similarly, it may have been

preferable to delay issuing the post departure instructions until the ac was lined up - just before the take-off clearance was to be issued - but controller workload might have precluded this and the crew might not appreciate having their departure modified at such a late stage. Nevertheless, having obtained a clear 'readback' from the B737 crew of the 'line up and wait' instruction, the controller would have been reassured that his instruction had been fully understood.

Finally, AIC 36/2002 (Pink 29), dated 2 May 2002, specifically addresses the issue of taking off without an ATC clearance.

HQ JHC comments that this incident appears to have arisen because of a misunderstanding on behalf of the B737 pilots. The Lynx captain and his crew are to be commended for their actions in noticing the B737 starting to roll on the runway, confirming the crossing clearance, and then turning away to avoid a potential collision. The risk of collision was minimal due to the avoiding action, and this incident serves as a reminder to all to be extra vigilant when operating into and out of an international airport.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board was reminded of a previous Airprox (58 of 1999) which had prompted a recommendation about RT phraseology – relating to the way that ATC instructions are given in sequence prior to take-off so that post departure instructions are separated from the take-off clearance. Here it was noted that the ADC had utilised appropriate phraseology, but 58/99 exhibited some striking similarities to this Airprox nonetheless.

Unfortunately, the B737 crew had managed to convince themselves at the critical moment that they had received take-off clearance, when in fact they had not. The STC member wondered if some form of visual aide memoire would prove useful. It was explained by CAT pilot members

that some companies utilise an SOP to indicate internally on the flight-deck when a take-off clearance had been issued by ATC – e.g. some require the landing light to be switched on, in addition to all the other external ac lighting being selected on prior to entering the RW. The Board was informed that the company does promulgate a procedure for use by its pilots, which should have worked, but both pilots were apparently preoccupied perhaps with their FMS fuel indication problem whilst taxiing out before departure and, despite having read back their clearance to line up and wait, during a momentary lapse in concentration they took-off. It was ironic that the B737 pilot had commented that the simultaneous ATC instruction to "fly heading 170° after **take-off/departure**" had been a contributory factor. The Board noted that the words "take-off" were not used by the ADC at this juncture - and never should be used - to prevent any ambiguity or confusion, such as apparently resulted here. Sufficient guidance had been published on this topic and had been amply covered in the comprehensive ATSI report. Here the ADC appeared to have chosen an appropriate moment to pass departure instructions; a controller member commented that the best time to transmit these was nevertheless a matter of judgement, adding as an aside, that the phraseology had changed from "hold" to "wait" to preclude any confusion with a clearance to 'roll'. Furthermore, both the helicopter pilot and the airliner crew were on the same frequency and the latter should have been able to hear the ADC transmit the airfield crossing clearance to the Lynx suggesting to one helicopter pilot member that the B737 crew had exhibited poor situational awareness. However, this remained a solitary view.

The Board complimented the Lynx helicopter pilot for his awareness, astute deduction and quick reaction. His sound grasp of the situation coupled with prompt avoiding action had stopped the incident degenerating into something much more serious. It was unfortunate that the ADC had not spotted the hazardous situation either when the Lynx pilot wisely double checked his crossing clearance. Here was a salutary lesson to pilots always to question the unusual and to controllers to check what is happening on the RW all the time. Fortunately, here the helicopter pilot's sound reasoning that something was awry was entirely correct. The Board determined that this

Airprox had been caused when the B737 crew executed a take-off without ATC clearance, into conflict with the Lynx helicopter. Furthermore, the Board concluded that the Lynx pilot's quick reaction and avoiding action had entirely removed the risk of a collision in the circumstances that pertained.

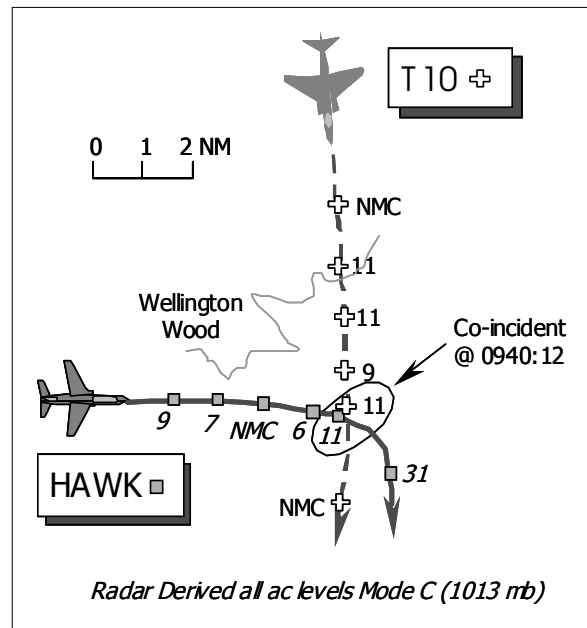
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The B737 crew executed a take off without ATC clearance, into conflict with the Lynx helicopter.

Degree of Risk: C.

AIRPROX REPORT NO 59/02

Date/Time: 17 May 0940
Position: 5209 N 0243 W (5 NM N of Hereford)
Airspace: UKDLFS - LFA 4 (Class: G)
Reporting Aircraft Reported Aircraft
Type: Hawk Harrier T10
Operator: HQ STC HQ STC
Alt/FL: 250 ft NR
 (agl) (RPS 1003 mb)
Weather VMC CLBC VMC NR
Visibility: >10 km 10 km
Reported Separation:
 <100 ft V 50 ft V, 50 ft H
Recorded Separation:
 contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK PILOT, a QFI, reports his ac has a high conspicuity black colour scheme and the HISL was on whilst flying a low-level instructional sortie and listening out on the LFS frequency of 300.8 MHz. The student was the PF from the front seat. The low flying conspicuity squawk of A7001 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted.

Approaching a position about 5 NM N of Hereford, heading 093° at 420 kt flying straight and level during an 'IP - target run' at 250 ft msd, a Harrier T10 was suddenly spotted about 500 m away to port crossing at 90° from L - R at the same height, as it emerged from behind a hill at Wellington Wood. To avoid the other jet he immediately took control and executed a "snap pull" at about 10 g

as the Harrier passed about 100 ft below his Hawk with a "very high" risk of a collision. He emphasised that the Airprox occurred during the final 15 sec of the 'IP - target run' and that the Harrier had been hidden from view behind the hill. He opined that this occurrence was an 'Open FIR' training hazard.

UKAB Note (1): After the Airprox the Hawk pilot declared an emergency and recovered to base under the control of LATCC (Mil) D & D section.

THE HARRIER T10 PILOT, the PNF, reports that his ac is camouflage grey and the HISL was on whilst operating independently on a low-level close air support instructional sortie and listening out on the LFS frequency of 300.8 MHz. The

student was flying the ac from the front seat and the low flying conspicuity squawk of A7001 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted.

After cresting a ridge heading 170° at 465 kt - on the last 3 NM of a practice attack run - he was descending into a plain with another ridge on the starboard beam. The student PF banked the ac into a level turn to starboard whereupon a black Hawk was spotted "*very close aboard*" at 3 o'clock about 200 yd away. Taking control, he pulled to avoid the Hawk, which passed 50 ft ahead from R - L and 50 ft above his ac - narrowly avoiding a mid-air collision and overstressing his Harrier during the avoidance manoeuvre. He assessed the risk of a collision as "*extremely high*" and added that the low-level Hawk had only just emerged from behind the hill when he spotted it.

UKAB Note (2): The Burrington SSR illustrates the preliminary stages of the Airprox quite clearly. The Hawk is shown eastbound passing S of Wellington Wood descending through 900 ft Mode C (1013 mb) converging on the southbound Harrier, which is indicating 1100 ft Mode C (1013 mb). The Hawk continued in a shallow descent to 600 ft Mode C at 0940:04, when the Harrier is shown at 900 ft – slightly more than 1 NM away. The next return at 0940:12 – moments before the respective tracks crossed - confirms the avoiding action climb initiated by both instructor pilots where both ac are shown simultaneously at the same level - 1100 ft Mode C. The contacts merged moments later and the Mode C indications are lost immediately thereafter, probably as a result of the robust avoiding action manoeuvres.

THE HAWK PILOT'S UNIT comments that just before the Airprox the student's attention was drawn to the ground features in the target area ahead, but although his effective scan was reduced it is not thought to be a contributory factor. This was a very late sighting by the Hawk crew who took violent avoiding action to prevent a collision and overstressed their ac as a result – safety was seriously compromised. This incident highlights the risks associated with low flying and the need for continuous good lookout especially when operating in hilly terrain.

THE HARRIER PILOT'S UNIT comments that the pilot was able to take appropriate avoiding

action albeit a minor overstress resulted. Collision avoidance systems may not have been beneficial in this type of event unless they are capable of operating outside the line of sight limitations that can prevail in mountainous areas. This incident therefore highlights an infrequent but significant training hazard and serves to remind us of the importance of good lookout especially in hilly terrain.

HQ STC comments that this Airprox was the result of a known operating hazard in the 'Open FIR'. It is a salutary reminder that when practising low flying and terrain masking we are inhibiting our ability to 'see and be seen'. Therefore, not only do we need to maintain a good lookout for others, but also we need to consider making it easy for others to see us.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was evident from the radar recording that this was a very close encounter indeed, confirming the respective pilots' reports. The Board noted that during both 'IP to target runs' to different 'targets', each crew was oblivious to the presence of the other's ac until they had cleared the obscuring ground feature at Wellington Wood. The STC member opined that when operating independently, as a singleton, it was easier to maintain the minimum authorised height compared with formation flying. Also an 'IP to target run' was a high workload exercise and because it demanded navigating within feet of the planned track, lookout tended to focus forward rather than on an all-round scan. Therefore, members did not agree with the Hawk's pilot's unit comment; the QFI may have had spare capacity for a wider lookout scan, but the nature of the task meant the student's attention was concentrated on the area ahead, not to either side. The Board agreed that this was a salutary lesson when valley flying - unseen dangers could be lurking 'around the corner' ready to trap the unwary. As ever pilots must be continually alert to the unexpected – as both instructors were here fortunately.

Both crews had planned their sorties in total isolation, completely unaware that they would each be in the vicinity of each other's 'IP to target run'. Members were concerned that no 'system' for de-confliction of such flights existed, a situation which many thought required attention. The outdated, but widely used STC target library was mentioned. Though now defunct, its purpose was amongst other things to reduce the density of low flying traffic so as not to concentrate low flying in a particular area, but more for noise reduction that the purpose of deconfliction. Its use would not have prevented this Airprox at all. However, it was explained that on some stations it was possible to deconflict missions intra unit; this was possible through various type specific ac mission planning devices. Coltishall was mentioned with its Jaguar Mission Planner; another in common usage was the C130 mission planner, which apparently also has the potential to resolve low level conflicts with support helicopter sorties. The STC LF adviser pointed out, however, that these tools would only work for flights that flew 'on track and on planned time'. Unfortunately, as yet, no joint service wide low flying deconfliction system was available. In the recent past the principle for the deconfliction of low level military flights had been enshrined in the rationale for the development of the 'ALFENS', a system which had ultimately failed to provide the deconfliction envisaged and never came to full fruition. The Board was briefed that development work was in progress for another advanced device, seen as a replacement for ALFENS. This new system might fit the bill and with a projected 'in-service' date of 2005, members found this encouraging.

Returning to the circumstances at hand, it was evident to members that 'see and avoid' was all that could prevent these two ac from colliding. No forewarning was available from any ATSU here; neither was there any other form of CWS to warn the crews about the other ac, as both jets descended into the valley along their conflicting tracks. Some members thought that the Harrier might just have been a little more apparent to the Hawk crew, as it could have been skylined while cresting the ridge, but this was conjecture. Each instructor had but moments to react and they did, the Hawk QFI a shade ahead of his fast jet colleague. Neither crew had apparently made any use of the LFS frequency for warning broadcasts, but members were sceptical anyway

of its efficacy if used in this way. Nonetheless, it was another method of making one's presence known albeit within the constraints of line of sight communications. The members agreed unanimously, that this Airprox had resulted from very late sightings by both pilots, understandably so as a result of terrain masking.

Paradoxically, it was evident that the Hawk had descended below the level of the Harrier T10 before the acs' tracks crossed. The radar recording (based on 1013 mb and not, therefore, an altitude amsl) showed both ac 1 NM apart, with the Hawk at 600 ft and indicating 300 ft below the T10. On the next return the Hawk pilot had climbed to 1100 ft, the same level as the T10, whose pilot had already climbed up 200 ft; this illustrated the swift reaction of both instructor pilots to change the flightpaths of their ac. The Board commended both pilots, but for different reasons. As it was, the Hawk pilot had probably sighted the Harrier a little earlier and his 9G+ 'pull' was an instinctive action that undoubtedly played its part in averting a catastrophe. Meanwhile in the other cockpit, the T10 instructor fortunately sighted the Hawk just as the student lowered the starboard wing whereupon he took control and pulled up as well. It must have become clear at that stage that his avoiding action climb, initiated a split second after the Hawk pilot's, had the effect of compounding the problem. Ironically, if the T10 pilot had not pulled and had remained at low level the Hawk QFI's climb alone would have given greater separation but that observation was a matter of hindsight. Whether by chance or by judgement, the T10 instructor did not pull as hard as the Hawk pilot, otherwise members thought a collision would have ensued. Nonetheless, with both ac indicating the same level just moments before, it had been a very close call indeed - too close for the Mode C to differentiate and members agreed the subsequent loss of a Mode C indication from either ac, was the result of the stress inducing climb. The Hawk QFI would probably have been momentarily unsighted as the Harrier passed underneath, so members thought the T10 instructor's estimation of the vertical separation, potentially, more accurate. The end result, it would appear, being that the Hawk passed 50 ft above the T10. Taking all these factors into account, the Board concurred with the assessments provided by the two instructors, in

that an actual risk of a collision had existed in these circumstances.

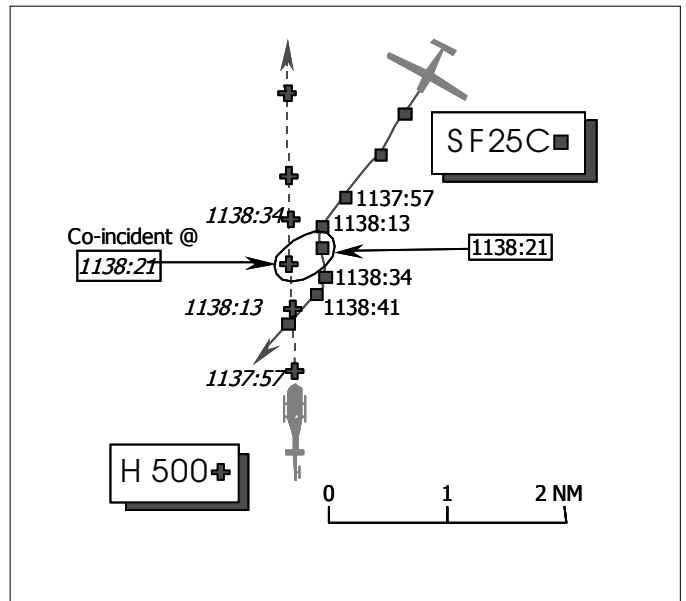
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Very late sighting by both pilots, as a result of terrain masking.

Degree of Risk: A

AIRPROX REPORT NO 60/02

Date/Time: 19 May 1130 (Sunday)
Position: 5128 N 0138 W (3 NM NE of Marlborough)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: SF25C M/Glider Hughes 500C
Operator: Civ Pte Civ Pte
Alt/FL: 1800 ft NR (QNH 1011 mb)
Weather VMC NR
Visibility: 5 NM+ NR
Reported Separation:
 400 ft H, 50 ft V NR
Recorded Separation:
 0.3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SF25C MOTOR GLIDER (M-G) PILOT reports that his ac was white with orange tips. It was not fitted with anti-collision lights, transponder or TCAS. At the time of the Airprox he was in contact with Lyneham ZONE who were supplying a FIS. Visibility was good, varying between 5 NM to the West, and 50 NM to the East.

Whilst flying level at 70 kt on a heading of 200° at 1800 ft he sighted a small/medium sized light grey helicopter at less than 1 NM range which appeared to be on a reciprocal course at the same height. Avoiding action was taken in the form of a diving turn to port. The pilot believes that the helicopter did not change course during the encounter. The Airprox was not reported until

after landing as ZONE were very busy at the time. The pilot did not directly report the risk level other than to re-state that the other aircraft was co-height and on a reciprocal heading.

THE HUGHES 500C PILOT reports that she did undertake a flight on the day of the Airprox but was unable to recall precise details. The pilot was unaware that her ac may have been involved in an Airprox during the flight, which was made from a private site near Salisbury to Leamington Spa. The helicopter was coloured light and dark grey and strobes were on. A transponder was fitted but she believes that it was unserviceable. Although flight parameters could not be recalled, she reports that she would normally transit at 1500 ft agl and at 100 kt.

UKAB Note (1): Unfortunately tracing action on the reported ac took more than 4 months. The helicopter pilot's report was as complete as may be expected under the circumstances.

MIL ATC OPS reports that the M-G pilot called Lyneham ZONE at 1130:30 and requested a FIS. It was determined that the ac was non-transponder equipped. The Cotswold pressure setting was passed and the ac's route established as Sandhill Farm to Marlborough and return. According to the tape transcript, the flight appears to have been uneventful, although it is obvious that ZONE was quite busy with a number of other ac.

Sandhill Farm lies on the approach to Lyneham RW24 but outside of Class D airspace. Although the M-G was expected to operate in Class G airspace, a FIS was provided "*due to planned aircraft movements into Lyneham*". The controller recalls that at the time of the Airprox he was busy "*controlling multiple aircraft on 2-3 frequencies*".

A FIS is a non radar service provided for the purpose of supplying information for the safe and efficient conduct of flight. Where a controller suspects that a flight is in dangerous proximity to another ac, a warning is to be issued, however the controller cannot assume responsibility for its issuance and is not responsible for separation or sequencing of ac. In this instance the M-G was not identified, the reported helicopter was not in communication with ZONE, and reported positions could not be correlated. It appears therefore that there are no ATC aspects to this incident.

UKAB Note (2): Analysis of the Heathow Radar recording at 1136:35 shows what is believed to be the M-G as a slow moving primary return about 12 NM East of Lyneham tracking about 190°. A North bound primary return, believed to be the Hughes 500, pops up at 1138:13 tracking about North. At 1138:21 the M-G is seen turning left, before reversing the turn to pass behind the other ac. Minimum horizontal separation is assessed as about 0.3 NM. No Mode C is observed and vertical separation cannot be determined.

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 controller involved and reports from the appropriate ATC Authority.

The Board observed that this Airprox took place in class G airspace, in generally fine weather and on a Sunday, when GA traffic levels could be expected to be quite high. The principle of "see and avoid" applied in this case, so the Board considered factors affecting the pilots' ability to do that. The M-G pilot needed to see a grey coloured helicopter, with little relative movement. In the event, his lookout proved effective, and his avoiding action removed any risk of collision, which undoubtedly existed had the two ac maintained their initial flight paths. Although the sun favoured the Hughes pilot's lookout, the M-G presented a difficult sighting because of its colour and aspect. Helicopter specialists pointed out that the Captain sits on the left in this type of helicopter and suggested that this may have further impeded lookout in the direction of the approaching M-G. It was therefore unsurprising that the M-G had gone unseen.

Some members thought it possible that the M-G pilot, who was in receipt of a FIS from Lyneham, may have been expecting more from this service in terms of traffic information than was the case. If this were so, it may account for the "surprise" element in such an encounter, both in the initial sighting and in the lack of response from the other ac. However, there was no information to support this view and the Board were in general agreement that the M-G pilot's actions had been timely and appropriate.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict of flight paths resolved by the Motor Glider pilot.

Degree of Risk: C

AIRPROX REPORT NO 61/02

Date/Time: 4 May 1403 (Saturday)

Position: 5141 N 0155 W (1 NM S of South Cerney - elev 360 ft)

Airspace: FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: C182 Grob 109

Operator: Civ Pte Civ Pte

Alt/FL: 1700 ↓ 1500-2000 ft
(QNH) (QNH 1019 mb)

Weather VMC CAVOK VMC CBLC

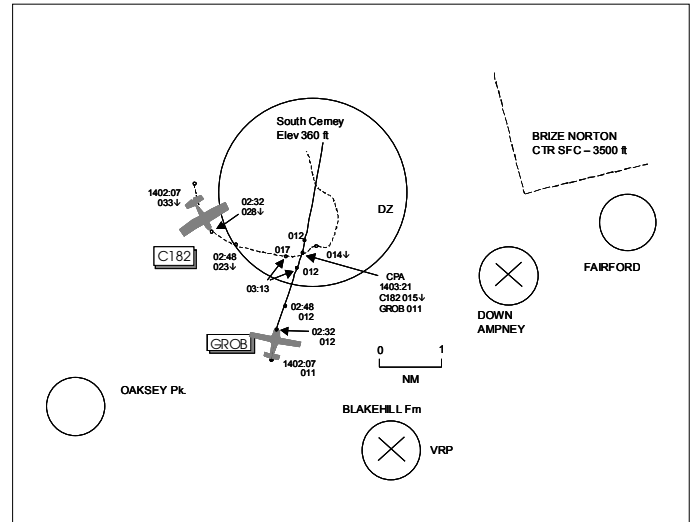
Visibility: 30 km >10 km

Reported Separation:

150 ft V 50 ft V

Recorded Separation:

400 ft V ac returns merge

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE C182 PILOT reports descending at 100 kt into South Cerney on completion of his freefall parachutists drop and was talking to the DZ Control on a discrete frequency. The visibility was 30 km in CAVOK. The ac was coloured white/green and he was squawking 0033 with Mode C. Passing FL 35, he thought, overhead the DZ, he caught sight of an ac just as it was clearing on his LHS flying about 150-200 ft beneath him heading 010°; he made a steep R turn to avoid it. He had seen this ac very late and this had badly shaken him up. This unexpected encounter had occurred within a NOTAM'd DZ, which is always active and is clearly marked on aeronautical charts. He assessed the risk as very high, particularly as it is a freefall parachute centre.

THE GROB 109 PILOT provided a very comprehensive report on the incident. He had departed a private site near Warminster routing to another private site near Cottesmore, flying between 1500-2000 ft QNH. A colleague of his was flying another ac following the same route about 1 NM to the W, with the intention of picking him up at his destination and then returning to Warminster. The visibility was >10 km 1000 ft below cloud in VMC. The ac was coloured white and he was squawking 7000 with Mode C. Whilst working Lyneham ATC, he was told that Colerne and Hullavington were active, both of which were

on his planned track, so he chose to deviate to the E around them. When passing E abeam Oaksey Park heading 360° he was then informed that South Cerney was active to 10,000 ft, that Brize Norton had conflicting traffic ahead and it was suggested that he call Brize for an ATC service. He looked at his map and judged that his new route would not be passing through the Brize CTR so he did not change to their frequency, instead he changed to 129.9 MHz to chat to his colleague whilst en route. He could see a large grass airfield ahead with a large circle in the centre; he was convinced that this had to be South Cerney as Blakehill Farm was a farm strip, or so he thought. Keeping clear of this airfield to the W, the downwind side, he then inadvertently overflew South Cerney. He saw the conflicting ac, possibly a C185, late, when it was in his 9 o'clock about 300 ft away and less than 100 ft above him. The Cessna had its RH door removed and was crossing L-R about 10 kt faster, the pilot could be clearly seen as it banked gently to the R. After moving his stick gently forward, the Cessna passed over the top of him by 50 ft. He erroneously assumed that as he could see the Cessna pilot, he could see him and that the close encounter was the Cessna pilot noting his registration marks and letting him know of his presence. He only saw South Cerney when he looked back at the Cessna after he had been

overflowed. Post flight he had rung the parachute school at South Cerney to apologise for flying through their DZ.

UKAB Note (1): The Grob pilot had subsequently made another flight over the area to see where he had gone wrong, taking photos of the airfields and later confirming his hypothesis of the event.

UKAB Note (2): Met Office archive data gives the South Cerney QNH as 1022 mb.

UKAB Note (3): The UK AIP at ENR 5-5-3-4 promulgates South Cerney Free-fall Parachute Drop Zone, as a circle radius 1.5 NM centred on 514114N 0015519W, up to FL 150, the activity being notified on the day to Brize Norton ATC but normally taking place during daylight hours Sat, Sun and PH.

UKAB Note (4): The UK AIP at ENR 5-5-2-2 also promulgates South Cerney as a Parascending Launch Site centred on 514115N 0015515W, sfc to 2000 ft above the aerodrome elevation of 360 ft, active during daylight hours.

UKAB Note (5): Analysis of the Cleve Hill radar recording at 1402:07 shows the C182 1.9 NM W of South Cerney tracking 170° and descending (RoD 1500 ft/min) through FL 033 (3570 ft QNH 1022 mb) with the Grob 109 3 NM SSE, tracking 010° and indicating FL 011 (1370 ft QNH 1022 mb). The Grob continues on a steady track until after the incident, its Mode C changing to FL 012 (1470 ft QNH) at 1402:32, by which time the C182 has commenced a L turn. The C182 is shown 16 seconds later tracking 100° descending through FL 028 (3070 ft QNH) 1.25 NM NW of the Grob. Both ac continue on steady tracks, on constant relative bearings until 1403:13, as the C182 descends through FL 017 (1970 ft QNH) with the Grob at 1 o'clock range 0.23 NM indicating 500 ft below. The CPA occurs at the next radar sweep (1403:21) with both radar returns merged, the C182 having turned L onto a NE track descending through FL 015 (1770 ft QNH) with the Grob now indicating FL 011, 400 ft below the Cessna. The radar recording 8 seconds later shows the Cessna still descending through FL 014 (1670 ft QNH), 0.2 NM E of the Grob which is indicating 200 ft below as the ac tracks diverge.

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 shown colour photographs (taken during a later flight) that were submitted to the UKAB as part of the Grob pilot's report, as well as a 1:500 000 map showing his planned and actual route on the day. One snapshot shows Blakehill Farm as a large grass area with a white object (an aerial array) situated within a mown grass circle, which could be misconstrued as a parachute DZ aiming point. However, it also shows the outline of the old runways and perimeter track which should have been correlated to the disused aerodrome symbol used on the topographical chart. Also, a large area covered by lakes (situated to the NW of Blakehill Farm and S of South Cerney) is clearly seen on another photograph and this mass of water should have alerted the Grob pilot; cross reference to his map would have shown that on his northerly track he had not yet reached the South Cerney Parachute DZ. Members were also surprised by the Grob pilot's actions when he ignored the Lyneham ATC advice to contact Brize Radar, who not only had conflicting traffic but also could have helped him avoid the Parachute Zone. That aside, members agreed that the Grob pilot had inadvertently penetrated the South Cerney Free Fall Parachute Drop Zone and this had been a part cause which had led to the Airprox. Also apparent was the fact that both pilots were flying under VFR (see and avoid) in very good weather conditions but they had managed to get fairly close to each other before 'look-out' had detected the confliction. The Grob pilot saw the descending C182 very late as it appeared in his 9 o'clock only 300 ft away whereas the C182 pilot only saw the Grob after he had overflowed it and as it emerged on his LHS. Members agreed that this had been a very late sighting by the Grob pilot and effectively a non-sighting by the C182 pilot; this also had been a part cause of the Airprox. The Cessna pilot may have thought that the NOTAM'd DZ area afforded him a larger degree of protection from other airspace users (an exclusion zone) but during any VFR flight he remained ultimately responsible for visually clearing the airspace into which he was

descending, and this should have revealed the transiting Grob.

Turning to risk, the C182 pilot was surprised by the Grob's appearance on his LHS after it had passed beneath him by 150 ft and turned R to increase the separation distance. The Grob pilot had seen the Cessna very late on his LHS, 300 ft away, 100 ft above and descending, and after moving his control stick forward he watched it pass 50 ft overhead, erroneously believing that the Cessna pilot could see him. Even though he may have been misled by this assumption, he was always in a position to take more evasive avoiding action to prevent an actual collision. The radar recording shows the ac returns merging with 400 ft vertical separation and subsequently separated by 200 ft and 0.2 NM after the tracks diverge; the Cessna pilot's avoiding R turn is seen commencing immediately thereafter. Although

the subject ac were not going to collide, they had certainly flown closer to one another than was ideal before the conflict was noticed, which led the Board to conclude that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

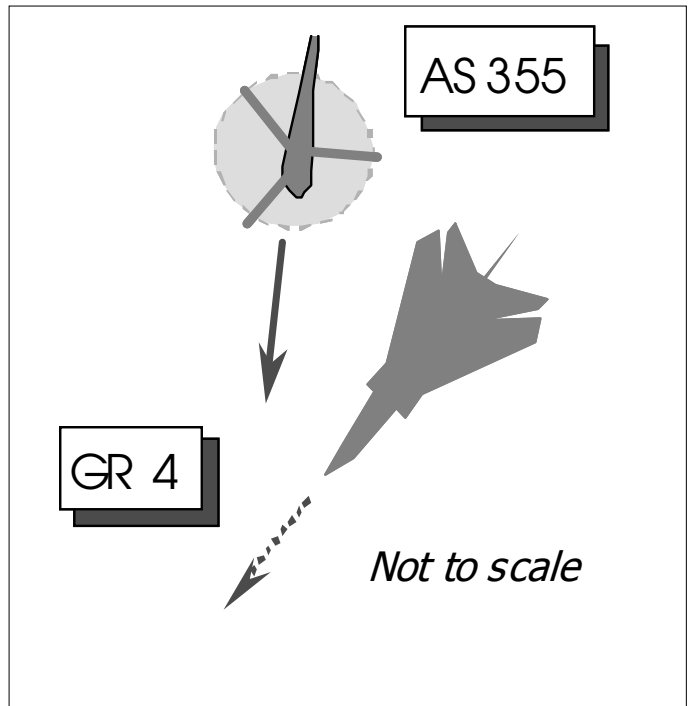
Cause:

- a. Inadvertent penetration of the South Cerney Free Fall Parachute Drop Zone by the Grob 109 pilot.
- b. A very late sighting by the Grob pilot and effectively a non-sighting by the C182 pilot.

Degree of Risk: B

AIRPROX REPORT NO 62/02

Date/Time: 21 May 1108
Position: 5405 N 0159 W (1 NM N of Grassington)
Airspace: UKDLFS/FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Tornado GR4 AS355 F1
Operator: HQ STC Civ Comm
Alt/FL: 450 ft ↑1500 ft
(Rad Alt) (NR)
Weather VMC CLOC VMC CLOC
Visibility: 20 km+ 10 km+
Reported Separation:
200 ft V 1000 m H
Recorded Separation:
Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4 PILOT provided a very comprehensive report stating that he was flying as the No 2 of a GR4 pair on a low-level affiliation sortie against a single Hawk in LFA 17, whilst listening out on the LFS frequency of 300.8 MHz. His ac has a low visibility grey camouflage scheme, but HISLs were on and a squawk of A7001 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted. The sortie was conducted in "good" VMC, with an in-flight visibility of 20 km+, some 4000 ft below cloud.

Approaching a position 1 NM N of Grassington in wide battle formation with his leader 3-4 NM on the starboard beam, heading 220° at 420 kt, he spotted a helicopter in his 12:30 - "at very close range" - 2-400 m away. To avoid the helicopter he pulled up passing 200 ft above and just ahead of the helicopter where the Rad Alt indicated 450 ft. He added that the risk of a collision before the pull-up was "high".

The helicopter was possibly a Eurocopter AS350/355 and he reported the Airprox after landing.

THE AS355 TWIN SQUIRREL PILOT reports his ac is dark green with multi-coloured stripes and he was outbound from a private helicopter landing site (HLS) at Grassington, climbing to an altitude of 1500 ft and under a FIS from Leeds/Bradford ATC. The assigned squawk was selected with Mode C, but TCAS is not fitted.

Heading 185° at 120 kt he spotted a Tornado about 1 NM away to the east. No avoiding action was initiated because the jet crossed from L – R about 1000 m ahead of his helicopter - in a climbing L turn attitude he thought - before he could take any action. He assessed the risk of a collision as "moderate".

He opined that this was an "Open FIR incident" and suggested that high use civil sites near to military routes should be notified – the HLS used here is adjacent to a house.

UKAB Note (1): In a subsequent telephone conversation with the AS355 pilot, he opined the Grassington HLS is used about 30 times a year.

Consultation with STC LF Staff revealed that normally, HLSs must attract activity on a daily basis to be marked on Military Low Flying Charts.

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

THE TORNADO PILOT'S UNIT comments that from the geometry of the encounter described by the Tornado pilot, it is likely that the 2 ac involved in this incident approached each other with little relative motion, which may partly account for the late sighting by the Tornado pilot. When he gained visual contact, he quickly took effective avoiding action. It was not ideal to pass directly above the helicopter, but to attempt a level turn would probably have led to a closer encounter on this occasion.

HQ STC comments that helicopters often appear virtually stationary in relation to fast jets. When presented against a background of terrain, their small size makes them very difficult to see. ANY measures - such as a dayglo paint colour scheme - that can make them more conspicuous would be welcome.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

A helicopter pilot member thought that without any form of CWS fitted to FJs, such encounters as this were an inevitable consequence of military high speed low level operations. This was a solitary view, however, and members were briefed that work was in progress concerning the provision of such equipment for military jets, which was encouraging. Here, the helicopter was squawking, and it had apparently just departed from the HLS, leading members to believe it was unlikely that a CWS would have proved beneficial in this terrain; indeed it was pointed out that neither was the helicopter involved here so fitted. In this 'see and avoid' environment discussion moved to the conspicuity of helicopters at low level and the most advantageous colour scheme.

With so many variables as to background and prevailing conditions this was a complex subject, but a second helicopter member thought the most useful solution might be different coloured main rotor blades. They had certainly proved to be effective on some older military helicopters in the past - notably the Wessex and Sea King – and the Board would welcome any measures which would improve matters. At the same time it was recognised that the cost involved in provisioning different coloured blades for civilian helicopters would be prohibitive for commercial operators.

There was an anomaly in the pilots' reports presented to the Board. The Tornado GR4 pilot had reported passing 200 ft above and just ahead of the helicopter at close range, whereas the Twin Squirrel pilot opined that the jet had crossed 1000 m ahead. The Board was unable to reconcile the differing perceptions from both cockpits and the relative horizontal distances reported during the encounter. It seemed to some members improbable that one pilot would judge the separation in this encounter so vastly different to the other. With this in mind some members wondered if the Twin Squirrel pilot would have heard the jet if it had passed so close. Helicopter pilot members thought not, above the high ambient noise in the cockpit. One possible explanation was that the helicopter pilot had not seen the same jet. Speculation arose as to whether the GR4 pilot had his leader to port and not starboard as he had reported, but as the leader was apparently 3-4 NM away on the beam in wide battle formation this would have placed the other ac even further away than that

reported. As it was, with the leader to starboard, this jet would have been astern of the helicopter in this situation. Without supporting radar data this could not be resolved with certainty. The GR4 pilot had not sighted the helicopter ahead until he had closed to within 400 m, a late spot indeed and part of the cause, but in view of the reported 1000 m horizontal separation from the other pilot's cockpit, the Board was not convinced the Twin Squirrel pilot had seen the same GR4 as that flown by the reporting pilot. Consequently, in the Board's opinion this was, probably, a non sighting by the AS355 helicopter pilot, who might have seen another ac.

Turning to risk, working on the assumption that the Twin Squirrel pilot had not seen the subject GR4, the former would have been unaware of its presence so close and therefore unable to effect the outcome. Conversely, the Tornado pilot had spotted the helicopter at a very late stage, but just in time for him to climb 200 ft above it. This avoiding action had been enough to remove the actual risk of a collision, but by an uncomfortable margin, where in the Board's opinion the safety of the ac involved had been compromised.

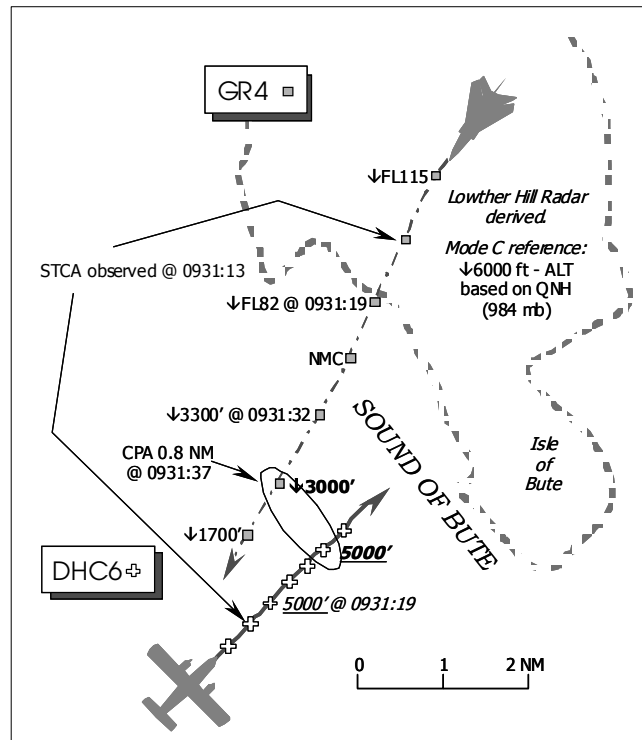
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Tornado GR4 pilot and, probably, a non sighting by the AS355 helicopter pilot.

Degree of Risk: B.

AIRPROX REPORT NO 63/02

Date/Time: 24 May 0931
Position: 5543 N 0508 W (3½ NM W of Garroch Head - Isle of Bute)
Reporter: Glasgow ATC
Airspace: Scottish FIR (Class: G)
First Aircraft Second Aircraft
Type: DHC6 Twin Otter Tornado GR4
Operator: CAT HQ STC
Alt/FL: 5000 ft 3500 ft
(QNH 985 mb) (RPS 973 mb)
Weather IMC VMC CLOC
Visibility: Not reported 10 Km
Reported Separation:
Not seen Not seen
Recorded Separation:
2000 ft V/0.8NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GLASGOW RADAR 1 CONTROLLER (RAD), reports that the Twin Otter was inbound to Glasgow from Campbeltown IFR, flying level at 5000 ft QNH (985 mb), under radar vectors and a RAS whilst squawking A5057 with Mode C. Another ac squawking A4624 – subsequently identified as the Tornado GR4 - was observed in transit southwest bound from the NE initially indicating FL 150, but the Mode C was intermittent. About 20 NM W of Glasgow, the jet was "suddenly observed" passing down the Twin Otter's port side indicating 4600 ft QNH (985 mb) and descending. The Mode C was only displayed for a few sec on the Glasgow Watchman's SSR and as the GR4 had already passed behind the Twin Otter when he realised it had descended, no avoiding action was transmitted. However, the Twin Otter crew was asked their flight conditions – IMC - and traffic information issued. He estimated that separation was eroded down to 2.28 NM and 300 ft.

He subsequently contacted ScATCC (Mil) who advised that the Tornado had been in receipt of a RIS and had been informed of the Twin Otter 4

times but elected to continue. His concern was that as the Twin Otter crew were IMC at the time of the Airprox the Tornado crew could not have been in visual contact with the airliner before they passed.

GLASGOW ATC REPORT that the secondary return from the Tornado was intermittent on the Glasgow Watchman radar and at the time of the Airprox was only visible for a few sec, but indicated that the jet was descending rapidly - passing 4600 ft ALT Mode C.

THE DE HAVILLAND 6 TWIN OTTER PILOT reports he was flying from Campbeltown to Glasgow via ROBBO at 140 kt. The assigned squawk of A5037 was selected with Mode C, but TCAS is not fitted; Glasgow RADAR was providing a RAS. Heading 060° about 053° MAC 19 NM, IMC at 5000 ft amsl, ATC advised him of 'pop-up' traffic which passed 2 NM down the port side 500 ft below his ac at 4500 ft. No avoiding action was taken and he assessed the risk of a collision as "low".

THE TORNADO GR4 PILOT reports that he was in a straight descent to low-level at 420 kt, about 2 NM NE of the Isle of Arran heading 230° and in receipt of a RIS from SCOTTISH MILITARY. The assigned squawk of A4624 was selected with Mode C; neither TCAS nor any other form of CWS is fitted. Just after clearing the Scottish TMA he was descending VFR, to his low-level entry point. He was VMC during the descent and at the point of the reported Airprox was about 1500 ft below and 2 NM clear of cloud with an in-flight visibility of 10 km. The Twin Otter was called twice by SCOTTISH MILITARY, but when he received the second call he increased his RoD to ensure that he would pass clear underneath the reported ac, which he estimated he passed by 3 NM and 1500 ft. At all times during the descent he was able to clear his own flight path, but at no stage did either he or his navigator spot the reported traffic. The RIS was terminated once established at low-level, the squawk changed and he switched to his en route frequency.

MIL ATC OPS reports that the Tornado GR4 was working ScATCC(Mil) Controller 2 (CON 2) transiting across the NW portion of the TMA under a RCS. At 0924:46, the pilot acknowledged the type of service and requested *"left turn to parallel the TMA and looking for descent in the Firth of Clyde."* The L turn was approved and clearance to *"descend FL 150 initially"* was given. The Tornado turned onto a heading of 240° and at 0926:04, the crew requested *"further left 225"*. The turn was refused at this time by CON 2 because of *"traffic south twenty miles tracking west climbing out of Edinburgh west bound"* but approved just over 2.5 min later at 0928:41. Having turned, the Tornado crew indicated that they were ready for further descent, which was given to *"FL 100 initially"* at 0929:23. It was obvious to the controller that the pilot wanted to go low-level at the earliest opportunity so he suggested that the GR4 crew *"come right twenty"*. At 0930:44, the Tornado cleared CAS, the flight placed under a RIS as requested by the pilot earlier and traffic information passed to the crew on *"traffic 12 o'clock, seven miles tracking north east, civil traffic indicating FL 50"* – the Twin Otter. The Tornado pilot acknowledged and advised CON2 that he was *"coming left onto south and descending"*. At 0930:57, CON2 then passed the relevant RPS with an instruction to descend to the Sector Safe Altitude – 3900 ft - and advised the crew to *"report victor mike*

charlie". The previously reported traffic - the Twin Otter - is again called to the Tornado crew at 09:31:13 as *"south three and a half miles, tracking northeast, indicating FL 50"*. The pilot reported *"looking [c/s] victor mike below and en-route, squawking 7000, thanks"* at 0931:20, to which CON 2 immediately responded, *"[C/S] roger, that traffic is 12 o'clock, 2 miles, crossing right left, indicating 50"* although there was no acknowledgement to this transmission. CON 2 reports that the GR4's Mode C readout then *"dropped out due to his rate of descent and when it re-appeared it indicated 2000 ft below the Twin Otter while approximately 1-2 miles north"*, he also added that the Tornado *"changed en route as he flew under the civil track but did not change his squawk to 7000 until past it"*.

The radar video recording was difficult to analyse as the Mode C figures were blurred somewhat. The Tornado is shown in transit close to the north-western edge of the Scottish TCA. Timings appear to be reasonably accurate and the GR4 reaches the western boundary at 0930:44, indicating FL 112 Mode C. At this stage the Twin Otter is 12 o'clock at approximately 8.5 NM. When the Twin Otter is called again at 0931:13, as *"south"* it is actually south-southwest however the range is quite accurate. The use of cardinal points is correct, as the Tornado had already commenced his turn. The Mode C drops out at 0931:20, which is also the time the Tornado crew advised switching to their en route frequency. Before losing the Mode C indication, it appears that the Tornado is passing FL 92, however the numbers are indistinct. At 0931:32, the GR4 Mode C reappears indicating 3300 ft ALT. The SSR code does not appear to change to 7000 until the Tornado is some 4 NM SW of the Twin Otter.

Under RIS the Controller will inform a pilot of *"the bearing, distance and, if known, the level of conflicting traffic"*. Additionally *"the controller will only update details of conflicting traffic, after the initial warning, at the pilot's request or if the controller considers that the conflicting traffic continues to constitute a definite hazard"*. CON2 passed traffic information on the Twin Otter 3 times to the Tornado. The pilot must *"advise the controller before changing level, level band or route"* and it appears as though the Tornado pilot kept CON2 appraised of his intentions although *"coming left"* is more a fait accompli rather than *"advise before"*. Nevertheless, as the pilot is

"wholly responsible for maintaining separation from other aircraft" and he was given ample warning of traffic effecting his desired descent, this point has little bearing on the incident. It is apparent that CON 2 applied the rules in an accurate and timely manner, providing clear and concise traffic information on the conflicting Twin Otter.

UKAB Note: The Lowther Hill radar, in use by the CON2, displays Mode C information based on the Glasgow QNH for ac below the transition Altitude of 6000 ft amsl. Therefore, CON2 was incorrect in referring to the Twin Otter being at *"FL 50"*, whereas it was level and displayed as being at *"5000 ft"* ALT Glasgow QNH throughout. The applicable pressure difference between the SAS (1013 mb) and the QNH (985 mb) was about 840 ft. The CPA of 0.8 NM occurred at about 0931:37, as the subject ac passed 'port to port', the GR4 2000 ft below the Twin Otter, as the jet descended through 3000 ft Mode C (985 mb).

HQ STC comments that the separation between the subject ac was about 1 NM, as the GR4 descended below the Twin Otter with neither ac's crew seeing the other, nor being overly concerned at the separation between them. The GR4 was compliant with VFR rules in Class G airspace. However, given the extensive traffic information the GR4 had received from ScATCC (Mil), it would have been better airmanship to level above the Twin Otter until clear behind, maintaining the ATS rather than descending below at reasonably short range.

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 understood why the Glasgow RADAR controller had been concerned when he suddenly observed the Tornado GR4's Mode C just below that of the Twin Otter and subsequently filed this Airprox. He had not spotted the jet's Mode C during its rapid descent and from the Glasgow ATC report it was apparent to members that the

Watchman's Mode C had difficulty in keeping pace with the rapidly decreasing GR4's level until it was shown at 4600 ft ALT. Considering that his last sighting of the Tornado's Mode C indication had been at FL 150 some time earlier, controller members understood his natural surprise about the sudden appearance of the jet some 400 ft below the Twin Otter. Thus in the provision of the RAS to the Twin Otter crew, he had been caught unawares and had not been able to effect standard separation against the jet. It was emphasised that RADAR should have been attempting to provide 5 NM horizontal separation against non-participating ac not under his control descending through the same altitude as the Twin Otter, but members believed that this was perhaps an unreasonable expectation here and the rapid descent had left the controller powerless to act. This was an important lesson for pilots; that rapid climbs/descents do not give controllers the chance to react even if the radar equipment can keep up with the rapidly changing indication from their ac. Some members also thought that TCAS might be affected in a similar way, though here unfortunately, the Board noted it is not fitted to the Twin Otter. (Post meeting note: TCAS II version 7 is designed to cope with vertical rates of up to 10,000 ft/min.)

The Glasgow controller had reasoned in his report that if the Twin Otter crew were flying in IMC, as reported, the fast jet pilot could not possibly have seen the Twin Otter 0.8 NM to port when he passed it flying in the opposite direction. This was correct, insofar as the Tornado GR4 crew had not seen the Twin Otter, but with the benefit of full information the Board did not accept that it was inherently unsafe. The jet pilot had reported his in-flight conditions as VMC throughout and he had quantified this. Though it was impossible to confirm with certainty what the cloud structure was along his track, the GR4 pilot reported he was able to clear his flight path ahead during his descent, which coupled with the traffic information provided by CON 2 enabled the GR4 crew to form a mental 'air picture' and maintain their situational awareness such that they could descend clear of the Twin Otter. The Board had no reason to doubt the veracity of this statement; the Tornado pilot seemed to have dived steeply through a gap in the clouds. Indeed, the GR4 pilot had emphasised that he purposely ensured a good RoD to get below the other ac.

It was unfortunate that unbeknown to the GR4 crew at the time, CON2 had erroneously reported within his traffic information that the Twin Otter was flying at FL 50 – on more than one occasion - whereas the data displayed to CON2 actually showed the other ac correctly at 5000 ft ALT. A civilian controller member pointed out that it was fortunate that CON2 had not tried to stop the descent of the GR4 at FL 60 and effect co-ordination beforehand. If he had, because of the great pressure differential at the time equating to about 840 ft, in the order of only 160 ft of vertical separation would have been provided above the other ac. Although the other members recognised this was merely conjecture and the Board did not consider the 'what ifs' in its determination of cause and risk, it was nonetheless, a salutary lesson for controllers not to forget the basics of altimetry or the high transition altitude used in the vicinity of this aerodrome. Indeed a CAT pilot member's personal view was that the transition altitude should be raised throughout the UK FIRs to a common 6000 ft, but the Board declined to take a stance on this point. The STC FJ member reinforced the HQ view that the extensive traffic

information provided had permitted the GR4 crew to descend safely under VFR. Some members thought the GR4 crew should have advised CON2 about what they were doing. Though some viewed it as 'good practice' there was no specific onus on CON 2 to initiate co-ordination and, notwithstanding his level/altitude mistake he had complied with his responsibilities under the RIS that pertained. The GR4 pilot had flown clear of the Twin Otter by a closer margin than he thought horizontally, though further below it – 2000 ft on Mode C as both ac passed 0.8 NM away 'port to port', after his rapid descent. He had done so while clearing his flight path ahead. The Board concluded therefore, that on the basis of the information reported, this was a controller perceived confliction where no risk of a collision had existed.

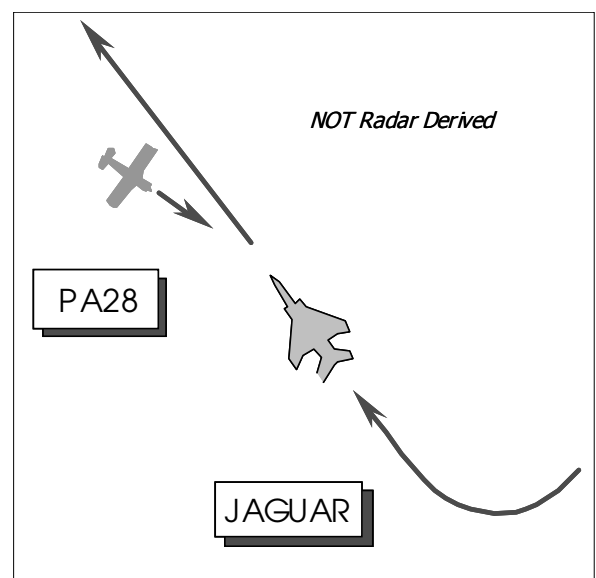
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Controller perceived confliction.

Degree of Risk: C.

AIRPROX REPORT NO 64/02

Date/Time: 24 May 1348Z
Position: 5536 N 00156 W (10 NM NW of Brunton)
Airspace: Scottish FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Jaguar GR3A PA28
Operator: HQ STC Civ Club - Trng
Alt/FL: 2000 ft 2500 ft
 (Rad Alt) (QNH 990 mb)
Weather VMC Below cloud VMC Below cloud
Visibility: 10 km + >10 km
Reported Separation:
 ≈ 150 yd 1-200 ft V/100 m H
Recorded Separation:
 Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JAGUAR PILOT reports his ac is

camouflage grey, but navigation lights and HISLs were on whilst flying alone at 450 kt, between 2-3000 ft Rad Alt, some 12 NM SW of Holy Island. A squawk of A7001 was selected with Mode C;

neither TCAS nor any other form of CWS is fitted. He was flying VFR 1000 ft below cloud with an in-flight visibility of about 10 km, but a large shower was visible to the NW. Just after rolling out of a 90° R turn onto a heading of 329°, he sensed - rather than saw - something pass down the port side. No avoiding action was taken, but looking back over his L shoulder he saw a light ac (LA) tail on, about 300 yd astern and going away. They had passed each other about 150 yd apart - though he could not be certain of the range - on reciprocal headings at the same height, but there was no indication that the LA pilot had seen his jet. He assessed the risk of a collision as "high" and added that the LA may have blended into a large shower in the background.

The Airprox was reported to London MILITARY when he climbed out to RTB at 1354.

THE PA28 PILOT reports his ac has a predominantly white colour scheme, but HISLs were on whilst flying about 500 ft below cloud in level cruise at 2500 ft QNH (990 mb) VFR, with a student pilot. The assigned squawk was selected with Mode C whilst under a FIS from Newcastle RADAR. Heading 120° at 100 kt, about 15 NM NW of Brunton aerodrome, he spotted a Jaguar ac about 1 NM away. The jet turned across the nose - he thought from R - L - about 1000 m away and then passed about 100 m away down the port side, 1-200 ft above his ac on a reciprocal heading.

There was "no" risk of a collision, and he did not report the Airprox himself as the Jaguar was seen very early and he was able to ascertain that the jet's flightpath would not result in a conflict.

THE NEWCASTLE APPROACH RADAR CONTROLLER (APR) reports that as far as he could remember nothing was observed in the vicinity of the PA28, which was the only LA on frequency at the time of the Airprox.

UKAB Note: Neither the ScATCC (Mil) Lowther Radar nor the LATCC (Mil) Great Dun Fell Radar video recordings show this Airprox. The PA28 is evident approaching the vicinity at 3400 ft Mode C (1013 mb) - about 2710 ft QNH (990 mb), but fades momentarily 5 NM NW of the reported Airprox location. The PA28 then reappears, maintaining a SE'ly track but no other ac are shown in the vicinity. However, both pilots agree

that their ac passed 'port to port' with about 100 to 150 m horizontal separation.

HQ STC comments that both ac were operating VFR in Class G airspace. The Jaguar pilot was taken by surprise when he became aware of the PA28 late, as he rolled out of a turn. The PA28 had early acquisition of the Jaguar and was content that their relative flightpaths gave safe separation. It is hoped that if the PA28 had perceived a potential collision that he had the time and manoeuvrability to effect an avoidance.

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 operating authority.

It was unfortunate that the Airprox was not shown by recorded radar, which made confirmation of the relative geometry difficult. A similar situation applied for the Newcastle APR who was powerless to provide a collision hazard warning to the PA28 pilot since his radar did not display the Jaguar either. Some members thought that the jet's A7001 squawk should have been visible, but the Jaguar was not shown at all on the Great Dun Fell - in view of the range of the Airprox location from the radar head perhaps not surprising - but the STC member opined that pilots do, on occasion, forget to switch the SSR transponder back from standby after changing codes.

The Board recognised the significance of the reporting Jaguar pilot's remark that he had 'sensed something pass down the port side'. Evidently, the Jaguar pilot would have been 'belly-up' to the PA28 during the latter stage of his high speed 90° R turn and remained unaware of the light ac's presence until it had almost passed. Some members wondered whether the jet pilot was flying too fast at 450 kt; a former Jaguar pilot member confirmed that the ac does not fly comfortably well below 420 kt and this speed would be the norm. The members noted that although the jet pilot had spotted the PA28, it was after their relative flight paths had crossed and the LA was drawing astern. The Jaguar pilot was

therefore, effectively unsighted before the event. Conversely, the PA28 pilot appeared content that he had spotted the jet in good time as it crossed ahead and above him and then turned to fly past down his port side about 100 m away, still high. Consequently, the Board agreed that this Airprox had resulted from effectively, a non-sighting by the Jaguar pilot.

Turning too risk, some members thought that as the Jaguar pilot was unsighted he would have been unable to take avoiding action, leading to the suggestion that the safety of the ac had been compromised. Although the Jaguar pilot was surprised by the sudden appearance of the PA28, its pilot had affirmed that the jet was spotted 1 NM away and in sufficient time so that he could

establish that the Jaguar's flight path in the turn would take it clear of his ac and that no avoiding action was required at all. Although some members were unsure if the PA28 had the speed and manoeuvrability to get out of the way of the jet, this had not been necessary. Therefore, the Board agreed 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 by the Jaguar pilot.

Degree of Risk: C.

AIRPROX REPORT NO 65/02

Date/Time: 27 May 1140

Position: 5237 N 0226 W (4¼ NM WSW of Cosford)

Airspace: London FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Squirrel Vigilant T MK1

Operator: HQ DAAvn HQ PTC

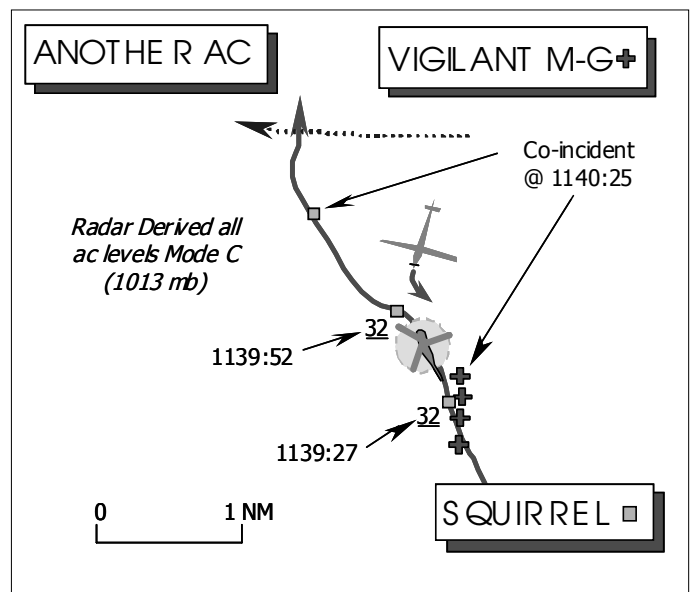
Alt/FL: 2500 ft 2500 ft
(QFE 992 mb) (QFE 997 mb)

Weather VMC VMC

Visibility: 20 km 25 km

Reported Separation:
400 m H, nil V 1000 m H

Recorded Separation:
Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SQUIRREL PILOT, a QHI and the PNF, reports he was conducting an instructional IF transit sortie from Middle Wallop to Shawbury, with his student flying the ac on instruments under a RIS from Shawbury. The assigned squawk of A0231 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted. A second student pilot occupied the centre rear

seat looking forward. His ac has a black/yellow colour scheme and the HISLs were on.

Flying straight and level at 2500 ft Shawbury QFE (992 mb), heading 330° at 115 kt, approaching a position 12 NM SE of Shawbury, the controller reported several contacts including one at 12 o'clock. Both he and the second student in the

rear seat were looking for the reported ac when a motorised glider was spotted at 12 o'clock about 0.5 NM away just commencing a L turn. To increase separation the helicopter was banked to the L, whereupon the motor glider passed about 400 m away to starboard at the same height.

He assessed the risk of a collision as *"significant"*, and reported the Airprox to Shawbury on RT, adding that although the visibility was good, the sky presented *"a white backdrop"* at their height.

THE VIGILANT T MK1 MOTOR-GLIDER (M-G) PILOT, a QGI, reports he was conducting a "normal" training sortie with the student handling the ac. His M-G has a white colour scheme overall with red wingtips and nose section.

About 4 NM SW of Cosford – he thought - in a level L turn at 20° AoB through 180° at 2500 ft flying at 60 kt, he spotted a Squirrel helicopter about 2 NM away in his 10 o'clock at a similar height. He took control of the M-G from the student and tightened the turn to ensure both separation and also to increase conspicuity by providing the Squirrel pilot with a plan view of his M-G. When he rolled out of the turn the Squirrel was then in his 3 o'clock about 1000 m away and increasing, whereupon the Squirrel was seen to make a hard L turn as if its pilot had spotted his M-G at a late stage. He assessed the risk as *"none"*.

MIL ATC OPS reports that the Squirrel helicopter crew called Shawbury RADAR on handover from Brize Norton at 1129:05. Traffic levels were *"extremely light"*, so the controller was operating from the DIRECTOR'S position, covering RADAR, APPROACH and DIRECTOR whilst monitoring 5 frequencies. The Squirrel was identified and the flight placed under a RIS, *"limited...due to poor radar performance"* as *"I've got you on SSR only"*, which was acknowledged by the crew at 1130:03. The controller then completed some admin tasks for the ac's recovery, before a series of traffic information calls to the Squirrel crew starting at 1134:11, about multiple contacts in the helicopter's vicinity. After establishing that the crew would remain VMC during their descent from FL 45 to 2500 ft QFE (992 mb), RADAR passed further traffic information at 1136:59, including one flying L - R and another R - L before transmitting information on a contact believed to be the subject M-G at *"...12 o'clock 5 miles*

manoeuvring". The Squirrel pilot reported visual with one ac at 1138:15, *"...right 1 o'clock..left - right..."* and again at 11:38:32, *"...also...the traffic in the 1 o'clock right to left..."*. The controller called the presumed M-G contact again at 11:38:41, *"...12 o'clock 3 miles reciprocal no height"*, before the Squirrel pilot commented on the traffic in his 1 o'clock position *"...approximately 500 to 1000 ft below"*. This was acknowledged by RADAR, who called the presumed M-G track again at 1139:27, *"...now 12 o'clock one and a half miles reciprocal no height"*. The helicopter pilot responded, *"roger we're not visual with that traffic, good VMC, must be either well below or well above"*. The Squirrel pilot then commented further about the ac in his 1 o'clock, before at 1139:53, reporting that he wanted to *"...file an airmis...that traffic 12 o'clock was a motorised glider we got late pax position [more probably 'acquisition'] at approx 1 mile range"*. RADAR immediately asked for confirmation of the heading and altitude of the conflicting ac, which the Squirrel pilot stated was *"...150 reciprocal heading on us...same altitude 2500"*, adding that he was still converging on the other ac in his 1 o'clock, wherefore he asked to alter heading to manoeuvre clear of that ac, which was agreed.

The Watchman SRE 'Angels Suppression' Cct was in use at the time at Shawbury, which can desensitise the radar enough to lose radar contacts, but appears to have had little bearing here; the RIS was correctly limited iaw promulgated guidance in JSP 318A.

The controller appears to have done a good job keeping the Squirrel crew informed of observed hazards. RADAR recognised that the traffic in the Squirrel's 12 o'clock posed a threat and called it to the crew on 4 separate occasions. Asking if the pilot would remain VMC if descended, whilst not necessary, was prudent given the number of conflicting tracks observed in the vicinity and the limitations to the RIS.

UKAB Note: The LATCC (Mil) radar recording does not show all the traffic called to the Squirrel pilot by RADAR, nor the Airprox. Furthermore, there is an apparent time discrepancy of about 10-15 sec between the radar and RT recordings. The track at R-1 o'clock, R - L, is clearly displayed on a constant relative bearing to the Squirrel squawking A7000 but without Mode C and was another motor glider – shown on the diagram as

'Another ac' . The traffic called repeatedly by RADAR at 12 o'clock is believed to be the subject M-G, but is not shown before the Airprox, which occurred as reported at 1140, after which the avoiding action L turn reported by the Squirrel pilot is shown. A primary contact, which is believed to be the M-G, is shown 25 sec later for the first time on the recording after the Airprox has occurred, 1.5 NM astern of the helicopter, on a reciprocal heading before turning southbound.

HQ PTC comments that in attempting to clarify some inconsistencies in the reports so far, we have spoken at length to the Vigilant pilot himself, OC the VGS and HQ AC. There were 4 Vigilants airborne at the time. Two may be discounted as they were not in the area. A fourth Vigilant – shown as 'another ac' - was in the area but he saw no Squirrel. We believe that the respective pilots might have seen each other's ac at a different stage of 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, and reports from the appropriate ATC and operating authorities.

Despite some anomalies within this Airprox, it seemed to the Board that the correct ac had been identified. However, it was not clear from the Squirrel QHI's report what form of IF screen/hood was in use to constrain artificially the view of the student PF. Some helicopter pilot members wondered whether the QHI's view had also been obscured or that of the student in the rear seat. Some IF screen types could have a significant effect on lookout, but military pilot members thought it probable that a helmet mounted hood had been in use, which would have had little obscuring effect for the safety pilot in this encounter. (Post meeting note: It was confirmed with the Squirrel pilot's unit that the device used was a helmet mounted IF hood).

The Board commended the RADAR controller for his conscientious and comprehensive traffic information on the observed Vigilant contact, which 'painted' a clear picture of the traffic ahead

for the helicopter crew. Though the Board viewed the operation of five frequencies at once as somewhat excessive, in the light traffic level that pertained he had provided an excellent service, well beyond normal expectations under a RIS. In more intense traffic scenarios it might only be limited to one call and if further information is required pilots might need to request further updates from the controller.

The Board thought the QHI exhibited sound airmanship in ensuring his rear seat student was effecting a look-out – a good CRM teaching point. Nevertheless, having been given 4 separate reports about the unknown contact – the M-G - the Squirrel QHI had become convinced in the prevailing good VMC that the M-G was not at his level - according to his RT transmission just before he reported the "*airmiss*" (sic). However, this was evidently not the case. Undoubtedly the M-G would have presented a very small frontal area at a head-on aspect with little relative crossing motion. Furthermore, the white M-G against the reported "*white back drop*" would have hindered detection by the QHI, or rear student, until at close quarters, where it was suddenly spotted 0.5 NM ahead – possibly as a result of the QGI's deliberate manoeuvre to make his M-G more conspicuous. The Board agreed that this had been a late sighting from the helicopter cockpit and it would appear from the Vigilant QGI's report that he had spotted the helicopter beforehand. Having spotted it, the QGI had taken control and turned onto a heading to remain clear, shortly followed by the Squirrel QHI's own avoidance manoeuvre of a L turn. Thus both pilots had seen each other's ac and both had taken appropriate action to remain clear; the principle of 'see and avoid' had worked albeit that one had seen the other a little later. Therefore, the Board agreed that this Airprox had resulted from a conflict in the FIR resolved by both pilots.

Without recorded radar data it was impossible to resolve the differing perceptions of the reported horizontal separation that pertained at the time. However, with even the minimum horizontal separation quoted as 400 m, whilst it might have been viewed as less than ideal in these circumstances, the Board concluded that no risk of a collision had existed here.

PART C: ASSESSMENT OF CAUSE AND RISK

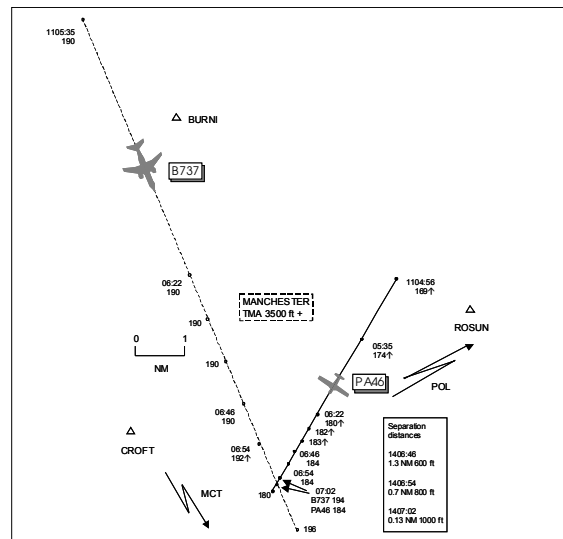
Degree of Risk: C.

Cause: Conflict in the FIR resolved by both pilots.

AIRPROX REPORT NO 66/02

Date/Time: 25 May 1107 (Saturday)
Position: 5337 N 0227 W (14 NM SW POL)
Airspace: TMA (Class: A)
Reporting Aircraft Reported Aircraft
Type: B737-300 PA46
Operator: CAT Civ Pte
Alt/FL: FL 190 FL 180

Weather VMC CLOC VMC NK
Visibility: 50 km NK
Reported Separation:
 400 ft V nil H not seen
Recorded Separation:
 600 ft V 1.3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 166° at 310 kt and level FL 190 en route from Glasgow to Stansted and in receipt of an ATC service from Manchester. A TCAS TA alert was received from traffic 900 ft below climbing at a range of 2-3 km; it was visually acquired and identified as a small single engine ac closing rapidly in his 10 o'clock. Shortly thereafter a TCAS RA "climb" was received as the conflicting ac was now 500 ft below him at a range of 1500 m and still climbing. The FO, the PF, announced "TCAS climb" and performed the manoeuvre correctly whilst he as the ac Capt, the PNF, transmitted "TCAS climb" to Manchester RADAR. The conflicting ac, a PA28 type, was seen to pass 400 ft directly below them. The RA was discontinued at FL 199 and normal cruise was resumed shortly thereafter. The crew agreed that without TCAS, little, if any, vertical separation would have existed at the time.

THE PA46 PILOT reports climbing to FL 180 at 150 kt en route from Leeds to Alderney and in

receipt of a RCS from Manchester ACC. The weather was VMC; TCAS is not fitted to his ac. He was flying the ac manually, the AP altitude acquire and hold functions were u/s, so he was busy during the en route climb section of the flight. During this period with MACC (who were also very busy), several changes to his ATC clearance resulted in an increased workload. These instructions had included a stepped climb up to FL 190, two radar headings, before a stop-off at FL 180 followed by a 'resume own navigation'. He had told the controller that he was approaching FL 180 as a reminder that he was requesting a higher cruising level. Unfortunately, he had not monitored the situation closely enough and had climbed through his cleared level. When ATC pointed out his level, he had reacted quickly and descended immediately back to FL 180, but did not see any conflicting ac at the time; he had apologised to ATC for his error.

MACC SAFETY AND QUALITY SECTION reports that the PA46 departed Leeds Bradford for Alderney, routing via POL and MCT. The radar controller climbed the PA46 to FL 190 at 1059:20, and then due to other traffic, vectored it towards the western side of the sector.

As the PA46 climbed through FL 150, the controller assessed that because of its slow speed and the position it had been vectored into, a confliction would arise with the B737 at FL 190. Consequently, the controller instructed the PA46 pilot at 1100:00, to maintain FL 180 on reaching, which was readback correctly. Later the PA46 pilot reported approaching FL 180, at 1106:10, and the controller repeated the instruction for him to maintain FL 180 on reaching, because the B737 was approaching from the N; this instruction was also correctly readback.

Shortly after 1106:40 the B737 pilot reported a TCAS climb, the controller immediately confirmed with the PA46 pilot his cleared level and passed TI followed by instructions to descend to FL 180.

UKAB Note (1): The Manchester RADAR controller reported that STCA activated at the same time as the B737 pilot reported his TCAS climb.

UKAB Note (2): The RT transcript at 1106:50 reveals the SC's response to the B737 pilot's "TCAS climb" transmission as *"standby, PA46 c/s, just confirm you are maintaining flight level one eight zero traffic a thousand feet above you now descend now flight level one eight zero"*. The PA46 pilot replied *"one eight zero PA46 c/s sorry"*.

UKAB Note (3): The Great Dun Fell radar recording at 1106:22, shows the PA46 tracking 210° and climbing through FL 180, 3.75 NM SE of the B737 which is tracking 160° and cruising at FL 190. Horizontal separation reduces to 3 NM at the next radar sweep where the PA46 indicates FL 182. The PA46 climbs to FL 184 at 1106:46, with

the subject ac 1.3 NM apart, and maintains this level for 2 further radar sweeps, and then indicates on the next sweep FL 180, immediately after the ac have crossed (1107:10).

ATSI endorsed the MACC report.

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.

Loss of some AP modes had undoubtedly kept the PA46 pilot busy during the en route climb phase of the flight. Some 12 seconds before reaching FL 180 he had called approaching this level and the MACC controller had repeated the previously passed instruction to maintain it on reaching and this had been correctly readback. However, the PA46 pilot had then not monitored the situation and had continued to climb above his cleared level; this had caused the Airprox. The B737 crew had received a TCAS TA alert and had then reacted swiftly to the RA *"climb"* alert, as the crossing PA46 reached FL 184. The MACC controller had also quickly acted, after STCA had activated, by instructing the PA46 pilot to descend immediately back to FL 180. These 'safety nets' had all worked and led the Board to conclude that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA46 pilot climbed above his cleared level.

Degree of Risk: C

AIRPROX REPORT NO 67/02

Date/Time: 28 May 1903

Position: 5105 N 0107 W (8 NNE of Southampton Airport)

Airspace: Solent CTA (Class: D)

Reporting Aircraft Reported Aircraft

Type: Embraer 145 Islander

Operator: CAT Civ Comm

Alt/FL: 3000 ft 3000 ft
(QNH 1005 mb) (QNH 1005 mb)

Weather IMC VMC CLBC

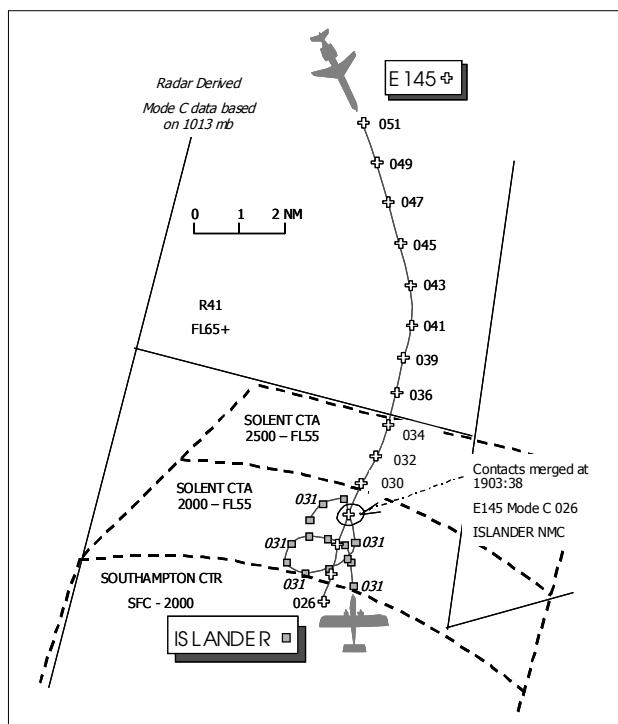
Visibility: NK 30 km

Reported Separation:

200 ft V, Nil H 500 ft V, 0.5 NM

Recorded Separation:

500 ft V, Nil H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EMBRAER 145 PILOT reports that he was inbound to Southampton from Edinburgh positioning for an ILS on approach to RW 20. Following radar vectors the E145, squawking 7461, was cleared to descend to 3000 ft, he thought, and at 3000 ft to establish on the LLZ. Having established on the LLZ the E145, heading 205° at 200 kt, was then cleared to descend on the glideslope. However, before glideslope interception, a proximate target appeared on the TCAS at the same level, at 1 o'clock crossing right to left. PNF queried this with ATC who simply confirmed that the traffic was at 3000 ft. However, before any further queries could take place the proximate target became a TA followed rapidly by an RA with a TCAS descent; this was followed in accordance with company standard operating procedures. The E145 passed directly beneath the other ac, which by this time had turned back onto a westerly heading. At this point the E145 was at 2800 ft with a 200 ft separation on the TCAS display. The risk of collision was assessed as high.

The E145 pilot further reports that prior to the incident the crew had heard a VFR ac, the

Islander, cleared by ATC to climb to 3000 ft from 1500 ft for traffic avoidance.

THE ISLANDER PILOT reports that he was engaged in a police support operation over a search area near Winchester, 7/8 miles N and slightly E of Southampton Airport. In addition to himself he had 2 observers on board, one of whom had a good view to the left forward of the wing above and below, and the other, at the rear of the ac, had a view only to the right behind the wing above and below. The pilot had a good view to the left, ahead of the wing, above and below, and through an arc out to the right hand side, level and above, but not to the right rear. His ac is coloured blue/white and all navigation lights, wing tip HISLs and the wing tip landing lights were selected on. Additionally, the ac is fitted with TCAS, which was selected on, although it provides TA information only.

He was in contact with Solent Radar on 120.225 MHz and was under Radar Control, which he considered unusual, being VFR, but understandable possibly because of inbounds to the ILS. He was flying at 1500 ft (QNH) and

squawking 0032. Although his mission qualified for special flight handling, this had not been declared and he had told Solent Radar that he would move away from the area, if required, to facilitate inbounds on ILS approach to RW 20. Solent Radar asked if he could complete his task at 3000 ft, which he agreed to and climbed accordingly before reporting level on the QNH. He was given information on 2 inbounds, which he informed his observers about and then maintained a scan for the reported traffic both externally and on TCAS, although at that juncture he had no contact with either.

He heard ATC descend the first inbound, the closest he presumed, to 4000 ft. On reaching Winchester he reported on task and took up a left hand orbit/racetrack pattern at 80 kt with one stage of flap, which is standard procedure for the mission upon which he was engaged. Although there was cloud both at his level and above, he was never closer than 1 NM horizontally and had 10 km visibility. One contact on his TCAS indicated 2100 ft above, descending 6 miles on his right hand side but he could not detect the ac visually. At the time he was turning through NW. While looking for the other ac he noticed that the TCAS contact had disappeared. Then he heard ATC pass information on his ac to the E145 and the E145 pilot reply that he could see him on TCAS.

Shortly afterwards he heard ATC clear the E145 to descend to 2500 ft and was aware that it would be turning and descending towards, and through, his own level to establish on the ILS. It was possible, however, that the E145 could already be S of him, which would account for the descent to 2500 ft. However, he was also aware that the E145 would need to be at 2500/2400 ft to intercept the glideslope abeam his own position. It was more likely, therefore, that the E145 had not yet passed him. He could still not see the E145 nor had it on his TCAS display and none of his observers could either. Feeling uneasy about the developing situation he decided to fly N at his assigned level, (3000 ft QNH) albeit remaining within his orbit area. He was just about to voice his concern to ATC when he heard the E145 pilot report, in quick succession, that the "*traffic is now showing 200 ft below*", that it was "*showing level*" and finally "*TCAS descend, TCAS descend*". He held his course and then heard the E145 pilot transmit "*that aircraft has just gone over the top*

of us". The rear observer then reported seeing the Embraer on the left side, at which the Islander pilot also saw it 500 ft below at about 0.5 NM and going away. As he had not seen the E145 until it had passed below he was unable to estimate the collision risk.

The Islander pilot also adds that at the time of the encounter he had no TA, either audible or visual, from his TCAS. However, for a couple of weeks before the reported incident he, and other pilots, had suffered problems with returns appearing and disappearing spontaneously, double returns from the same target and a lack of audio warning. Consequently, confidence level in the equipment was low. Nevertheless the equipment was selected on, although subsequently on landing he reported it unserviceable. Finally, he suggests that had the equipment been functioning properly, the Airprox may have been avoided.

ATSI reports that the Solent Radar controller described his workload as light at the time of the incident, despite the fact that he was operating the combined function of Southampton and Solent Approach in banded mode.

The Islander established communication with Solent Approach at 1853, requesting "zone entry" to operate at Winchester, advising that he was levelling at 1500 ft VFR. He was issued with a VFR joining clearance to enter not above 1500 ft. At 1856 the pilot was informed that, as he was joining controlled airspace, the service provided was Radar Control. As Winchester is situated on RW 20 Approach Path and there were a number of IFR inbounds expected shortly, the controller ascertained from the pilot that he would be happy to be moved off task, if required.

The E145 made its initial call on the Solent frequency at 1857. The flight was transferred from LTCC descending to FL 80, routeing to SAM. This was in accordance with agreed 'silent release' procedure, between Southampton and LTCC, whereby ac are released passing FL 90. The pilot reported that he could accept descent outside CAS, under a RAS. Radar recordings reveal that, on first contact, the E145 was in CAS (Airway G1) 4 NM NNW of Compton VOR. As the controller was expecting another inbound ac at FL 80 from the E, he cleared the E145 to descend to FL 70.

Rather than moving the Islander off task, the Solent Radar controller assessed that, if it could accept a climb to 3000 ft whilst still maintaining VFR, he could then position inbound IFR flights beneath it on the ILS. Accordingly, the Islander started its climb to 3000 ft at 1859. Immediately afterwards, the E145 was cleared to descend to 4000 ft. This instruction meant that when the flight passed through FL 65 it would be beneath the base of CAS. The controller's plan was to monitor the progress of the inbound ac, issuing further descent through the level of the Islander, when appropriate. The E145 was given a radar heading of 170° to position it towards final approach on a closing heading for the LLZ. Although no actual service contract was entered into between the controller and the E145 pilot, it would appear that both parties accepted that a RAS would be provided when the ac was outside CAS. However, the pilot was not informed as he left CAS nor when he rejoined. The MATS Part 1 Sect 1 Chap 5 para 1.2.4 states *"Pilots must be advised if a radar service commences, terminates or changes when:"*

a) they are operating outside controlled airspace; or b) they cross the boundary of controlled airspace."

At 1901, when the subject ac were 11.4 NM apart, the E145, which was 2400 ft above the Islander, was cleared to descend to 2500 ft and to report established on the LLZ. The controller decided to issue further descent clearance, assessing that the E145 would pass well below the level of the Islander, based on its RoD (radar recordings show the flight descending at about 1000-1200 ft per minute). He was unable to issue descent to 2000 ft, to obtain 1000 ft vertical separation between the subject ac, as Southampton ATC procedures preclude the provision of RAS below 2300 ft, unless the ac is within the Radar Vectoring Area (RVA). Traffic information was passed to the E145 as: *"...there is VFR traffic, an Islander, operating about 8 miles N of the airfield at 3000 ft VFR"*. Subsequently, the controller agreed that it would have been prudent and beneficial to inform the E145 pilot that the traffic was actually operating on the final approach track. The pilot of the Islander was then advised that the first inbound was at 16 miles. As the E145 approached the RVA, further descent was given, initially to 2500 ft and, one minute later, to 2000

ft together with an update of the traffic information *"... that traffic your right 1 o'clock range of 6 miles"*. However, this transmission was not received by the E145 pilot because of a simultaneous transmission on the frequency. Consequently, the E145 was cleared to descend with ILS and another traffic information update was given *"... the VFR traffic your right 1 o'clock range of 5 miles"*.

The controller, realising that the RoD of the E145 had slowed, reasoned that, if he continued to pass traffic information, the E145 pilot would adjust his descent profile appropriately to avoid the traffic. The pilot responded to the traffic update *"... we have him TCAS"*. Thirty seconds later, at 1903:00, the E145 pilot commented that *"... that traffic we have on TCAS 200 ft below us at 3 miles in our 12 o'clock is that correct?"* Solent Radar replied *"That's correct 3000 ft VFR."* Subsequently, the E145 pilot reported the traffic at the same level, followed by an announcement of a TCAS descent. At 1903:00 the radar recording shows the subject ac to be 3.5 NM apart with the E145 300 ft higher than the Islander. The 2 ac continued to close and as they passed, the vertical separation was 500 ft, by which time the E145 had descended below the Islander. The controller noted that, once the pilot of the E145 reported commencing TCAS action, he was happy that the confliction would be resolved satisfactorily, without further input from ATC. Furthermore, the controller also believed that the E145 pilot, having been informed of the presence of VFR traffic at 3000 ft, would adjust his descent to remain clear of it.

MATS Part 1 Sect 3, Chap 4 para 1 states *"This Chapter provides advice and guidance to controllers on the safe integration of VFR flights with the IFR traffic flow in the vicinity of aerodromes. Separation standards are not prescribed for application by ATC between VFR flights or between VFR and IFR flights."* Moreover, MATS Part 1 Sect 3 Chap 4 para 3.1 states *"Although in Class D, E, F and G airspace separation standards are not applied, ATC has a responsibility to prevent collisions between known flights and to maintain a safe, orderly and expeditious flow of traffic. This objective is met by passing sufficient traffic information and instructions to assist pilots to see and avoid each other"*.

UKAB Note (1): Analysis of the Pease Pottage radar data recording shows the Mode C of the Islander indicating 031 (2860 ft Southampton QNH 1005 mb) prior to, and immediately after, the merge of returns at 1903:38. However, at point of merge only one Mode C readout, that of the E145, is displayed; this indicates 026 (2360 ft Southampton QNH 1005 mb).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcript of the relevant RT frequency, radar video recording and reports from the appropriate ATC authority.

The Board noted that the plan formulated by the controller to ensure separation between the subject ac was flawed because of its dependence upon 2 factors he was unable to influence; maintenance of the observed RoD by the E145 and ability of the Islander visually to acquire the E145. In the first case pilots pointed out that it was inevitable that the E145 RoD would adjust as ILS GP transmissions were received. In the second, it was questionable whether the Islander could maintain VFR at 3000 ft and even then, whether the E145 would be clear of cloud in sufficient time to enable its visual acquisition by the Islander pilot. But in order to do so, the Islander pilot required greater assistance from the controller in the form of more descriptive traffic information updates. Traffic information provided to the Islander was, in the opinion of the Board, inadequate. Members also questioned the wisdom of climbing the Islander to 3000 ft for a task at 8 NM on the final approach to RW 20, especially given that the Islander pilot had already indicated his willingness to move off task if required; but this could be explained, it was suggested, as an effort to accommodate the Islander pilot's requirements, given the nature of its task, and enable its expeditious completion. In the event, the Islander pilot was unable to effect visual separation against the E145 as he never saw it until after it had already passed beneath him.

Much discussion focused upon the Islander pilot's understanding of what he could expect from the controller having been placed under Radar Control. It was not clear to some members why

a radar service was applied, since the Islander was conducting a task, apparently incompatible with a radar service, and the climb to 3000 ft was, by mutual agreement, subject to the prevailing cloud conditions. From his report, it would appear that the Islander pilot was expecting provision of separation from arriving traffic. This was a view shared by other Board members. However, civil ATC members explained that, in line with the provisions of MATS Pt 1 Sect 1 Chap 5 para 1.2.1, the only radar service the controller could apply was RCS since the Islander was operating within Class D airspace. They went on to say that "Radar Control" in Class D airspace did not mean that ATC would provide separation between VFR and IFR traffic. The Islander pilot's obligation was to comply with instructions issued by the controller, unless he advised otherwise, and responsibility for separation against other traffic remained with the Islander pilot himself, since he was operating under VFR. This surprised many Board members and was not what most pilots would expect. Furthermore, military ATC members suggested that within Class D airspace military controllers would provide separation against other traffic, respective flight rules notwithstanding. That such misunderstanding exists gives cause for concern, and therefore the Board recommended that clarification was needed from the CAA.

Warned by his TCAS, the E145 pilot resolved the situation by descending below the Islander, thereby achieving 500 ft vertical separation. Accordingly members considered that despite resolution from only one TCAS, because of apparent unserviceability of the other, there was no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

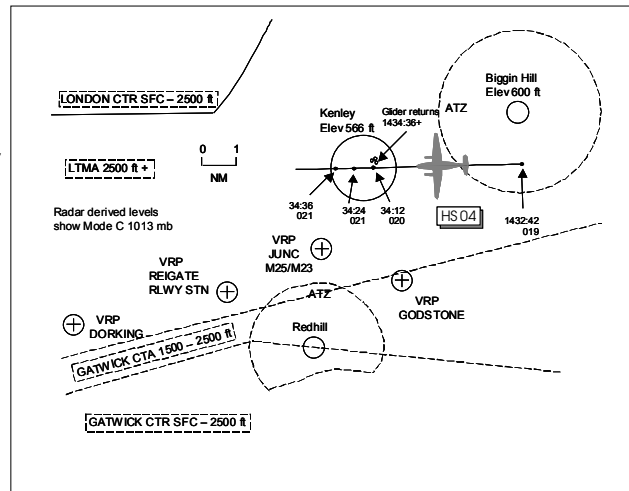
Cause: The Solent RAD/Southampton APR controller vectored the E145 into conflict with the Islander.

Degree of Risk: C

Recommendation: That the CAA considers publishing clarification on the meaning of "Radar Control" within Class D airspace for ac operating to different flight rules.

AIRPROX REPORT NO 68/02

Date/Time: 17 May 1434
Position: 5118 N 0005 W (O/H Kenley Gliding Site - elev 566 ft)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: KA7 Glider HS04 Dove
Operator: Civ Trg Civ Pte
Alt/FL: 1000 ft ↑ NK
 (QFE)
Weather VMC HZBC NK
Visibility: 10 km NK
Reported Separation:
 300-400 ft V <50 m HNK
Recorded Separation:
 not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KA7 GLIDER PILOT reports flying a dual training sortie from Kenley with a visibility of 10 km in haze in VMC. The glider was coloured red/white and was not fitted with a radio. During a winch launch heading 090° at 57 kt and climbing through 1000 ft QFE, he spotted a twin engined ac approaching head-on just as he was lowering the nose; he was seated in the rear cockpit. He immediately terminated the launch by releasing the cable and at the same time the twin altered course to port, passing 3-400 ft above and just down his RHS <50 m away. He assessed the risk of collision as considerable.

THE HS04 DOVE PILOT reports that he was flying in the vicinity of Kenley gliding site at the time of the incident but categorically denied that an Airprox incident took place and declined to complete a CA1094 report form.

THE GLIDER PILOT'S CFI reports seeing the incident from outside a hangar at Kenley. He saw a twin engined ac approaching the airfield at about 1500 ft agl and in potential conflict with the launching KA7 glider. The twin altered course at the same time as the glider terminated its launch, the separation distance could not be estimated but it was close. On that day winch launches were being successful to 1700 ft agl. As the twin had approached from the Biggin Hill area, he

contacted Biggin ATC to ascertain traffic information. He was informed that a Dove ac was receiving a service from them, routing from Headcorn to Fair Oaks, and had reported abeam Biggin at 1500 ft QNH 1009 mb. Later, he contacted the Dove pilot who said that he had overflown Kenley at 2400 ft, had seen the launching glider and had considered there to be no risk.

UKAB Note (1): Met Office archive data shows the 1420Z London QNH as 1009 mb. The Biggin Hill METAR 1420Z 06012KT 030V100 6000 -SHRA BKN070 16/12 Q1010= and Gatwick METAR 1420Z 06013KT CAVOK 21/15 Q1008=.

UKAB Note (2): The UK AIP at ENR 5-5-1-3 promulgates Kenley aerodrome as a Glider Launching Site centred on 511850N 0000537W for winch launches where cables may be encountered to 1700 ft agl, aerodrome elevation 566 ft amsl, during daylight hours.

UKAB Note (3): Analysis of the Pease Pottage radar recording at 1432:42 shows the HS04 squawking 7000 with Mode C passing 1.6 NM S of Biggin Hill tracking 270° indicating FL 019 (1780 ft QNH 1009 mb). At 1434:12 the Dove is seen O/H Kenley still tracking 270° and climbing through FL020 (1880 ft QNH) and levelling, 12

secs later, at FL 021 (1980 ft QNH). As the Dove reaches 0.85 NM W of Kenley at 1434:36 maintaining FL 021 (1980 ft QNH), a primary only response, believed to be the KA7 glider, appears O/H Kenley and just to the N of the HS04's observed track history; it subsequently turns L and manoeuvres O/H the glider site. The Airprox as described by the reporting KA7 pilot is not seen on recorded radar. The HS04's G/S is measured at 180 kt.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members were dismayed that the HS04 pilot had declined to complete an Airprox form. Kenley Glider site is shown clearly on topographical charts and is notified within the UK AIP, with winch launches up to 1700 ft agl (2266 ft amsl). The Pease Pottage radar shows the HS04 tracking through the Kenley O/H, with Mode C indicating a climb from 1780 ft amsl, finally levelling at 1980 ft QNH; this was below the max launch height 1700 ft agl (2266 ft amsl) being attained on the day at Kenley. In doing so, the HS04 pilot had flown into conflict with the launching KA7 Glider and this had caused the Airprox. Pilot members wondered whether the ground launching party at Kenley should have heard or seen the Dove approaching when they had cleared the area above and behind the winch prior to launch but there was little information to go on in this respect. The weather at the time towards the E

was hazy and with the Dove approaching at 3NM/min, it was thought that the ground party had carried out their 'Duty of Care' to the best of their ability given the prevailing conditions.

Members were all too aware of the damage that cables could inflict on ac transiting through active gliding sites below the max cable launch height. Fortunately, in this instance the KA7 pilot had seen the Dove as he lowered the glider's nose at 1000 ft agl (1566 ft amsl) and had immediately terminated the launch before the Dove passed 3-400 ft above and close to his R. Simultaneously, the Dove was seen to alter course to port, which suggested that the pilot may have seen the glider, or perhaps his position relative to the site, late. It was a pity that the Dove pilot had declined to give his side of the story, which would have helped to explain how he had come to be head-on to the launching glider at the height captured on radar. This left the Board with little option but to assess events on what information had been put forward. Members felt that the glider pilot's action of aborting his rapid climb had effectively removed the possibility of a collision, but left a situation in which safety had been compromised - needlessly so.

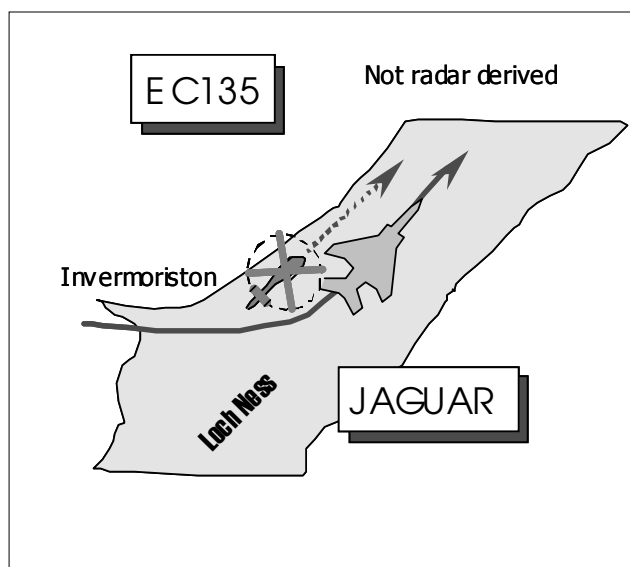
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Dove pilot flew through a notified Glider launch site into conflict with a launching glider.

Degree of Risk: B

AIRPROX REPORT NO 69/02

Date/Time: 29 May 1426
Position: 5713 N 0435 W (Loch Ness)
Airspace: UKDLFS LFA 14 (*Class:* G)
Reporting Aircraft *Reported Aircraft*
Type: Jaguar EC-135
Operator: HQ STC Civ Comm
Alt/FL: 500 ft 550 ft
 (Rad Alt) (Rad Alt)
Weather VMC CLBC VMC RASH
Visibility: 15 km 2-3000 m
Reported Separation:
 100 ft H/nil V 200 ft H/nil V
Recorded Separation:
 Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JAGUAR PILOT, reports his ac is camouflage grey, but HISLs were on whilst flying a low-level sortie up Loch Ness at 500 ft Rad Alt. A squawk of A7001 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted. He was not in receipt of an ATS. The in-flight visibility was 15 km and at the time he was flying 2000 ft clear below cloud.

Entering the Great Glen (within which Loch Ness is situated) from the W – eastbound, he turned hard L onto a heading of 040° to route up the western side of Loch Ness at 450 kt. About 5 sec later he spotted a helicopter heading NE at the same height about 100 ft away on the port beam. He overtook the helicopter - a yellow Heli-Med ac – on its RHD side and the helicopter passed down his port side about 100 ft away. There was no opportunity to avoid the helicopter and he assessed the risk of a collision as *"high"*.

THE EC135 PILOT reports his helicopter has a yellow colour scheme. HISLs and the landing light were on because of the weather conditions, which he reports were a variable visibility of between 2-3000 m in showers and 8 km; 150 ft clear below and 3 km horizontally clear of cloud. A squawk of A0020 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted. He was not in communication with any ATSU.

Whilst returning to base VFR at 550 ft Rad Alt, northbound up the 'Great Glen' from Oban to Inverness heading 030° at 120 kt, close-in to the western shore of Loch Ness about 0.25 NM N of the Invermoriston Valley, his rear seat paramedic shouted *"Fast Jet"*. He then spotted the jet about 300 ft away on the starboard beam – he thought a Jaguar – which passed about 200 ft away to starboard from the 3-2 o'clock position and moving fast ahead, overtaking his helicopter on a similar heading at the same height. He thought that after a L turn into the Glen the fast jet pilot might have taken action to avoid his helicopter, but the jet had approached in his blind arc astern and he had no idea it was there until it overtook him. He was unable to assess the risk because the jet had approached from behind; after he spotted it he moved into a shower and he lost sight of it, but he added that he was trying to avoid weather and *"luckily"* hugging the western shore of Loch Ness.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

THE JAGUAR PILOT'S UNIT comments that this was a close call that demonstrates the difficulty of seeing a low flying helicopter in time to take avoiding action. PINS does provide some helicopters with some protection, but this was a

chance encounter with an Air Ambulance helicopter. Consequently, there was little either pilot could have done to reduce the risk. However, the traditional yellow or red livery of ambulance helicopters is far from conspicuous and consideration should be given to recommending that civilian helicopters that routinely operate at low-level adopt darker colour schemes.

HQ STC comments that after reviewing the relative positions of these ac it is likely that the helicopter appeared virtually stationary in relation to the Jaguar, in the pilot's 11:30 position. This would have made the helicopter, a small apparently stationary object, difficult to see against the dark hillside. The Great Glen is used as a transit route by all ac types; particularly when there is a low cloudbase. It is notable that the pilots of both ac elected to fly at 500 ft; perhaps to avoid meeting lower flying ac. The minimum height that fast jets may fly in the Great Glen is 250 ft, so if helicopters fly below this height they could afford themselves greater protection.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Jaguar pilot's unit comments on the conspicuity of the helicopter's colour scheme were noted by the Board. This issue had engendered much debate in the past and with so many variables of background/prevaling conditions and colour this was indeed a complex subject, with no clear cut answers and outwith the Board's sphere of knowledge. The BHAB helicopter pilot member was critical of high speed military ac flying at low level without the benefits that a CWS can provide – but this was a solitary view. Here, it might potentially have provided some useful warning to the jet pilot as he approached the helicopter over the flat surface of the loch – unbeknown to its pilot, but the STC member explained that the fitting of any form of CWS to the Jaguar was not envisaged. It was noted that the helicopter was not equipped with any CWS. The Board had endorsed within many Airprox reports the enhanced flight safety that

TCAS can provide to CAT, but it was not a panacea. In the low level environment – in mountainous terrain - it might not provide the quantum improvement envisaged and considerable work was necessary before a practical system was available to military FJ pilots. That said, the Board endorsed the use of any proven system which could enable a pilot to operate more safely.

Unfortunately, neither pilot had such equipment and both relied on the principle of 'see and avoid'. Some members wondered if it was more advantageous for the helicopter to fly to one side of the Loch or down the centre, or, whether some form of traffic separation scheme was warranted. Helicopter pilot members pointed out that the EC135 pilot would invariably want to hug the coastline, so that in the event of an engine failure it would give him a greater chance of alighting on the ground as such helicopters are rarely fitted with flotation devices, which might therefore, constrain the pilots choice of route. It was clearly evident to the members that the EC135 helicopter pilot would have been unable to detect the jet any earlier, as it approached in his blind arc from astern. It seemed that the yellow colour of the helicopter, probably seen against the background of the shower that the EC135 subsequently flew into, conspired to mask the helicopter's presence from the jet pilot until it was 100 ft abeam his ac at the same height. Therefore, this was - for whatever reason - a late spot where the jet pilot had no time or opportunity to do anything about it. The Board concluded, therefore, that this Airprox had resulted from effectively, a non-sighting by the Jaguar pilot, whilst overtaking the EC135.

The jet was displaced 100 ft to starboard of the helicopter, which suggested to some that though safety had been compromised they were never going to collide. Other members were not convinced, as nothing had been done to engineer the minimal horizontal separation that existed – it had been nothing more than luck. Moreover, there were many examples of 'overtaking ac' colliding with an ac in front of it, without having seen it. Whilst not quite unanimous, the Board concluded that an actual risk of a collision had existed in the circumstances that pertained.

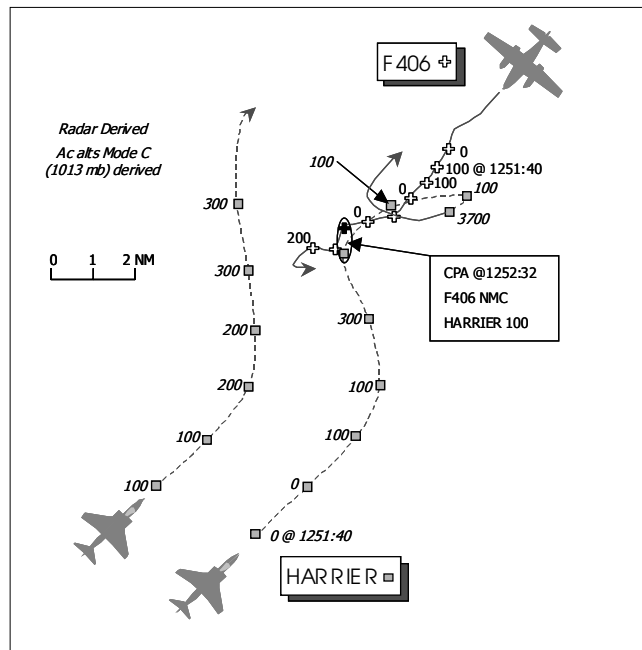
PART C: ASSESSMENT OF CAUSE AND RISK

Degree of Risk: A.

Cause: Effectively, a non-sighting by the Jaguar pilot.

AIRPROX REPORT NO 70/02

Date/Time: 30 May 1252
Position: 5104 N 00538 W (Bristol Channel, 45 NM NNW St Mawgan)
Airspace: London FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: F406 Harrier GR7
Operator: Civ Comm HQ STC
Alt/FL: 500 ft 250 ft
 (Rad Alt) (Rad Alt)
Weather VMC SKC VMC
Visibility: 9 km 25 km
Reported Separation:
 200 ft V, Nil H Nil V, 1 NM H
Recorded Separation:
 100 ft V, 0.6 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE REIMS F406 PILOT reports that he was conducting a fisheries’ protection sortie at 500 ft (Rad Alt), with SSR code 4100 and Mode C selected on and was in receipt of a FIS from London Mil on 135.15 MHz and, he thought, from Culdrose ATC on 373.7 MHz. He was also in contact with Culdrose Operations on H/F. When heading 220° at 140 kt and tracking towards a ship contact, he saw a Harrier in his 11 o’clock at about 0.5 NM coming towards him approximately 200 ft above but descending. He turned right and descended and as he did so the Harrier banked into a steep right turn and climbed towards another Harrier seen as he turned which, he assumed, was his playmate.

The F406 pilot also reports that his ac was coloured blue/white, was not equipped with TCAS but wing HISLs and nav lights were selected on. He was operating under VFR, in VMC with sky clear and 9 km forward visibility, although he was flying into sun.

UKAB Note (1): Iaw the UK SSR Code Assignment Plan, promulgated in UK AIP ENR 1.6.2, SSR Code 4100 is allocated for MPA/DEFRA/Fishery Protection conspicuity purposes.

THE HARRIER GR7 PILOT reports that he was no 2 of a 4-ship of Harriers participating in a 32 ac Combined Air Operation (COMAO) exercise and in receipt of a FIS from an AWACS ac. His ac was grey and HISLs were selected on but TCAS was

not fitted. He was VMC in haze, clear of cloud but with 25 km forward visibility. He was squawking SSR code 1611 with Mode C selected on. Level at 250 ft on Rad Alt he was heading 080° (T) at 420 kt when he saw the F406, initially at approximately 3 NM. It appeared to be flying on a reciprocal heading at the same altitude. He monitored the ac, which passed no closer than 1 NM down his left hand side. He assessed that there was no risk of collision. He adds that shortly after seeing the F406 he engaged a Tornado F3.

MIL ATC OPS reports that the F406 pilot was in receipt of a FIS from LATCC (Mil) Allocator West when he reported an Airprox with 2 Harriers. All ac, however, were operating below LATCC (Mil) radar cover and, therefore, the incident was neither seen nor recorded. Previously the F406 had been in receipt of a FIS from Culdrose but had gone en route to St Mary's at 1120. It is believed that "ops normal" calls were being passed to Culdrose Ops on HF but this facility provides no form of service other than logging calls and passing pressure changes. Consequently, there appears to be little relevant Mil ATC involvement in this incident.

ASACS SSU reports that the Harrier was part of a large COMAO package under the direction of the mission crew of an E3D. The E3D was not fitted with a Mission Audio Recorder so no R/T transcript is available. The COMAO mission was planned to flow from the North Devon and Cornish coasts towards Central/North Wales. The E3D was tasked with providing control of all elements, including opposing fighters, and accordingly the mission crew was configured with 3 Weapons Controller (WC) positions under the direction of a supervising Fighter Allocator (FA) and management of a Tactical Director (TD).

All ac in the strike package were operating under a FIS with a WC providing Broadcast Control to 18 ac split into 5 elements in a 60 NM stream. This is routine for COMAO exercises due to complexity and number of ac involved. The Harrier formation of 4 ac was the last element of the strike package and passed the start gate position, 5055N 00555W, at 1250. Although the E3D radar tracings show that the radar detected and displayed the F406 just prior to the incident, the WC, FA and TD cannot remember observing any conflicting strangers, although they would have been looking out for such tracks. The radar

tracings show the Harrier in close proximity to the F406 at 1252:32. At the time of the incident, the WC's task was to warn the package of opposing forces. With this in mind, the WC and FA would be concentrating on the lead elements of the package some 50 NM ahead of the Harrier formation, who were responsible for their own safe separation from other ac under the terms of FIS.

HQ STC comments that this Airprox occurred at low level, over the sea 35 NM from the coast where no radar service was available. The COMAO exercise activity was promulgated by ACN and NOTAM. While the NOTAM covered a fairly large area, it specified only a 2-hour time window. Therefore the F406 pilot should have been aware that he was likely to meet intensive military flying, and might have considered the option to reschedule his activity within the area either before, or after, the COMAO event. A telephone number had been promulgated in the NOTAM for use by anyone requiring more information on the COMAO exercise.

UKAB Note (2): Met Office archive data reveals that the 1200 UTC Scillies RPS was 1015 mb.

UKAB Note (3): The COMAO exercise was the subject of Airspace Co-ordination Notice (ACN) 2002-05-0049 entitled "CAOC9 Corporate COMAO 03/02 – 30 May 02". It was also the subject of NOTAM N H2094/02 issued 23 May 02 that promulgated "*Corporate COMAO. A medium-scale airex comprising up to 40x FJ acft supported by AAR, AEW and RW acft. Ex activity will be concentrated, 1230-1430, WI a Fighter Area of Responsibility (FAOR) bounded by 5130N 00350W - 5040N 00530W - 5104N 00614W - 5130N 00700W - 5210N 00540W - 5205N 00500W - 5230N 00410W - 5238N 00410W - 5238N 00410W - 5250N 00330W - 5200N 00300W - To Origin, SFC-FL245 clear of regulated airspace. Acft will conduct high energy manoeuvres and non-participating military and civil acft are advised to remain clear. ... Current FAOR and AAR activity info available fm CAOC 9 Current Ops x5221/01494 461461 Ext 2702/2004. ... ACN 02-05-0049 dated 15 May 01 (sic) and AL1 dated 21 May 01 (sic) refer.*"

UKAB Note (4): Recorded radar data was obtained from the E3D; this displays SSR Mode 3/A plot positions together with altitude information

derived from SSR Mode C. Analysis of the data reveals that at 1251:40 the F406, indicating 100 ft alt (1013 mb), is tracking SW with the subject Harrier on a reciprocal track at 11 o'clock range 10 NM, indicating alt 0 ft, the right hand ac of a Harrier pair in battle formation. As the contacts close to 5.8 NM the Harriers commence a left turn onto a N track and begin to cross the track of the F406 L – R. The next sweep shows the F406 commencing a right turn, however no alt is indicated. The subject Harrier indicates alt 300 ft on the next sweep, at 1252:21, at 9 o'clock to the F406 range 2.4 NM with the latter indicating alt 0 ft. On the next sweep, at 1252:32, the subject Harrier, indicating alt 100 ft, has commenced a right turn to pass behind the F406. Unfortunately, no return from the F406 is apparent. Nevertheless, from subsequent returns its position can be estimated and is plotted in black on the diagram. It is also estimated that CPA was at about this time with the Harrier passing approximately 0.6 NM to the south of the F406 and, probably, 100 ft above. Having passed the F406, the subject Harrier continues E for 2 sweeps before suddenly reversing track to the right and climbing to alt 3700 ft before thereafter, continuing a descending right turn onto NE. This manoeuvre is consistent with the fighter engagement reported by the Harrier pilot. It is also noteworthy that the other Harrier climbs although not above alt 700 ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, E3D radar data traces, reports from the E3D mission crew and reports from appropriate ATC and operating authorities.

Some members expressed surprise that, notwithstanding promulgation of the COMAO exercise by ACN and NOTAM, the F406 pilot elected to fly his mission within the area notified for intense military flying activity at the very time it was 'all happening'. However, it was assumed

he was aware of the relevant NOTAM, which would have been available to him at his point of departure, St Mawgan. The Board noted that in a previous incident involving another ac that was also engaged upon a fishery protection sortie (207/01), the operating company reported that it notifies its flights to several agencies, both civ and mil, to enhance overall flight safety. A civil ATC member confirmed that his unit regularly receives such notification, supplied in the form of an operating area, but without specific on-task times at any location within it. This rendered such information too general to be acted on in deconfliction terms.

On the other hand, members also noted that a specific SSR Mode 3/A code, 4100, has been assigned for fisheries' protection sorties for conspicuity purposes. This squawk was selected 'on' by the F406 pilot and it was detected by the E3D radar, as shown by the E3D radar traces. However, since the E3D radar was not tracking the code it would not have been labelled and consequently drawn to the attention of the WC providing FIS to the Harrier.

Despite potential for prior notification, neither pilot was aware of the presence of the other until the Harrier pilot visually acquired the F406 at approximately 3 NM, or 25 sec prior to the encounter. Some time after that the F406 pilot acquired the Harrier, which by that stage was preparing to manoeuvre against a Tornado F3. Although the Harrier pilot thought that there was no risk of collision, the fact that the F406 pilot took evasive action whilst the Harrier pilot banked into a steep right turn convinced the Board that this unexpected encounter was resolved by the action of both pilots, which also removed any collision risk.

PART C: ASSESSMENT OF CAUSE AND RISK

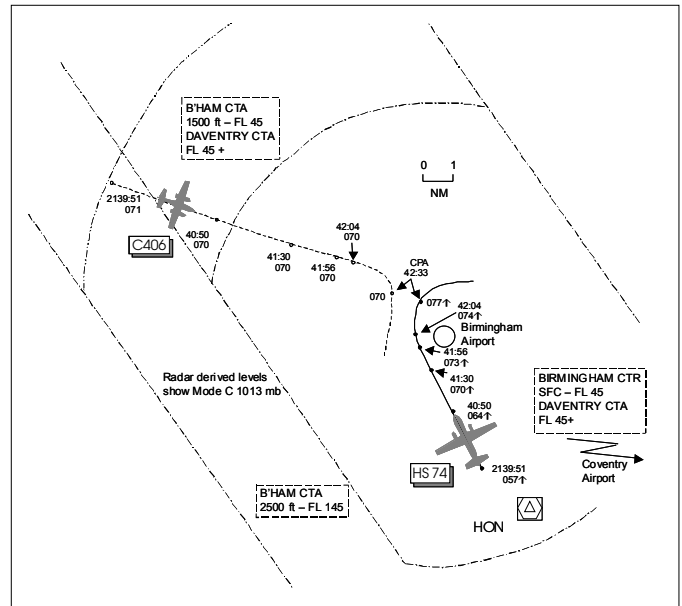
Cause: Confliction resolved by both pilots.

Degree of Risk: C

AIRPROX REPORT NO 71/02

Date/Time: 30 May 2143 NIGHT
Position: 5229 N 0147 W (2 NM NW of Birmingham)
Airspace: CTA (Class: A)
 Reporter: Birmingham APR
First Aircraft Second Aircraft
Type: HS74 C406
Operator: CAT CAT
Alt/FL: ↑ FL 90 FL 70

Weather VMC CLOC VMC CAVOK
Visibility: UNL 10 km
Reported Separation:
 500 ft V 3-4 NM H 0 ft V 1 NM H
Recorded Separation:
 700 ft V 1.1 NM H

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE BIRMINGHAM APR reports working the subject C406 inbound to Coventry from the W, the subject HS74 departing Coventry to the N and another ac inbound to Birmingham for RW 33 from the SW. The HS74 had been given an ATC clearance to climb straight ahead from RW 23 to 2500 ft but called on frequency climbing through 2100 ft for FL 30. His cleared level was queried and he was subsequently cleared to climb to FL 60. The APR then turned the HS74 R onto heading 280° then further R onto 330° and, following co-ordination with MACC, cleared it to climb to FL 80. By now, the C406 was entering CAS from the W descending to FL 70 and was given a RCS and instructed to continue on its present heading. When the subject ac were 10 NM apart, MACC telephoned to draw attention to the subject acs' flight paths but the APR, whose plan was to climb the HS74 through the level of the C406 before horizontal separation was lost, believed matters were under control. However, the HS74 was climbing at a very slow rate so it was turned R onto 060°, she thought, which its pilot acknowledged. After a short pause the pilot queried the heading change. The APR confirmed the turn to the R and changed the issued heading to 090° to increase separation. At this stage the quality of the primary radar was very poor and it

was not obvious that the HS74 had not initiated the turn until the pilot had queried the heading change on RT. It quickly became apparent that separation would be lost so an avoiding action R turn was given to the C406 and then the HS74 pilot was told that the R turn onto 090° was now 'avoiding action' and TI was passed.

THE HS74 PILOT reports departing Coventry for Belfast IFR and in receipt of a RCS from Birmingham on 118.05 MHz squawking 5063 with Mode C. The visibility was unlimited in VMC and the ac's nav and anti-collision lights were all switched on. Prior to departure, he was given a clearance of "after noise, maintain radar heading 230° cleared to 2500 ft". On contacting Birmingham, he called "radar heading 230° passing 2100 ft" but the APR asked him to confirm that he was only cleared to 2500 ft not 3000 which indicated that the controller had mistaken his heading for his cleared altitude. He was subsequently turned onto heading 330° and given climb clearance to FL 90, he thought. Whilst climbing at 150 kt through FL 73-75, the APR issued a R turn onto 050° followed by, a few seconds later, an avoiding action R turn onto 090°. Simultaneously, a TCAS TA alert was received which indicated traffic in his 10 o'clock

position about 4 NM away at FL 70 descending, he thought. He followed the controller's avoiding action 120° R turn, the other ac was not seen visually but TCAS indicated it was passing 3-4 NM clear to his L. He assessed the risk of collision as low.

THE C406 PILOT reports flying a radar heading of 115° at 195 kt and FL 70 IFR inbound to Coventry from Dublin; he was receiving a RCS from Birmingham on 118.05 MHz squawking 1464 with Mode C. The visibility was 10 km 2000 ft below cloud in VMC, his nav, anti-collision and wing (de-icing) lights were all switched on. TCAS was not fitted to his ac. He first saw the conflicting ac about 8 NM away as it converged from his R in a constant 2.30 position. The APR issued him with an avoiding action R turn onto heading 220°, he thought, which he complied with, whilst watching the other ac. It was a low wing twin engined type that passed down his port side at the same level range 1 NM in a banked R turn. He assessed the risk of collision as low as he had been in visual contact with the traffic continuously throughout.

ATSI reports that at the time of the Airprox both ac were under the control of the Birmingham APR. Both the workload and traffic loading were described as being light. The relevant ATC equipment was all reported to have been serviceable at the time, however, the controller stated, in her opinion, the quality of the primary returns was poor. There was neither a log entry nor a report made to this effect.

The C406 established communication with the Birmingham APR at 2132:50, and reported maintaining FL 80 routeing direct to the Honiley VOR. The ac was approx 40 NM NW of Birmingham, at that time, in Class G airspace.

Following departure from Coventry, the HS74 contacted the APR at 2135:20, stating: *"...passing two thousand one hundred feet and it's a radar heading two three zero"*. The controller responded by querying the ac's cleared level as she had erroneously believed that the pilot had reported climbing to *"three zero"*. The pilot of the HS74 confirmed that they were only climbing to two thousand five hundred feet and were now passing two thousand three hundred. The APR cleared the HS74 to climb to FL 60 and, shortly afterwards, instructed it to turn R heading 280°.

Shortly after this, the controller cleared the C406 to enter CAS on a direct track to the 'Charlie Tango', descending to FL 70. The controller explained that it was her plan to climb the HS74 through the level of the C406 before transferring the outbound to Manchester Control. At 2137:10, the HS74 was instructed to turn R heading 330°, the controller explained that the heading of 330° was chosen to keep it close to the ac's desired track and perceived that there was no other traffic to affect this. The controller then telephoned Manchester ACC requesting permission to climb the flight above the standard FL 60. This was agreed and the APR cleared the HS74 to climb to FL 80. At that time, the C406 was 32 NM NW of the HS74, passing FL 73 for FL 70.

As the C406 entered CAS, the APR placed it under a RCS and instructed the crew to continue on their present heading, which they advised was 115°. At 2140:50, Manchester telephoned and said to the APR: *"...I'm just double checking to make sure you haven't forgotten your xxxxxx (the C406's c/s prefix) against your xxxxxxxx (the HS74 c/s prefix)"* to which the reply was: *"No I haven't forgotten"*. When this conversation took place, the C406 was level at FL 70 and in the 11 o'clock position of HS74, which was passing FL 64 climbing to FL 80. The controller advised that during this call she had monitored the relative positions of the ac and remained convinced that her plan would still work.

The two ac continued to converge and, at 2141:30, when they were 7 NM apart, the APR instructed the HS74 to turn R onto 050°, which was both acknowledged and read back by the crew. The reason for a R turn was, as explained by the controller, to provide the HS74 with some additional track miles in order to achieve vertical separation from the C406. At 2141:40, the C406 reported visual with Coventry and requested a visual approach, which was refused due to the presence of the HS74. Analysis of the radar recording indicates that the HS74 had continued on its previous heading of 330° instead of turning R onto 050 as instructed. At 2141:55 the crew of the HS74 queried their assigned heading, even though they had previously read it back correctly.

The controller then instructed the HS74 to turn further R heading 090°, by which time the ac were only 4.6 NM apart with the HS74 climbing through FL 73 for FL 80. At 2142:05, the

controller instructed the C406 to turn R onto a heading of 200° as an avoidance manoeuvre. Although the controller stated later that she believed that TI had been passed, analysis of the RT recording shows that this was not the case. The controller issued avoiding action to the HS74 by turning it onto 090° and passed TI on the C406. Although the phraseology used was non-standard, both crews reacted and turned as instructed. The controller commented that the 'new phraseology' for avoiding action is, in her opinion, much more difficult to use.

UKAB Note: The 'new phraseology' for avoiding action, which was introduced on 28th December 2001, is *"(ac identity) avoiding action, (ac identity) turn left/right immediately heading (three digits) traffic at (number) o'clock (distance) miles opposite direction/crossing left to right/right to left (level information).*

As the two ac passed abeam each other, port-to-port, the horizontal separation reduced to 1.1 NM whilst the vertical was 700 ft. Standard separation was restored soon afterwards.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

Members commended the honest report produced by the Birmingham APR. Although ultimately she had passed avoiding action instructions to both ac, there may have been some reluctance to use the appropriate phrase - ATCOs agreed that in doing so it was perceived as an admission that something had gone wrong. However, the intention of the phrase 'avoiding action' was to grab the pilot's attention and to let him know that immediate action was required. ATSI apprised the Board with the rationale behind the 'new phraseology'. The use of the c/s twice was thought by some controllers to delay the passing of the important instructions whereas it was introduced to ensure that the c/s appeared clearly in the transmission even if the initial part of the RT call had been clipped.

Moving on to the encounter, it appeared that the APR had formulated a plan - to climb the HS74 through the level of the C406 - but had then not monitored the situation closely enough or was reluctant to change the plan as the subject ac converged. The radar recording revealed the HS74 climbing at a steady 700 ft/min well before the incident and she had been prompted by MACC to the developing situation. It was only 1 min prior to the Airprox that the APR decided to turn the HS74 R, as it was climbing through the C406's level, to increase separation; ATCO members thought this was executed far too late. In their view the APR had dispensed with vertical separation without ensuring horizontal separation existed as the ac converged and this had caused the Airprox. However, members also thought that the delayed turn by the HS74 pilot had contributed to the incident. Although the turn was given late, the pilot had acknowledged the instruction but had continued on track for 25 sec (about 1 NM) before querying the turn. Pilots sympathised with the HS74 pilot's dilemma, as he had been initially given an 80° R turn off track for no apparent reason followed by a further 40° turn. Nevertheless, he should have queried the ATC instruction sooner to alleviate any doubts in his mind.

Looking at risk, the APR had turned the HS 74 R to resolve the confliction which was subsequently upgraded to 'avoiding action' with TI after she had also given the C406 an 'avoiding action' R turn. After querying the ATC turn, the HS74 pilot had commenced the R turn whilst simultaneously receiving a TCAS TA alert and, whilst not visually acquiring the C406, he had watched it on his display pass 3-4 NM clear and below. Pilots observed that the inaccuracy of reported ranges on TCAS is well known and is dependent on range scale selected and the geometry of the encounter. They went on to emphasise that TCAS is designed to be used to resolve conflictions only in the vertical plane NOT by horizontal manoeuvring. The C406 pilot had seen the converging HS74 at about 8 NM range and had followed the APR's avoiding action R turn whilst watching it pass clear on his LHS. Although not a tidy resolution, all of these elements combined led the Board to conclude that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Birmingham APR dispensed with vertical separation without ensuring horizontal separation.

Degree of Risk: C

Contributory Factor: The HS74 pilot delayed his turn.

AIRPROX REPORT NO 72/02

Date/Time: 21 May 1212

Position: 5415 N 00043 W (22 NM ENE of Linton-on-Ouse)

Airspace: Vale of York AIAA (*Class:* G)

Reporting Aircraft Reported Aircraft

Type: KC 135R Tucano

Operator: Foreign Mil HQ PTC

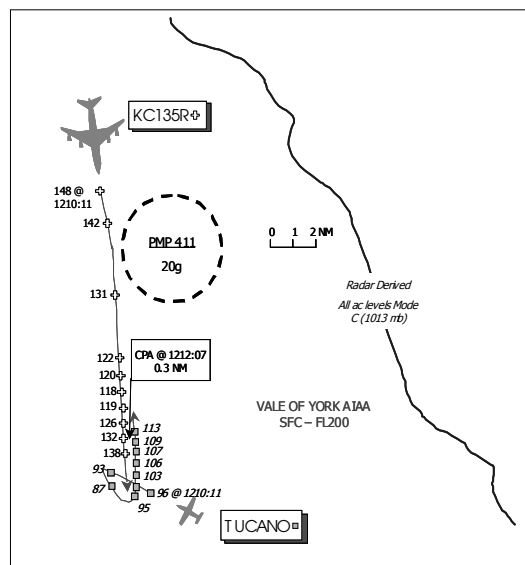
Alt/FL: FL 120 FL 107

Weather: VMC CLBL VMC CLAC

Visibility: Unrestricted >10 km

Reported Separation:
NR 2000 ft V, 1000 ft H

Recorded Separation:
1300 ft V, 0.3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KC 135R PILOT reports heading 160° at 250 kt, in descent from FL 240 to FL 110. Although in receipt of a RIS from London Mil, RAS had been requested originally. The ac was coloured grey and nav lights and HISLs were selected on. Passing FL 130, London Mil reported traffic at 2 o'clock. Just after identifying this traffic on TCAS, further traffic indicated at 12 o'clock. Within seconds this changed from proximate traffic to a TA, and then, when passing FL 120, to an RA commanding a 4000 FPM climb. A climb was initiated and the ac levelled at FL 140 when TCAS showed traffic clear. The conflicting traffic was never visually acquired.

The KC135R pilot adds that weather conditions were mostly VFR with unrestricted forward visibility although descent was in and out of cloud.

THE TUCANO PILOT reports operating under VFR on a PTC quiet frequency and squawking 4577 with Mode C. He was VMC, 6000 ft above cloud with forward visibility >10 km. Heading N at 180 kt and passing FL 107 in the climb, he saw a KC135 at 3 NM. The KC135 passed 1000 ft away and 2000 ft above and he turned away. He adds that the Tucano was black with a yellow stripe and HISLs were selected on.

MIL ATC OPS reports that the KC135R was in receipt of a RIS from LATCC (Mil) CON 15. Following handover from ScATCC(Mil), first contact was made with the KC135R pilot at 1202:19 and it is apparent from the subsequent recorded conversation that the crew was unfamiliar with the airspace, although it was eventually agreed that routing to Waddington would be via the Scunthorpe Radar Corridor (RC). This exchange was complicated by radio

reception difficulties although adequate 2-way communications were re-established on UHF. Thereafter CON 15 gave a heading change to 170° for the Scunthorpe RC. This was acknowledged together with a request for descent. CON 15 responded, at 1204:30, with Traffic Information (TI), passed on unrelated traffic, followed by an instruction to descend to FL 110. The descent instruction is acknowledged but not the TI. Subsequently, at 1205:58, transmissions again became broken to the KC135R crew and as a result they were instructed to change to the VHF frequency, 135.925 MHz. With communication established on VHF, at 1210:49 CON 15 reported traffic *"right 1 o'clock, 15 miles, crossing right to left, indicating 2000 ft below"* to which the KC135R pilot responded *"... searching"*. Thirty nine seconds later the KC135R pilot reported *"... deviating altitude for traffic"*. Thereupon CON 15 immediately called traffic as *"... now 12 o'clock, 3 miles, manoeuvring, indicating a thousand feet below"*.

Analysis of the radar recording shows the traffic called by CON 15 at 1210:49 was right 1 o'clock at 10.6 NM crossing R - L and indicating approximately 2000 ft below. But further traffic, the subject Tucano, is 12 o'clock to the KC135R at 7 NM, manoeuvring and indicating FL 91, ie 3500 ft below. However, it is not called even though only 1800 ft below the level the KC135R has been assigned. After the KC135R pilot reports *"deviating altitude for traffic"* traffic information on the Tucano is given as *"now 12 o'clock, 3 miles"*. In reality, however, this is the first time that the Tucano is reported.

The KC135R said that he had originally requested a RAS, although he was handed to CON 15 under a RIS. No information was available either to confirm the request or explain why RAS was not provided. This came to light sometime after the event and JSP318A Reg 235.115.1f states *"Requests for RIS to be changed to a RAS will be accepted subject to the controller's workload"*. It is apparent from the RT transcript that CON 15 was not particularly busy and such a request may well have been accommodated at any stage, although the most logical time would have been on initial contact.

SSR Mode 3/A code 4577 is a conspicuity code used by training ac within the Vale of York Area of Intense Air Activity (AIAA) and indicates to

controllers the presence of an ac that may conduct unpredictable manoeuvres. The subject Tucano was observed to descend just before TI was given at 1210:49 and this may explain why CON 15 elected to call the other ac as the priority. Nevertheless the subject Tucano remained a potential threat that went unreported until after the KC135R pilot had reported the TCAS RA. JSP 318A Reg 235.115.1 specifies that under RIS *"The pilot is wholly responsible for maintaining separation from other aircraft whether or not the controller has passed traffic information"*, nevertheless, it is evident that the controller could have been more pro-active. For example, given that the AIAA was active with numerous other ac, it would have been prudent to have limited TI owing to high traffic density and call **all** traffic in the vicinity. Arguably, a service upgrade would have been more problematic but not impossible. Finally, LATCC (Mil) reports that lessons have been learnt from this incident and disseminated internally.

UKAB Note (1): UK MIL AIP ENR 5-2-4 3.4 states that *"Considerable military fixed wing and rotary flying training, including, in addition to airfield let down procedures, exercises in stalling, spinning, steep turns and formation flying, takes place within ..."* the Vale of York AIAA. *"Peak activity takes place ? 0700 - 2359 Mon to Thurs. 0700-1600 Friday and as notified."* Additionally, *"Pilots transiting the area are advised to maintain constant vigilance ..."*

UKAB Note (2): Analysis of the Gt Dun Fell radar data recording reveals that the Tucano was manoeuvring in the vicinity for at least 6 min before the encounter. At 1210:11 the Tucano is tracking NW before a sudden reversal of track, which is evident at 1210:49 following 2 paints with NMC and one sweep with neither primary nor secondary contact. The Tucano turns onto the northerly track at 1211:20.

HQ PTC comments that the Tucano pilot was operating legitimately in Class G airspace under VFR and in (good) VMC. He saw the KC135 at a reasonable distance and turned away to preserve separation. Assuming that this was indeed the reporting ac - it filed a position some 30 miles away - it is troubling that TCAS can go so far as to trigger an RA where, apparently, the situation is benign.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcript of the relevant RT frequency, radar video recording and a report from the appropriate ATC authority.

The HQ 3AF USAF adviser to the Board explained that it is policy for USAF crews to file a Hazardous Air Traffic Report (HATR) for each occasion they get a TCAS RA. Such HATRs that are forwarded to HQ 3AF are reviewed and, when appropriate, submitted iaw the UK Airprox reporting procedure. In this instance, the KC135R TCAS equipment had detected the Tucano and, based on its measured vertical and horizontal vector components relative to the KC135, computed that its flight path would enter the 'safety bubble' surrounding the KC135. As a consequence, the RA had enunciated. Although members of the Board accepted that the Tucano pilot had good visual contact with the KC135, and had turned away to maintain separation,

nevertheless his flight path had triggered the RA. This suggested to some members that there would appear to be a lack of understanding that a wider berth needs to be given to transport and tanker/transport ac, which are now being equipped with TCAS.

To compound the situation, the Board noted that whilst the Tucano pilot was fully aware of the developing situation, the KC135 was alerted to the presence of the Tucano only as a result of TCAS, despite being in receipt of a radar service. Nevertheless, in compliance with the RA the KC135R pilot participated in resolution of the conflict. It was agreed that the combined actions of both pilots meant that there had been no risk of collision.

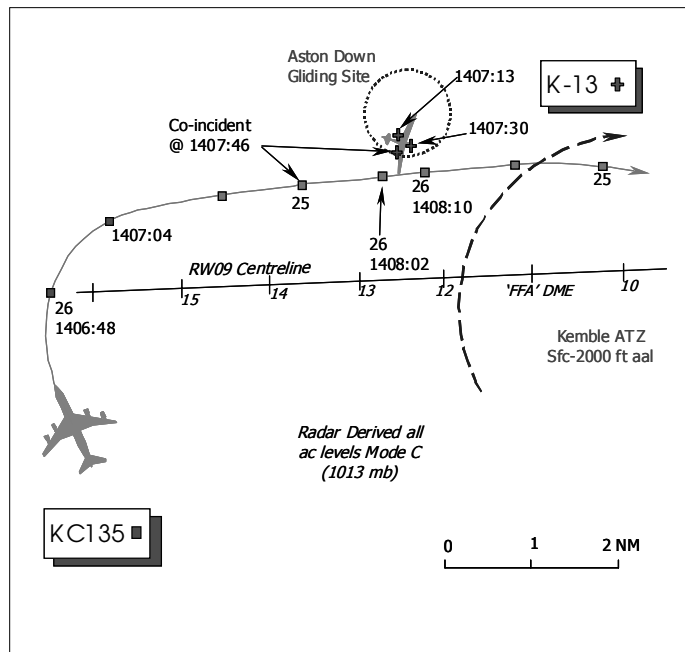
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction resolved by both pilots.

Degree of Risk: C

AIRPROX REPORT NO 73/02

Date/Time: 21 May 1408
Position: 5142 N 0208 W (13 NM West of Fairford - elev 286 ft)
Airspace: London FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: KC 135-R K-13 Glider
Operator: Foreign Mil Civ Trg
Alt/FL: 2000 ft 1900 ft
 (QFE 988 mb) (QFE 977 mb)
Weather VMC CLBC VMC
Visibility: NR "Good"
Reported Separation:
 1/2 -1 NM H, Nil V 1 NM H, 100'sft V
Recorded Separation:
 Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE KC 135-R PILOT reports that he was inbound to Fairford under a RIS from Brize Norton APPROACH (APP), squawking A3750 with Mode C; TCAS was fitted and HISLs were on. Whilst on finals for RW09 at 14 NM DME, LLZ established heading 095° at 210 kt level, and at 2000 ft Fairford QFE, traffic information was given by APP. The pilot in the LHS spotted a glider off the port wing climbing with "moderate" left bank applied. The glider appeared to be at the same height and about 0.5-1 NM away, pointing towards them so power was increased to pull ahead and increase horizontal separation. The approach was continued.

He questioned whether it was safe to have a glider site on the final approach track to Fairford.

UKAB Note (1): Aston Down gliding site is located just less than 2 NM north of the extended centreline of RW09 at about 13 NM Fairford (FFA) DME.

THE K-13 GLIDER PILOT reports that his glider has a red colour scheme and he was carrying out general handling training in the vicinity of Aston Down. He was flying various headings at 46 kt in VMC with "good" visibility, at a height of 1900 ft when he saw a military 4-engined jet ac. Minimum separation was about 1 NM horizontally and "hundreds of feet" vertically, but no avoiding action was considered necessary. He opined that an Airprox "did not happen".

UKAB Note (2): The UK AIP at ENR 5-5-1-1, promulgates Aston Down Glider Launching Site for winch and aerotow launches, where cables and tug ac may be encountered to 3000 ft agl, during daylight hours throughout the week. Site elevation is 600 ft.

UKAB Note (3): The final approach track to RW09 passes through the Kemble ATZ (sfc-2000 ft aal). Local ATC procedures are in place to deconflict with Kemble traffic and the location of the ATZ was not a factor in this Airprox.

MIL ATC OPS reports that analysis of radar and R/T recordings in this incident highlight a time discrepancy of about 10 seconds. R/T timings in

this report have therefore been adjusted accordingly.

The KC135 was under a RIS from Brize APP whilst positioning for a display run at Fairford. The ac requested "*direct to the Fairford 272 [radial] at 10 DME 2000 ft*" at 1358:03. This was approved by APP who instructed the ac to descend on the Fairford QFE (29.48 ins) before giving the pilot his own navigation. At 1406:03 APP advised the KC135 pilot that Fairford wanted them to "*fly through now*" and a right turn inbound was commenced. There followed an interchange regarding the KC135's departure details from Fairford. At 1407:04, APP reported "*traffic east 3 miles manoeuvring no height...*" followed by climb out instructions. The climb out instructions were acknowledged, however the traffic information was not. APP called the traffic again at 1407:46; "*c/s previously reported traffic 12 o'clock 2 miles no height*" and the KC135 pilot reported "*traffic in sight*" at 1407:57. At 1408:18 the KC135 pilot reported "*we may be filing a hazard*".

Analysis of the radar recording shows a pop-up return at 1407:04 just under 3 NM east of the KC135 during its right turn inbound. As the ac was in a turn it is acceptable to call traffic with reference to cardinal points. The second traffic information call was passed using the clock code however, the conflict is actually at 1 NM rather than the reported 2 NM.

The APP controller reported that the KC135 "*carried out a wide orbit which placed it in the vicinity of Aston Down*". Aston Down is marked on the 1:250 000 Topographic Chart as an area of 'Intense Gliding'; similarly it is also displayed on the Low Flying Chart. In retrospect it may have been helpful for the controller to have given a general warning that the ac was approaching an area of intense gliding activity. However, APP could have reasonably expected the crew to familiarize themselves with the airspace and the intended approach run during the planning stages of the flight. Additionally, APP was endeavouring to clarify climb out details with the KC135 pilot to ensure the instructions were understood. It is evident from the transcript that this was causing some problems.

APP passed timely, relevant and concise traffic information and was informed that the KC135 pilot had the conflictor in sight. The controller appears to have applied the RIS correctly and, consequently, there appear to be no ATC aspects to this Airprox.

UKAB Note (3): The "*wide orbit*" reported by the controller is confirmed on the radar recording. This places the KC135 left of the ILS09 LLZ centreline with a slightly diverging flight path at the time of the Airprox.

UKAB Note (4): The radar recording shows an intermittent slow moving primary return which corresponds with the KC135 pilot's report. Though it is likely that this is the reported glider, this cannot be positively determined. Based on the limited recorded radar history of the glider (the last primary return appears at time 1407:46), the closest point of approach can only be estimated to have occurred at between 1408:00 and 1408:10, with a probable minimum horizontal separation of about 0.5 NM.

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 and operating authorities.

The Board looked first at the actual position where this Airprox occurred. The K-13 glider was shown to be operating in or very near to the overhead of Aston Down glider site, as reported by the glider pilot. The KC135 had flown through the centre line for RW09 and its proximity to the glider site was seemingly not recognised by the crew who had reported being established on the

extended RW centreline at the time of the Airprox. The reasons for the apparent wide turn could not be positively determined but may have been due to a late turn (in response to the "*...fly through now*" request) and/or possibly extra speed being carried by the ac as a result of the nature of the approach, which was for a display fly-through rather than to a landing. However, in the absence of comparative information on a KC-135's turn rate at normal "base turn" speeds, neither scenario could be more than speculation. It was also felt that the exchange between ATC and the ac regarding climb out details may have distracted the crew to some degree at what would have been a busy period.

The Board agreed that this incident highlighted the need for Airshow organisers to provide full information to participating crews and local airspace users about the potential for conflictions in the local area. In this instance the KC-135 crew did not seem to appreciate that they may encounter other traffic in the vicinity, whilst the glider crew, being familiar with the airspace, knew of the likelihood of meeting a large ac and were therefore not overly concerned by its presence.

In answer to the KC-135 pilot's query about the location of the glider site, the Board agreed that a glider site on the final approach track would not be very safe, but observed that the site in question is displaced from it. It was felt that this Airprox amounted to no more than a sighting report, arising from the KC-135's inadvertent proximity to the glider site.

PART C: ASSESSMENT OF CAUSE AND RISK

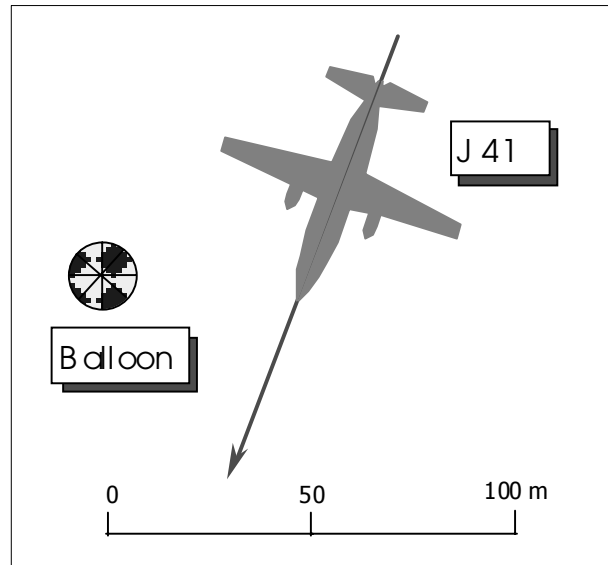
Cause: Sighting Report.

Degree of Risk: C

AIRPROX REPORT NO 74/02

Date/Time: 28 May 1650
Position: 5446 N 0140 W (15 NM S of Newcastle - Elev 266 ft)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Jetstream 41 Balloon
Operator: CAT N/K
Alt/FL: FL 115 NR

Weather VMC NR
Visibility: 10+ km NR
Reported Separation:
50m H, 50m V NR
Recorded Separation:
Not recorded

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE JETSTREAM 41 PILOT reports heading 190° at 170 kt, climbing through cloud at first towards FL 170. He was in contact with Newcastle Radar (APR) who were supplying a RAS. Just as the ac broke through the cloud tops, at about FL 115, a blue and yellow balloon of about 10 ft diameter was seen to pass about 50 m under the starboard wing. A yellow capsule was attached to the balloon and the crew believed that it may have been a weather balloon.

NEWCASTLE ATC reports that the controller had not been notified of any balloon release in the area. The controller had called possible traffic shown as a primary return, but which faded from radar before reaching 5 NM from the reporting ac. The Jetstream had travelled a further 20 NM when the pilot reported that a balloon had been sighted, though the controller observed nothing unusual in the ac's vicinity.

ATSI reports that analysis of the Claxby Radar recording shows nothing abnormal. At 1653:29, NCL APR notified the J41 pilot that his position was 15 NM S of NCL and instructed him to contact Pennine Radar. After reading back the frequency change the pilot added *"just for your information as we came out [on]top of the cloud passing passing 11,200 ft went over the top of met balloon missed by probably 50 metres"* This was

acknowledged by the controller and no further comment was made.

UKAB Note (1): UK Met Office conducted an investigation and determined a probable balloon launch area based on known timings, met data and weather balloon properties. It was confirmed that no radio sonde balloons were launched in the Newcastle region around the time of the sighting. Additionally, the Met Office balloons are white or translucent rather than the reported blue and yellow. Other known users of weather balloons were contacted but with no success.

AIS (MIL) report that despite extensive tracing action they have been unable to ascertain the identity of the reported balloon.

UKAB Note (2): Tracing action was terminated by the UKAB on 30 Oct 2002, five months after the Airprox. Exceptionally, therefore, the origin of the reported balloon remains untraced.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included the pilot's report, transcripts of the relevant RT frequency, reports from the air traffic controller

involved, the appropriate ATC and operating authorities, and the Met Office.

The Board was unable to discuss this Airprox in any depth because of the lack of available information regarding the balloon and the limited information regarding the J41's encounter with it. No theories were put forward as to the balloon's probable origin or purpose that had not already been considered. It was noted that there was a possible discrepancy in the report regarding exactly where the balloon was encountered, but it was subsequently confirmed that this occurred just before the pilot reported it, at 15 NM S of Newcastle Airport.

Discussion turned to the nature of the hazard posed by the balloon, and the mechanics of a very close encounter with an ac. There was insufficient knowledge of balloon aerodynamics amongst the Board members to arrive at any firm

decisions on the risk of colliding with it, though several theories were aired. It was recognised that the presence of a solid attachment increased risk of damage significantly, although some members also pointed out that attachments to scientific balloons were normally of a lightweight frangible construction.

Unfortunately, whilst there was no doubt that the crew had an encounter, the Board concluded that in this case there was insufficient information to assess the associated risk level.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the "open FIR" with an untraced balloon.

Degree of Risk: D

AIRPROX REPORT NO 75/02

Date/Time: 5 June 1439

Position: 5710 N 0516 W (3½ NM W of Loch Cluanie)

Airspace: LFA 14T/EGR610A (Class: G)

Reporting Aircraft Reported Aircraft

Type: Tornado GR4 AS350 B2 Squirrel

Operator: HQ STC Civ Comm

Alt/FL: 140 ft↓ 300-500 ft
(agl) (amsl)

Weather VMC CAVOK VMC

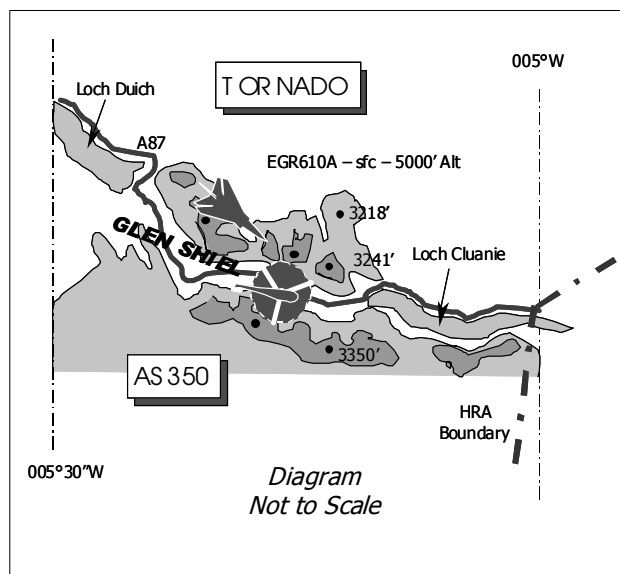
Visibility: >10 km >10 km

Reported Separation:
300 m H 250 m H, 200 ft V

Recorded Separation:
Not recorded

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO GR4 PILOT reports his ac is camouflaged grey/green, but HISLs were on whilst operating independently in LFA 14T – EGR610A - down to 100 ft msd in CAVOK conditions. A squawk of A7001 was selected with Mode C, but neither TCAS nor any other form of



CWS is fitted. Descending over a ridge into a valley about 3.5 NM W of the western end of Loch Cluanie, heading 110° at 420 kt, he spotted a red and blue coloured helicopter just R of the nose on a similar heading. A climbing L turn was immediately initiated to avoid the helicopter,

which passed about 300 m to starboard at about the same height. He assessed the risk of a collision as "high".

THE AS350B2 SQUIRREL PILOT provided a brief report stating his helicopter has a red/white and blue livery; the HISSL was on whilst flying E at 110 kt along the Glenshiel route at 350-500 ft QNH. A squawk of A7000 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted. He was not in communication with any ATSU. He saw the Tornado - but did not specify the range – and no avoiding action was taken as the jet passed 250 m to port and 200 ft above his helicopter. He added that the risk was "nil" and assumed that his helicopter had been seen by the Tornado pilot, who had wagged the wings of his jet in recognition.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

UKAB Note (2): This Airprox occurred within the confines of the Highlands Restricted Area (HRA) - EGR610A – sfc to 5000 ft amsl. The Air Navigation (Restriction of Flying) (Scottish Highlands) Regulations 1981, stipulates that an ac shall not fly within the HRA unless flying in accordance with an authorisation given by the LFBC at LATCC (Mil). Furthermore, AIC 57/2001 (Pink 21), promulgates the procedures to be used by non-participating helicopter pilots wishing to fly within the HRA; this requires pilots to notify their flight requirements to the LFBC a minimum of 6 hours before their intended flight along specified helicopter routes, one of which is the Glenshiel Route – which in part runs between Glenshiel and Loch Cluanie. Such flights by non-participating ac will be notified by UKL NOTAM to military crews. The width of the route is 0.5 NM either side of centreline and the maximum operating height is 800 ft agl. The helicopter pilot's flight along the Glenshiel route within the HRA had not been authorised by the LFBC, because they had not received any notification of it. Therefore, no prior notification was given to military FJ crews by NOTAM.

THE TORNADO GR4 PILOT'S UNIT comments that the GR4 was flying a singleton sortie, conducting Operational Low Flying (OLF) training to a minimum of 100 ft msd. The pilot was not aware of any planned helicopter activity affecting his route. From his description of the geometry

of the encounter, it is likely that the helicopter was screened from his view by terrain until a very late stage, which would account, at least in part, for the late sighting. Flying of this type in demanding terrain necessarily causes the pilot to concentrate more of his attention towards the terrain straight ahead, and hence decreases his capacity to search more widely for conflicting traffic. On this occasion, the Tornado's height brought it into closer conflict with the helicopter than might have normally been the case. Fortunately there was a lateral offset at the time.

HQ STC comments that the GR4 pilot sighted the helicopter in sufficient time to take avoiding action, although he deemed it to be a late sighting. The 'raison d'être' of OLF is to provide terrain masking and hence late ac acquisition. Aircrews need to be aware of the reduced opportunity for early sightings and adjust their flight paths and scans accordingly. However, it is helpful if low-level civil flights are promulgated so military flights can plan to avoid potential conflicts.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board was briefed that attempts to clarify some aspects of the Squirrel pilot's report had proved fruitless. However, a BHAB pilot member explained that he had been given additional information by the Squirrel pilot very recently; the latter had notified the use of other routes through the HRA but was unable to fly them because of poor weather, consequently he had utilised the Glensheil route. The Board's adviser on low flying was able to ascertain during the meeting that flight along two of the four routes within the HRA had been notified for use during the period of this Airprox and authorisation issued for flight over a three day period – but crucially not for the Glensheil route. The Board was briefed that the Squirrel pilot acknowledged that he had not attempted to obtain specific authorisation for use of the Glenshiel route from LFBC as he was required so to do. The members were disappointed that he had not done this, whilst apparently fully conversant with the requirements

AIRPROX REPORT No 76/02.

for flight through the Restricted Area. Since the Squirrel pilot's flight along this route went unnotified in advance by NOTAM, fast jet crews were denied any warning when flying through this part of the HRA. The Board concluded unanimously that this Airprox had been caused by the AS350B2 Squirrel pilot, who flew the Glenshiel route within the HRA without authorisation from LFBC.

From the geometry reported, members believed the Squirrel pilot would have been oblivious to the presence of the overtaking Tornado before the Airprox had occurred, because it would appear that the jet approached from astern of the helicopter in the pilot's blind arc. Fortunately, the principle of 'see and avoid' had worked. This was all that the Tornado crew could rely on to detect the unexpected presence of the unauthorised helicopter flight along their route, when they descended into the valley. Once seen, the Tornado pilot had sufficient time to initiate a climbing turn to avoid the helicopter, this action

effectively removing the actual risk of a collision with the Squirrel. Nevertheless, members agreed that the terrain within the steep sided valley did not provide a great deal of room for avoiding action and severely constrained the jet pilot's ability to manoeuvre out of the way of the helicopter, resulting in at most 300 m separation; this which was broadly in accord with the separation reported by the Squirrel pilot. Taking all this into account, the Board agreed unanimously that the safety of the ac involved had been compromised.

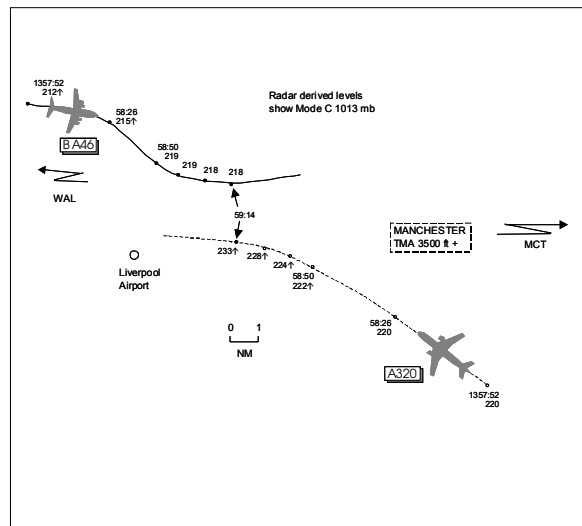
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The AS350B Squirrel pilot flew the Glenshiel route within the HRA without authorisation.

Degree of Risk: B.

AIRPROX REPORT NO 76/02

Date/Time: 2 Jun 1359 (Sunday)
Position: 5321 N 0245 W (13 NM E WAL)
Airspace: TMA (Class: A)
Reporting Aircraft Reported Aircraft
Type: A320 BA46
Operator: CAT CAT
Alt/FL: FL 220 ↑ FL 230
Weather IMC CLOC NK
Visibility: NK NK
Reported Separation:
NK 400 ft V NK H
Recorded Separation:
600 ft V 4.4 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A320 PILOT reports flying en route to Dublin at 330 kt and FL 220 and receiving an ATC service from MACC on 118.77 MHz. The flight had been 'level capped' earlier at FL 180 but had subsequently been given climb by MACC to FL

220. Following a short RT exchange with MACC, who offered climb to FL 260 but with a proviso that a descent back to FL 220 before WAL would be required, he declined this level change 'offer' and maintained FL 220. The MACC controller

then requested him to route TNT to WAL which was then later amended by a radar heading needing a slight R turn. Ahead of their track in the area of WAL he noticed a pair of towering cumulus clouds and knowing that a L turn would put him 'head-on' to the traffic flow, he requested a 10° R turn to take him between the two cells of weather. This turn request was approved subject to the caution "no further right" and he then briefed the passengers and cabin crew of the possible turbulence ahead and switched on the seat belt signs. Shortly thereafter he noticed on TCAS an ac 600 ft below and 5-10 NM ahead on an apparent collision course; he took control back from the FO, which he had relinquished during the cabin announcement. He told the FO to inform ATC of the conflicting ac but the FO was unable to get a word in on the RT without stepping on other calls. Although the conflicting traffic turned amber on TCAS there was no audible TA alert. He disconnected the AP as the traffic changed colour to red but instead of hearing a clear RA alert, only a muffled croak was received. As the traffic was still below, he assumed the TCAS command was to climb although he was unable to corroborate this from the visual display as the whole VSI band appeared dark owing to the bright sunlight and his sunglasses. Both crew members were unsure that they had manoeuvred in the correct direction but remembered seeing a gap at the top of the VSI with the other ac indicating below them. During this climb manoeuvre, ATC gave them an avoiding action L turn onto heading 260° as well as giving descent clearance; similar appropriate instructions were heard to be passed to the other ac. He complied with the ATC turn but advised MACC that he was following a TCAS climb; the conflicting traffic was not seen visually as they were just clear of the cloud tops in IMC. ATC regained control of the situation, subsequently issuing turn and descent instructions, which he complied with. TCAS had been checked prior to departure, the aural alert had been a bit quiet but appeared serviceable. It appeared that several A320s were having TCAS aural problems which have now been satisfactorily resolved.

THE BA46 PILOT reports climbing to his cleared level FL 230 on his own navigation and in receipt of an ATC service from MACC on 118.77 MHz. On passing through FL 219 he received a TCAS TA alert on opposite direction traffic in his 12 o'clock which was also climbing through the same level.

ATC called for an avoiding action L turn onto heading 080° and were heard also to give the opposing traffic an immediate turn. As he commenced his turn, a TCAS RA "monitor vertical speed" was received which he complied with by disconnecting the AP and stopping his climb. The conflicting ac was shown on his TCAS display to pass 400 ft above whilst he told ATC of his TCAS compliance and his stopped climb. The other ac's crew were also heard to tell ATC of their TCAS RA "climb" manoeuvre and after the conflict had passed he resumed his climb to FL 230. MACC later advised him that it was their mistake and apologised.

ATSI reports that the MACC S29 was manned by a Radar Controller, who was monitoring a trainee, and a Co-ordinator. The Radar Trainee was an experienced controller, holding a Certificate of Competence for other positions at MACC. He had completed about 160 hours training on S29 at the time of the occurrence. Both controllers described the workload on the sector as low when they took over the position approximately thirty minutes previously. The Co-ordinator said that his workload increased to medium, whereas the Radar Controller commented that, in his experience, it was moderate/high when the Airprox occurred, mainly as a result of pilots requesting weather avoidance.

In order to minimise ATC delays, a procedure was introduced nationally, whereby some flights were 'level capped' to keep them below LACC's airspace. The intention was to move excess demand from the higher levels to lesser used lower levels. The controllers commented that, on the morning of the Airprox, level-capping procedures had been in force but had ceased at about 1300. Nevertheless, some flights were still being filed at 'capped' levels. This procedure applied to the A320, which had been flight planned at FL 180, with a request to climb, if possible, to FL 220 ie into MACC S29's airspace (base level FL 195). At 1345, the S29 Co-ordinator accepted this flight at FL 220. He said that he agreed to the ac entering the sector because it was not very busy at the time. The A320 established communication with S29, at 1349:57, reporting maintaining FL 220 on a radar heading of 330° and requesting further climb. The Co-ordinator said that, whenever possible, subject to other tasks, he listens to the frequency and on this occasion he had heard the pilot's

request. He telephoned LACC S7 to enquire whether that sector could accept Dublin traffic (the A320's destination) at FL 260 but the request was refused. The trainee offered the pilot of the A320 climb within his sector but with the proviso that he would have to descend to FL 220 by WAL, in order to comply with the Agreed Level for transfer to the MACC IOM Sector. The pilot opted to maintain FL 220. The Co-ordinator received a telephone call from the MACC West Sector, at 1352, requesting co-ordination on the BA46, which was avoiding weather, NW of WAL. The Co-ordinator explained that he agreed to accept this flight climbing to FL 230 based on the erroneous assumption that the A320 was climbing to FL 240. Having heard the latter's pilot ask for a higher level, he had assumed that it had been issued although, admittedly, he had not referred to the fps display, which would have shown the ac still at FL 220. Additionally, as a previous ac in the same vicinity, which was also avoiding weather, had routed well to the W of track, he believed that the BA46 would follow a similar routeing and, consequently, not conflict with the track of the A320. The Co-ordinator stated that he did not inform the Radar Controller that he had accepted the BA46 at FL 230, something he would have done if he had appreciated the potential for conflict between the subject ac. The A320 was given a tactical heading, by the trainee, of 295° at 1353:27. The BA46 reported, on its initial call to S29 at 1354:48, heading 105° for weather avoidance, climbing to FL 230. When asked to report clear of the weather the pilot estimated that it would probably be in fifteen miles. The radar reveals at the time that the BA46 makes its initial call, it is passing FL 185, with the A320 in its one o'clock position at a range of 59 NM. In common with a number of other ac on the frequency, the A320 then requested a turn for weather avoidance. This was approved but because of conflicting southbound traffic (not the subject BA46) it was limited to a R turn of not more than 10°. The Radar Controller said that, because the Co-ordinator was occupied at the time, he had prompted his trainee to co-ordinate a higher level for another ac with LACC. This being approved, the clearance was issued straight away so as to resolve a potential problem with other traffic. The mentor commented that this action may have distracted him from his other tasks at a critical time and could explain why he erroneously believed that the BA46 had reached and was maintaining FL 230. This was based on

the ac's expected RoC, rather than observation of its Mode C SSR readout. With hindsight, he believed that his trainee had made the same assumption and therefore, when the BA46 advised that it could take a turn, the trainee routed it direct to PEDIG and, consequently, onto a conflicting track with the A320. Believing the BA46 to be level at FL 230, the mentor did not realise that vertical separation did not exist. The radar, timed at 1357:52, shows the BA46 climbing through FL 212 with the A320 19.4 NM away. The Co-ordinator confirmed that he also was not aware of the conflict between the subject ac, still believing that vertical separation existed because the A320 was maintaining FL 240. The mentor went on to explain that, subsequently, whilst scanning his radar display and before the activation of STCA, he noticed that the BA46 was only passing FL 215 and, consequently, was in conflict with the A320. He immediately alerted his trainee to the situation. He had thought that, as the trainee was an experienced controller, he would take positive action straight away. However, as no action was forthcoming, he told the trainee to instruct the BA46 to turn L. The BA46 was instructed to *"turn left now immediately heading zero eight zero"*. The mentor then prompted the trainee to issue an avoiding action turn to the A320, which was passed as *"for avoiding action turn left heading two six zero"*. The mentor said that he believed that the trainee had issued the instructions based directly on the words used when prompting him. This could explain why the term 'avoiding action' had been used on the transmission to the A320 and not to the BA46. The trainee, on his own initiative, then instructed the A320 to descend immediately to FL 200. The pilot responded by stating that he was in a TCAS climb. The BA46 pilot reported *"levelling descent"* in reaction to a TCAS alert. The radar recording shows that when the BA46 was instructed to turn, at 1358:30, it was at FL 215, 12.3 NM from the A320. The latter is seen to commence its TCAS climb, at 1358:50, when it is passing FL 222, still head-on to and 6.8 NM from the BA46, which is levelling at FL 219.

UKAB Note: Separation is lost, briefly, at 1358:58, when it is recorded as 4.8 NM horizontally and 500 ft vertically. (The required horizontal separation was 5 NM.)

By the time the ac passed (1359:14), starboard to starboard, both the TCAS advisories and the ATC

turn instructions had taken effect. At this point they were 2.2 NM apart and the vertical separation had increased to 1500 ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The NATS adviser informed members that level-capping procedures were in common use worldwide and were in place in the UK during the period when the new ATCC at Swanwick was brought into service. This tool was useful in reducing traffic flow at the higher levels (controlled at LACC) by forcing traffic to use lower flight levels that were 'controlled' by LTCC at West Drayton and at MACC. One drawback was that it complicated the usual operations at both of these ATSUs whenever capping procedures were in force and this had necessitated closer liaison/co-ordination between LTCC and MACC to ensure traffic levels, and procedures were adjusted accordingly. In addition to these 'level-capped' flights, the situation on the incident day was exacerbated owing to the number of ac requesting non-standard routeing to avoid weather. However, although the A320 would have normally been above MACC airspace, the ac's flight had been correctly notified through LTCC and MACC airspace. When he had accepted the BA46 into the Sector climbing to FL 230, the S29 Co-ordinator had erroneously assumed that the Radar controller had climbed the A320 to FL 240, after hearing the pilot's request on the RT. This had been done without reference to the fps board and he had then not informed the Radar controller of his actions, an omission that undermined the ATC teamwork ethos; this had led in part to the Airprox. Likewise, the radar controller had erroneously assumed that the BA46 had reached and was maintaining FL 230 and was therefore separated from the opposite direction A320, but the radar and fps indicated otherwise

since it was still climbing. This assumption had also led in part to the Airprox. Members also thought that in asking his trainee to carry out co-ordination with LACC on another ac the radar controller had almost certainly distracted his own and his trainee's attention at a critical time during the encounter. It was felt that the mentor may have believed that the 'experienced' trainee controller was more capable of carrying out the S29 radar function - he was qualified on other positions at MACC and had 160 hr training time on S29 - although ultimately he was responsible for his trainee's actions. Whatever the background situation was, members were clear that the S29 team had climbed the BA46 into conflict with the A320 and this had caused the Airprox.

One pilot member commented that the A320 pilot, in disconnecting the AP just as the TCAS alert changed to an RA, may have unknowingly created the 'muffled croak' as the aural warning may have been masked by the AP disconnection warning which would have been louder and at a higher priority in the warning 'pecking-order'. This, however, did not explain why there had not been an aural alert during the TA phase of the incident.

Turning to risk, the Radar controller mentor did eventually notice that the BA46 was still in a climb and in potential conflict with the A320. Some members thought that he should have taken earlier control of the situation and issued the avoiding action instructions himself as the trainee had needed prompting throughout. Meanwhile, TCAS had already alerted both the BA46 and A320 crews to the situation and they had both reacted quickly and effectively to the TCAS demands. These actions combined persuaded the Board that any risk of collision had been effectively removed.

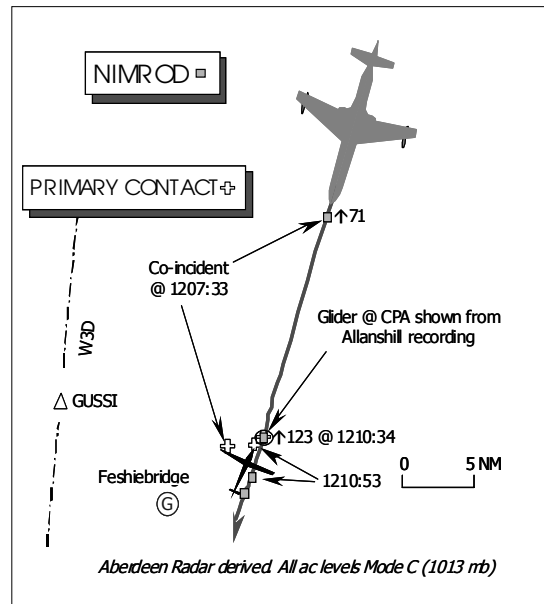
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The MACC S29 Control Team climbed the BA46 into conflict with the A320.

Degree of Risk: C

AIRPROX REPORT NO 77/02

Date/Time: 8 Jun 1210 (Saturday)
Position: 5710 N 0330 W (6 NM ENE of Feshiebridge - elev 860 ft)
Airspace: Scottish FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Nimrod Mk2 Grob CS77 Glider
Operator: HQ STC Civ Pte
Alt/FL: FL 150 11000 ft ↓ (QFE)
Weather VMC CAVOK VMC
Visibility: 50 km 25 NM
Reported Separation:
 300 ft H, 300 ft V 2000 ft H, 600 ft V
Reported Separation:
 Contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE NIMROD MK2 PILOT reports he was outbound from Kinloss, under a RIS from Scottish MILITARY and squawking A4601 with Mode C. Neither TCAS nor any other form of CWS is fitted.

About 29 NM S of Kinloss, heading 200° at 280 kt - some 10,000 ft above cloud climbing he thought through FL 150 - a white glider – [he reported a motor glider] - was sighted by the 'beam lookout' about 300 ft away. No avoiding action was taken against the glider because it was already passing about 300 ft away and 300 ft beneath his ac when reported by the lookout. Neither pilot saw the glider at all and he believed there had been a "high" risk of a collision.

THE GROB ASTIR CS77 GLIDER PILOT reports his 15 m glider has a predominantly white colour scheme with a red nose and tail. He was in communication with Feshiebridge 'Base Station' on 130.1 MHz whilst wave flying at 70 kt, about 6 NM ENE of Feshiebridge. Heading 030° (M) and descending through 11,000 ft Feshiebridge QFE, some 3500 ft above and 5 NM clear of cloud, he spotted a Nimrod about 5 NM away flying towards him. The jet was almost head-on crossing at a shallow angle L - R but higher than his glider. If he had turned R in accordance with the 'Rules of the Air', it would have reduced the separation, so

to avoid the Nimrod he opted to lose height rapidly by deploying the air brakes, whereupon the jet passed about 2000 ft away to starboard and 600 ft above his glider.

He assessed the risk of a collision as "low", and added that he had reported the occurrence to the duty instructor when he landed. Unfortunately, he had erased the Barograph/GPS Logger data before he was advised of the Airprox report.

UKAB Note (1): The subject glider was identified by AIS(Mil) and the pilot informed of the Airprox 2 days after the occurrence.

MIL ATC OPS reports that the Nimrod crew was in receipt of a RIS from SCOTTISH MILITARY climbing to FL 280 routeing to GOW, then direct ISLE OF MAN. At 1207:25, traffic information was passed to the Nimrod crew about an unrelated civilian ac – a Beech 200. This traffic was then reported again at 1209:50 - some 2 min 25 sec later. No further comment was made until 1211:25, when the Nimrod pilot reported "we've just gone over the top of..another aircraft it looked like a motor glider...missed by about two to three hundred feet and it's now in our 6 o'clock about 3 miles". This was acknowledged by the controller, who reported "nothing showing on

radar whatsoever". The Nimrod pilot then passed details of the incident to the SCOTTISH MILITARY.

The controller reports that the Nimrod was the only ac on frequency at the time and that it had his full attention. He was using the Aberdeen radar, which was clutter free; the only other ac displayed that could have been a factor was the BE200 working the TAY SC, which had been called to the Nimrod crew.

UKAB Note (2): The Aberdeen (Perwinnes Hill) radar recording – the radar source in use by the SCOTTISH MILITARY controller - does not illustrate this Airprox clearly, because only the Nimrod is shown throughout the relevant period, southbound and climbing. However, occasional intermittent primary contacts, which are probably the reported glider are shown. When the Nimrod climbed through FL 71 at 1207:33, a primary contact is shown to the SW of the Airprox location. The Allanshill radar recording shows the glider continuously over the period of the Airprox as a clear primary contact, which merged with the Nimrod at 1210:34, as the latter climbed through FL 123. The Aberdeen recording then shows two further intermittent contacts without a track history after the Airprox had occurred; the first at 1210:53 and another moments later.

ScATCC (Mil) commented that the primary return, which is probably the subject Glider was shown for the whole period on the Allanshill Radar, however, the controller was utilising the Aberdeen (Perwinnes Hill) radar head. This is correct practice as the Allanshill source is purely a back up for the Aberdeen head and has a limited primary range of 60 NM. Thus the controller needed to use the Aberdeen to search for conflicts further S from the Scottish TMA and along W3D. The Glider's primary return was first shown on the Aberdeen when the controller was passing traffic information on the BE200 above the Nimrod and he did not see the return. Even had he done so, the returns would probably have been discounted as radar clutter. No return appeared again on the Aberdeen until after the Nimrod crew had reported the Airprox. Again this was for only 2 sweeps and may have been missed by the controller - if not it would probably have been discounted as clutter.

The unit have had no previous experience of gliding activity from Feshiebridge affecting their operations, but are well aware of glider operations and would certainly provide traffic information in the Strathallan and Aboyne areas. Publicity on the potential for encountering gliders in this area will go to all controllers on the unit, advising them to call any contacts in the vicinity of Feshiebridge. Furthermore, controllers will be advised to use the Allanshill as a back up, if possible, when using the Aberdeen overland as it does seem to give a better picture. However, this will not always be possible as composite radar pictures are not available at ScATCC (Mil) and controllers will usually need to cover another area using another radar - each control position has 2 radar consoles, each of which can only display one radar source at a time.

UKAB Note (3): Examination of the CAA 1-500,000 VFR chart – Scotland - Sheet 2150ABCD, reveals a warning printed on the chart in three locations. This warning covers the location of the Airprox - *"AREA OF INTENSE GLIDING ACTIVITY POSSIBLY UP TO FL245"*. This area is located directly beneath the promulgated Class B UAS Gliding Area B, where gliders may be encountered flying in the UAS. This warning is not repeated on military charts, therefore, No 1 AIDU was consulted with regard to the possible replication of such a warning on applicable ERCs. However, No 1 AIDU subsequently declined to include such a warning, believing it to be unnecessary, recommending instead that a note should be included within the Kinloss FOB. Enquiries continue through DAP to trace the basis for the warning.

HQ STC comments that this Airprox appears to have been a late sighting in the open FIR by the Nimrod crew [a non-sighting by the pilots]. No 1 AIDU continually requests flying units to suggest amendments to charts. It appears that there is some debate as to the frequency of glider flying from Feshiebridge and hence the validity of including warnings on charts needs to be assessed. However, when flying at higher altitudes it would be helpful for gliders to give a courtesy call to the area radar service, to inform them of their likely heights, areas, and duration of activities.

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 was briefed that enquiries through No 1 AIDU & DAP had not revealed the source of the warning on the CAA 1-500,000 VFR chart – Scotland - about gliding activity in the middle airspace (MAS). It appears to have been lost in the 'mists of time' before 1990 when the paper trail ran cold, so it was not difficult to see, therefore, why the warning had not been carried over to the current RAF En-Route Series 6 Charts. Nevertheless, it was clear that gliding took place here in the middle airspace, as evinced by this encounter and this warning seemed pertinent, it was just the relative intensity of this gliding activity that appeared to be an unknown factor. The Board was briefed that the Kinloss SFSO had undertaken to publicise the presence of this activity throughout the station as a warning to all aircrew, but a civilian ATCO member familiar with this airspace opined that it was not a busy gliding area and doubted the veracity of the 'AREA OF INTENSE GLIDING ACTIVITY' (AIGA) warning. The Mil ATC Ops adviser added that this 'AIGA' appeared to be unknown to ScATCC (Mil), but the unit have now taken appropriate steps to brief their controllers on the potential for gliders to operate here, at these levels. The HQ STC member thought it would have been useful if the glider pilots could have given ScACC or ScATCC (Mil) a call to advise of their activity, but the Board recognised that there was no compunction on glider pilots to do this. Some thought the glider pilot's radio might only work on a small number of preset frequencies and queried if it was capable of dialling up the ScATCC (Mil) VHF frequencies; the GA member thought this entirely feasible with the sophisticated equipments now in use by the gliding fraternity.

Regardless of the intensity of gliding operations at this level, it only took two ac airborne in the area to create the catalyst for an Airprox. That said, the presence of the glider here appeared to have taken the Nimrod crew somewhat by surprise and without any warning from ATC under the RIS that

pertained. It had been explained to the Board why the controller had not spotted the glider, even though it was plainly detected and displayed on the Allanshill radar, as he was using the Aberdeen (Perwinnes Hill) radar at the time. Noting that the Nimrod was the only ac under control and that the controller was not busy, led some controller members to question why he had not routinely checked other radar sources, but the Board was encouraged by the subsequent advice passed on to all controllers on the unit.

The members recognised that the white glider at an almost head-on aspect and slightly below the Nimrod's nose, would have been very difficult for its pilots to acquire visually and it was probably the more distinctive plan view that attracted the beam lookout's attention to the large 15 m glider as it was overflown by the jet. Thus, unsuspected beforehand, there was nothing the Nimrod crew could have done to forestall this occurrence. From the other cockpit, the large grey jet was evidently more conspicuous to the Grob glider pilot, who reports that he spotted it 5 NM away as the jet flew towards his glider and he sensibly elected to avoid it by deploying the airbrake. Therefore, the Board concluded the cause of this Airprox was a conflict of flightpaths in the FIR, undetected by the Nimrod pilots, but resolved by the Grob glider pilot.

Turning to risk, some members were concerned that only one pair of eyes had detected this conflict before it occurred and that there were no other safety nets which could have provided a warning. However, after sighting the jet 5 NM away, the Grob pilot had managed to take appropriate avoiding action in sufficient time to provide, he reported, 600 ft vertical separation, with in addition, 2000 ft horizontal separation – 0.3 NM - as the two ac passed 'port to port'. This was at variance to the 300 ft height difference reported by the beam lookout. Without a Mode C indication from the glider it was impossible to determine independently, the vertical separation that pertained. However, the glider pilot had seen the Nimrod in good time it would appear, reacted promptly and positively such that in the Board's opinion, he had effectively removed the risk of a collision with the jet.

UKAB Post Meeting Note: In a subsequent telephone conversation with the CGI of the Grob Glider pilot's club, it was suggested that up to 20

gliders might be operating in the MAS, in this vicinity between FL 95 – 245 on a busy Saturday in the summer months. Apparently, this airspace above the mountainous Scottish terrain is a popular area for wave flying and glider pilots do transit from several other locations in Scotland to this vicinity. On the topic of RT, it was explained that many gliders are not fitted with a radio, moreover many pilots do not possess an RT licence. Those unable to exercise the privileges of an RT licence are, therefore, restricted to a

specific gliding frequency - 130.1 MHz - and would be unable to call ScACC or ScATCC (Mil).

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in the FIR resolved by the Grob glider pilot.

Degree of Risk: C.

AIRPROX REPORT NO 78/02

Date/Time: 11 June 0903

Position: 5347 N 0400 W (4.5 NM ESE of Llanbedr)

Airspace: Welsh MTA (Class: B)

Reporting Aircraft Reported Aircraft

Type: VC10 Hawk

Operator: HQ STC HQ PTC

Alt/FL: FL 367 FL 360

Weather VMC VMC

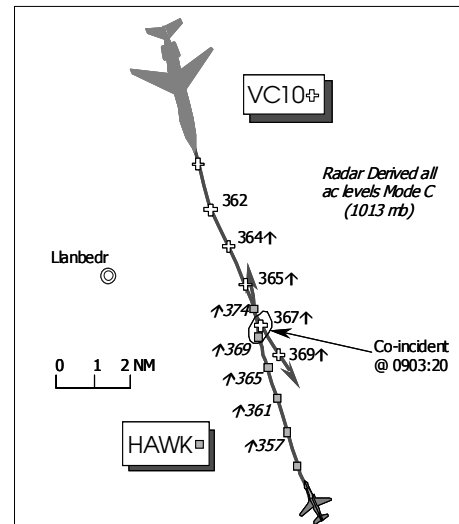
Visibility: Unlimited 20 km +

Reported Separation:

300 m H/100 ft V 500 m H/100 ft V

Recorded Separation:

200 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VC10 PILOT reports his ac has a low conspicuity grey colour scheme, but HISLs were on whilst operating in the WELSH MTA, VMC with unlimited visibility under a RIS from London MILITARY. The assigned squawk of A3327 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted.

Whilst operating in the northern part of the MTA climbing at 500 ft/min to FL 400, at 465 kt and in a L turn from 350° onto a heading of 150°, London MIL advised him of a contact 10 NM to the S at FL 350. Shortly afterwards the contact was reported at 3 NM S, heading N at FL 360. Whilst still in the L turn climbing through FL 367, a Hawk ac was spotted about 1000 m away as it passed about 100 ft above his ac, diagonally L – R about

300 m ahead he thought, with a "medium" risk of a collision. No avoiding action was taken as the Hawk was seen too late. He added that although the visibility was unlimited the L turn on to 150° was into the sun.

THE HAWK PILOT reports his ac has a black high conspicuity colour scheme and HISLs were on whilst conducting a full airtest on the aeroplane in the MTA near Portmadog. Neither TCAS nor any other form of CWS is fitted. He was not in receipt of any form of ATS, but was listening out on a Valley quiet frequency. Heading 330° at 360 kt, whilst recording air test data and climbing through FL 360, he spotted the VC10 at 2 o'clock about 500 m away and 100 ft below his ac. He rolled L away from the VC10 into a L turn

to ensure a divergent track and passed about 100 ft above the other ac and 500 m away, whereupon he waggled the wings to show that he had seen it. He did not consider there had been a chance of a collision and assessed the risk as "very low", but he was very busy during this phase of the air test.

MIL ATC OPS reports that the VC10 was flying in the NORTH WALES MTA at FL 340, climbing to FL 400 and in receipt of a RIS from LATCC (Mil) Controller 32 (CON 32). At 0901:48, CON 32 observed an ac squawking A7000, manoeuvring to the S of the VC10 and traffic information was given to VC10 crew, "*c/s traffic south, 15 miles, manoeuvring, indicating FL 350*". The crew reported "*looking*" and as the unknown ac – the Hawk - turned towards the VC10 traffic information was passed again at 0902:21, "*c/s previously reported traffic now south, 5 miles northbound, indicating FL 360*". At 0902:40, the VC10 crew reported "*that traffic's just passed down our right hand side fairly close.*" The Airprox was not declared to London MILITARY on RT at the time, but Brize Norton SUPERVISOR relayed details to the LATCC (Mil) TACTICAL SUPERVISOR - WEST by telephone at 1215.

Analysis of the radar recordings shows the Hawk approaching the VC10 rapidly from the south-southeast. When traffic information was first passed at 0901:48, the VC10 appears to be in a shallow LHD turn, therefore reference to cardinal points is the only way to call conflicting traffic. Although the Hawk is slightly E of S and actually 11 NM distant rather than the reported 15 NM, this call was reasonably accurate given the displayed range normally used at LATCC (Mil). As the Hawk manoeuvred, CON 32 correctly identified it as a "*definite hazard*" and, in accordance with JSP318A 235.115.1b, reported its position again to the VC10 crew who have not reported steady on a given heading. Again, traffic information was passed correctly with reference to cardinal points, but this method cannot, by its nature, be as accurate and the assessment of position is somewhat subjective.

Military Training Areas are "*established in the Upper Airspace for the operational freedom of Military aircraft engaged in exercise or training*". Therefore, it is not unusual to find ac operating autonomously in the Class B UAS in this area. Under RIS the controller "*will inform the pilot of*

the bearing, distance and, if known, the level of the conflicting traffic" however "*no avoiding action will be offered*". Con 32 appears to have applied RIS to the VC10 crew to the best of his ability.

UKAB Note (1): The LATCC Clee Hill radar recording shows the VC 10 in a slight L turn southbound and converging on the Airprox location 4.5 NM ESE of Llanbedr, in a gentle climb through FL 362 Mode C. The Hawk is shown virtually on the nose at a range of 6.25 NM, 500 ft below on a reciprocal track climbing through FL 357 Mode C at 0903. The ac converge from almost head on, and are shown at the same level – FL 365 – after they have closed to 2.5 NM apart. On the next sweep the Hawk is shown at FL 369 – just before it enters the VC10 pilot's R 1 o'clock at 0.3 NM - after climbing above the VC10 which itself indicates FL 367 at 0903:20. Some 200 ft of vertical separation is evident as the Hawk passes above and about 300 m down the VC10's starboard side, before the FJ crosses from R – L astern, and slightly at variance with the VC10 pilot's Airprox report, but in conformity with his RT message to London MILITARY at the time.

HQ STC comments that this Airprox resulted from a failure of either crew to see each other in sufficient time to take greater avoidance. It is well documented that it is harder to perceive other ac at higher altitudes, therefore it is prudent to use ATC assistance to locate potential conflicts. Due to its low manoeuvrability the VC10 crew could have considered using a RAS, or asking for suggested avoiding action. Most (almost all) fast jet airtest pilots, recognising that the 'head-down' nature of airtest work compromises lookout, employ an ATS to alert them to potential conflicts. It is good airmanship to remember the question asked by old bold pilots; 'If I'm not looking out then who is?'. Therefore, get an ATS that can give you a 'heads-up' when you're operating 'heads-down'.

HQ PTC comments that there will necessarily be times when a Unit Test Pilot has to be "head-in" recording data. Clearly this one did not remain so over long or he would not have seen the VC10 soon enough to avoid it - but he did so by a less than comfortable margin. His engineer back-seater saw the VC10 at about the same time. The differing perceptions of vulnerability seem typical of an encounter between a manoeuvrable FJ with

good cockpit visibility and large, heavy ac without. It is general practice at Valley and Linton to fly air tests dual. We have taken soundings and are contemplating an ASI which would normally require an ATS but is not so prescriptive as to hamper minor air tests.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The PTC member accepted that STC's comments were well founded, insofar as the use of a radar service whilst conducting FJ air tests could have assisted the Hawk pilot, and provided earlier warning of the proximity of the VC10. Furthermore, the Board was advised that the person in the rear seat of the Hawk was an engineer; if the air test had been flown "dual" the other pilot's 'competent' lookout might have been more beneficial whilst the PNF was 'head-in' checking the gauges etc. The Board noted that PTC was contemplating issuing further guidance on this matter and was advised that staffing was in progress, but a fine balance had to be struck between being over-prescriptive and a hindrance to the task on one hand and clear guidance which would enhance flight safety on the other. Some fast jet pilot members thought it was not solely about mandating that an ATS 'should' or 'must' be obtained during such sorties, but more a matter of common sense and good airmanship. In their opinion, the crux of this incident was effective lookout and anything that might assist in achieving that was well worth having.

The VC10 crew had obtained radar assistance from London MILITARY, and CON32 had provided a warning about the proximity of the Hawk from 11 NM away (though reported as 15 NM). Furthermore, CON32 had astutely recognised this ac was a further hazard and had given updates on it, ultimately leading the VC10 crew to acquire it visually at close quarters. However, the limited outlook from the VC10's flight-deck was apparently a factor here and the Board believed it would have been difficult for the pilots of this

large ac to spot a relatively small jet, at a head on aspect approaching rapidly from below the nose. This, combined with the sun's position, conspired to mask the approaching Hawk from view until it was suddenly spotted about 100 ft above, 1000 m away, and closing at over 800 kt. Hence the VC10 crew had probably spotted the Hawk as soon as they could, but nevertheless at a very late stage and too late to take any avoiding action, which the board determined was part of the cause.

The view from the Hawk's cockpit should have been a lot better. Pilot members were concerned that the Hawk pilot had not seen the comparatively large silhouette of the VC10 earlier, though as the STC member pointed out, a grey colour scheme against the sky was not conducive to high conspicuity and evidently provided good camouflage as it is designed to do. A radar service could have helped the Hawk pilot detect the presence of the VC10 earlier than his reported 500 m – half the range of the other crew's sighting - suggesting the Hawk pilot had spotted it a lot later. This was a very late stage indeed, just 1 sec at the closing speed involved, leading some to wonder if the range estimation (always difficult at high altitude) might have been underestimated by the Hawk pilot. Even so, acquisition was late and the Board agreed that this was the other half of the cause and that this Airprox had resulted from very late sighting by both pilots.

Whatever the visual acquisition range was, the Hawk pilot believed he had time to turn his jet away from the VC10 and in doing so had virtually minimised the risk of collision to "very low". Members were not convinced. The flight path of his ac had not changed very much. Pilot members suggested that the adverse effects of high altitude on turn performance probably came into play, since the Hawk pilot's reported avoiding action L turn onto a divergent track was not particularly apparent on the radar recording. The Hawk had passed in the order of 300 m down the VC10's starboard side and a mere 200 ft above it. The roll to the L had not produced a significantly divergent track as reported and the Hawk had passed marginally astern of the VC10, it would appear, not ahead. Hence, any change in the Hawk's flight path was minimal; some members were unconvinced that it had produced any effect on the outcome at all and, with no other safety nets available, an actual risk of a collision had

existed. Conversely, several members thought that as the Hawk was already 100 ft above and slightly to starboard of the VC10 when the Hawk pilot spotted it, trajectories were such that they were always going to pass clear, albeit by the smallest of margins, thereby reducing the potential for an actual collision. This geometry was, however, fortuitous rather than the result of any action. Opinion was evenly divided on the situation leading, unusually, to the Chairman exercising his casting vote, whereby the Board

concluded that an actual risk of a collision had existed.

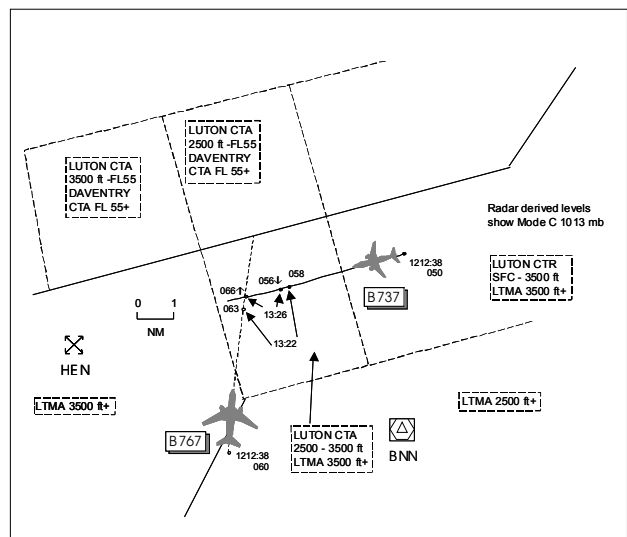
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Very late sighting by both pilots.

Degree of Risk: A

AIRPROX REPORT NO 79/02

Date/Time: 12 Jun 1213
Position: 5147 N 0039 W (5 NM NW BNN)
Airspace: TMA (Class: A)
Reporting Aircraft: B737
Reporting Aircraft: B767
Type: B737 B767
Operator: CAT CAT
Alt/FL: ↑ FL 70 ↑ FL 70
Weather: IMC KLWD IMC IICL
Visibility: NK
Reported Separation:
 600 ft V 0.5 NM H 700 ft V NK H
Recorded Separation:
 500 ft V 1.4 NM H



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports climbing in IMC to 5000 ft at 250 kt on departure from Luton and following a CPT 3B SID. He was receiving an ATC service from London on 121.27 MHz. ATC cleared him to climb to FL 70 and shortly thereafter he received a TCAS TA followed immediately by an RA 'monitor vertical speed'. The FO, the PF, disconnected the AP and followed the TCAS guidance, during which time the controller told them to descend back down to 5000 ft. The other ac was not seen visually but was observed on TCAS to pass 0.5 NM ahead, crossing L to R, 600 ft above. The initial clearance to FL 70 was readback and agreed by both crewmembers but

the controller did not challenge this readback. He assessed the risk of collision as high.

THE B767 PILOT reports departing Heathrow for N America and climbing at 500 ft/min and 290 kt from 6000 ft to FL 70. He was in receipt of an ATC service from London. Whilst he was monitoring an ac on TCAS, descending through FL 100 and crossing L to R, an RA alert - "climb, increase climb" - was generated by another ac climbing to FL 70 from below and crossing R to L. He disconnected the AP and followed the TCAS commands, climbing to FL 75 to avoid the

conflicting ac which passed 700 ft below. He assessed the risk of collision as high.

UKAB Note (1): Both ac were using numeric c/ss - the B737 was using ABC523 whilst the B767 was using XYZ203.

UKAB Note (2): The London QNH was 1013 mb.

ATSI reports that the incident took place at 1213, approx 5 NM NW of the 'Bovingdon' (BNN) VOR in Class A CAS of the LTMA. The B767 had recently departed from Heathrow bound for Detroit on a WOBUN 2F SID while the B737 had departed from Luton en route to Palma on a CPT 3B SID.

At the time of the incident both flights were in receipt of an Area Control service being provided by the LTCC SC operating the TC NW Departures (NW Deps) and the TC Bovingdon (BNN) sectors in combined, or 'bandboxed', mode. When in this mode the two sector frequencies continue to operate but are 'cross-coupled' so that calls made on 119.775 MHz (NW Deps) are re-transmitted on 121.275 MHz (BNN) and vice versa. The traffic loading for the SC concerned was assessed as light to moderate.

At 1209:18, the B767 established communications with the 'bandboxed' sector on frequency 119.775 MHz. The flight was identified and instructed to maintain 6000 ft, the SID altitude. Just over one minute later, the B737 made its first call on frequency 121.275 MHz and was instructed by the SC to maintain its SID altitude of 5000 ft on reaching. The B767 was then placed on a heading of 010° and, at 1212:38, instructed to climb to FL 70. This clearance was readback clearly by the pilot. The radar recording shows that at this point the two ac were a little over 7 NM apart on tracks converging by about 100, the B767 having now reached 6000 ft and the B737 5000 ft. About 40 seconds later the SC's attention was drawn to an STCA activation between the B767 and the B737. She noted from the respective Mode C height readouts that, in addition to the B767, the B737 had also commenced a climb and the two ac were now in potential conflict. Unfortunately, the SC was prevented immediate access to the RT by another flight making its first call on frequency and it was during this time that the two ac reached their closest point - the radar replay showing, at 1213:22, the B737 climbing through

5800 ft with the B767 about to cross through its 12 o'clock position climbing through 6300 ft at a range of 1.4 NM. As soon as the other flight's call was complete the SC transmitted *"the B737 descend immediately altitude 5000 feet"*, but there was no reply. The controller repeated the instruction, but neither provided TI nor utilized the term 'avoiding action'. The pilot responded with *"Er roger we're coming back down 5000 feet"*, adding that he thought he had been cleared to FL 70. Replying, the SC suggested that the pilot may have taken another flight's climb instruction in error. The radar recording shows that by the time the B767 was passing through the B737's 12 o'clock position (1213:26), the minimum required 1000 ft vertical separation had been re-established with the B767 climbing through 6600 ft and the B737, now in a descent, passing 5600 ft. Although tracks had crossed, the B767 continued its climb to FL 75 in response to a TCAS RA before it returned to its assigned level of FL 70.

The SC was operating the 'band-boxed' sector from the NW Deps (119.775 MHz) position, designated CF48. An examination of the deskside recording of CF48 shows that only the B767 can be detected as responding to the instruction to climb to FL 70. However, a similar examination of the BNN frequency, 121.275 MHz, that used by the B737 reveals that when the pilot of the B767 responds, there can be detected a faint and just audible response from the B737 in the background. From this evidence it would appear likely that the B737 believed it had been issued with a climb clearance to FL 70 and responded accordingly. Had the SC been witness to the additional transmission it may have been sufficient to alert her to the fact that another flight had responded also to the climb clearance.

Analysis by ATCI at LTCC shows that the reason for the call from the B737 not being heard by the controller lies with the use of cross-coupling of the two frequencies. Communications facilities throughout Terminal Control are controlled and distributed by the Audio Distribution and Control Equipment (ADCE), a feature of which is the ability to cross-couple two frequencies. The reply from the B737 was not heard by the controller due to the action of ADCE re-broadcasting the call from the B767, thus blocking the reception of the call from the B737 at the working position. Engineering Investigations at LTCC have

confirmed that ADCE was functioning correctly at the time of the incident. Further analysis has shown that the call from the B737 was audible on the BNN working position (CF47) as the re-broadcast of ac transmissions only applies to the working position on which the cross-coupling is selected, in this case, CF48. The limitations of operating cross-coupled frequencies are known and a note to that effect is included in the LTCC MATS Part 2, GEN 5, Communications. In it controllers are reminded of the possibility that the ac that transmits first will be heard with the other transmission possibly being suppressed and also states that *'any risks from using cross-coupling have been assessed as minimal, with similar levels of risk being involved when using a single frequency without cross-coupling'*. As this Airprox illustrates, the controller was denied the ability to detect and correct the second transmission by the action of the cross-coupling.

As part of the preparation for Swanwick a safety assessment of cross-coupling at LTCC and Swanwick was conducted which included analytical modelling of cross-coupling and a review of incidents (forming part of the paper "The Safety Assessment of Call Blocking in the Area and Terminal Control Operations" -issue 2.0, dated 03/09/2001). The review concluded that the use of cross-coupling on multiple frequencies was acceptably safe. However, as a result of this and other recent incidents, LTCC has initiated a further review of this analysis. LTCC Engineering and ATC Operations are also reviewing alternative cross-coupling strategies that could be deployed in the TC control room.

LTCC Management have met to determine whether it was appropriate to cease using the current cross-coupling procedures pending the outcome of these reviews. It was concluded that on the evidence to date, this was not necessary given the increased workload and frequency transfers that would need to take place if band-boxing to a single frequency was mandated. However, an OPNOT (operational notice to ATC staff), 65/02, was issued reminding controllers of the limitations of cross-coupling and reiterating the guidance contained in the TC MATS Part 2."

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 post incident, with the benefit of extensive analysis of the RT at the two LTCC bandboxed positions (CF48 TC NW Deps & CF47 TC BNN), that the crew of the B737 had reacted to the ATC instruction intended for the B777; this had caused the Airprox. The B737 crew believed that the ATC climb clearance to FL 70 was intended for them, reinforced when their readback had gone unchallenged by ATC. Although an element of callsign confusion was felt to have played a part, the B737 crew were also expecting a climb clearance to that level in that area. Even so, pilot members were critical of the CRM on the B737 flightdeck where procedures were in place to avoid just such an occurrence like this. Members wondered how the frequency cross-coupling system could have denied the controller the ability to hear a readback transmission. The NATS adviser informed members that only in exceptional circumstances could this happen, as in this case. The B767 crew were first to reply and, crucially, their transmission length coincided exactly with that of the B737 - thus the second ac's transmission was masked by the re-broadcast of the first ac's reply. This suppression by the cross-coupling system of the B737 crew's erroneous readback had undoubtedly also been a part cause of this Airprox.

Although much debate followed about the reasons for 'bandboxing' and cross-coupling, members agreed that the second review by LTCC on cross-coupling and consequent strategy reviews were needed and accepted the offer by the NATS adviser to brief the Board on the outcome of both.

Turning to risk, STCA alerted the SC to the incident but she was unable to take immediate action as the RT was in use with an incoming transmission; as soon as practicable she had told the B737 crew to descend back down to 5000 ft.

Meanwhile both crews had TCAS alerts on the developing situation. The B737 crew had received a TA then an RA 'monitor vertical speed' and followed the TCAS guidance, before descending back to 5000 ft when instructed by ATC. The B767 crew had swiftly reacted to a TCAS RA and climbed to FL 75 whilst following TCAS commands. The combined prompt actions of both crews persuaded the Board that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause:

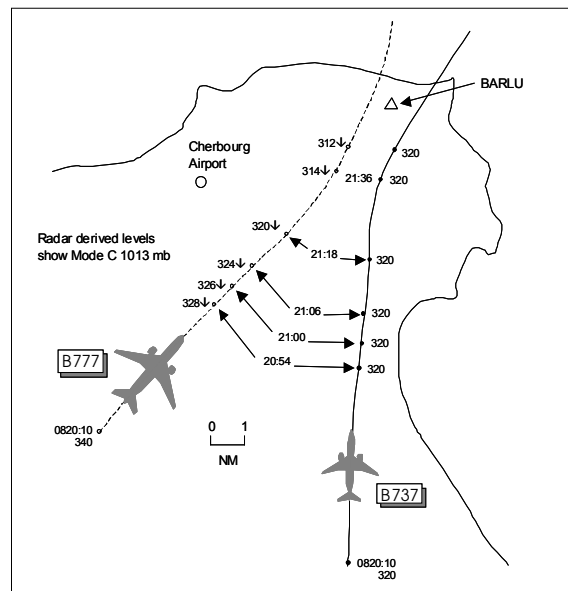
- The B737 crew reacted to an instruction intended for the B767.
- The B737 crew's erroneous readback was suppressed by the cross-coupling system.

Degree of Risk: C

AIRPROX REPORT NO 80/02

Date/Time: 17 Jun 0822
Position: 4939 N 0120 W (2.5 NM SSW BARLU)
Airspace: UAR UN868 (Class: B)
Reporting Aircraft Reported Aircraft
Type: B777 B737
Operator: CAT CAT
Alt/FL: ↓FL 310 FL 320

Weather VMC CLOC VMC CLOC
Visibility: 60 km NK
Reported Separation:
 200 ft V 2 NM H NK
Recorded Separation:
 600 ft V 1.5NM H



APART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B777 PILOT reports flying inbound to Heathrow from S. America heading 040° and in the descent to FL 310 at 260 kt. He received a TCAS TA on traffic converging from the SE of BARLU simultaneously with LONDON ATC requesting him to stop his descent at FL 330; by now he was already passing through FL 325. ATC then gave him an instruction to expedite a turn onto N during which time he saw the other traffic, 200 ft above and descending (he thought), 2 NM away to his R.

THE B737 PILOT had not submitted a report as he had only received a TCAS TA alert. After discussing the incident with a Flight Safety Dept representative the Capt stated that he had been steady in the cruise at FL 320 and had been visual with the other ac throughout. He had not considered that the other ac had passed very close and was not aware that it had been cleared to descend through his level.

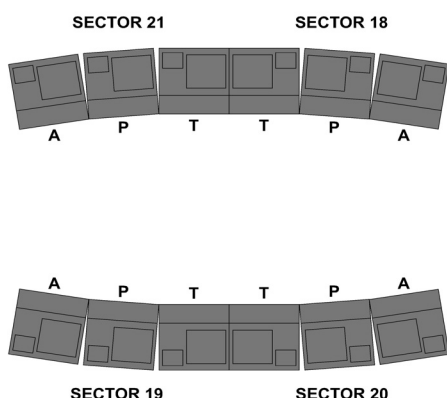
ATSI reports that both ac were in communication with the LACC Sector 19 (Hurn East) Tactical controller. The sector was operating in a

bandboxed mode with Sector 19 coupled with Sectors 20 and 21. A mentor and trainee were carrying out the tasks of the Tactical controller and in the planning position was a qualified Planner controller who, although being in possession of a valid certificate of competence, was being monitored by another controller. The reason for this was that the former had recently returned from a period of maternity leave and, in accordance with the unit's procedure as the absence was greater than 45 days, was undergoing a period of 'dual' before a competence check.

Both the mentor and trainee Tactical controllers described the workload as 'medium' at the time. During the investigation issues relating to the Mentor Box were found and technical aspects relating to this equipment are discussed in an associated ATS Engineering report.

UKAB Note (1): A CA1262 ATS Engineering Occurrence Report for the Mentor Box confirms the unit was u/s when tested post incident.

At the time of the Airprox, the staff were seated at the Sector 18-21 'banana' as follows: The sector assistant sat at the far L end of Sector 21, alongside and to the R were the two Planning controllers. To the R of them in the usual position for the Sector 21 and Sector 18 tactical positions, were, respectively, the trainee Tactical controller and his mentor.



The mentor and trainee returned to the sector, following a break, approx 45 min before the Airprox. The trainee had the displayed range on his radar set at 66 NM, as had been selected and used by the previous controller. For the first 30 min of this training session, the mentor was standing behind the trainee and looking over his

shoulder at the radar and fps display. After this initial period, the mentor sat down, to the R of the trainee on the Sector 18 Tactical position, and selected his workstation radar display to a range of 76 NM.

The mentor advised that a 'typical' range selection would be in the order of 70 NM and so neither 66 nor 76 would be considered as an unusual setting. From his position, the mentor was able to see both his own display and, looking sideways to the L, the trainee's display. The trainee recalled that his fps board was located in front of him but overlapping the bottom of the radar display. This meant that his view of the bottom edge of the radar display was obstructed, although this probably would not have been apparent to his mentor.

The Planner was occupied in trying to obtain an electronic 'blocking strip' for an ac operating in EGD 038, which is to the E of UB11, the upper ATS route from FAWBO to the SAM VOR, which both the B777 and the B737 would follow after BARLU. She said she was following the instructions as displayed on the Support Information System (SIS). This was taking some time and so both the ATSA and the monitoring controller were trying to help. (Note 1: *The Training Manual (ATC MMI Course) details how to create a blocking strip by opening the 'Flight Data Editor' and creating a 'Stereo Flight Plan' sub-window. It was found subsequently that the instructions for producing a strip using the search words 'stereo plan' were incorrect*). It was during this period, approx 10 min before the ac reported on frequency, that the fps for the B737 was produced. It arrived in the output box of the printer, waiting to be placed in a strip holder. Owing to pre-occupation associated with the Planner's problem referred to above, the assistant was delayed in placing the strip into the Tactical controller's fps board. This was critical because of the reduced time associated with the ATC system at LACC between strip production and the arrival of an ac on the controller's frequency. Prompt delivery of fpps to controllers is essential.

At 0819:50, the B777 established communication with the Tactical controller and reported descending to FL 340 on course to BARLU. This was acknowledged and the crew then requested further descent. The transfer of control point for such flights is 10 NM S of BARLU. (Note 2: *The*

MATS Part 2, page Wor 2.5 para 2.5.5.1 states: 'Unless otherwise instructed by Brest on the direct radar line, all northbound flights via (U) B11 – BARLU will be released for descent or climb after passing 10 NM south of BARLU)'. The mentor explained that this position was somewhat ambiguous, as it could be a 10 NM arc based on BARLU, or a W – E line drawn at a tangent to the 10 NM arc. There is no position displayed on the radar videomap to indicate when the ac has reached the transfer of control point. If the former is the correct position then the B777 was 4.9 NM from the transfer point whereas if the latter is correct the ac was only 2 NM from it. As part of the investigation a number of controllers were asked where they believed the correct transfer of control point to be and opinion was very divided.

The trainee checked his fpps and could see no conflicting traffic. Both the trainee and his mentor later commented that they believed the ac to have reached the transfer of control point and, therefore, was released for descent. The radar recording indicates that, at the time, the B777 was approx 15 NM from BARLU. The trainee recalled that the B777 was just visible, at the bottom of his radar display.

The trainee gave clearance for the B777 to descend to FL 260 at 0820:00 and, although the ac had not reached the transfer of control point, the mentor did not attempt to intervene and correct this. The mentor reported that, shortly after the clearance was issued, he saw the track data block of the B777 highlighted and a line disappearing off the screen to the SE. He then looked back at his own radar display and saw the data block of the B737, which was approaching BARLU from the S, highlighted and linked by a line to the B777. This indicated that STCA had activated between the two ac. The mentor then tried to transmit on the frequency in order to resolve the confliction, however, his Mentor Box failed to operate.

MATS Part 1, Section 4 Chapter 2 Page 4 states: *'In certain circumstance it may be necessary to apply radar separation between an ac under radar control or receiving a radar advisory service and known traffic outside radar cover. Bearing in mind the radar coverage, separation should be applied as follows: Same Direction Traffic – Proceeding into radar cover vertical separation must be*

provided until the identified ac is at least 10 miles within the point at which the conflicting traffic can be expected to enter radar cover'. It would therefore seem to be good practice and preferred technique to ensure that, if traffic was to be descended at the transfer of control point, ie 10 NM S of BARLU, the controller could see at least 20 NM S in order to comply with the requirements of MATS Part 1 above.

Having tried twice unsuccessfully to transmit, the mentor then told the trainee to "...turn the (company c/s) onto 005°". The trainee, at this stage, was unaware of the confliction so the instruction passed to him by his mentor did not seem urgent. Just as this was happening (0820:10), the B737 (with the same company c/s prefix) reported on frequency, level at FL 320 with the B777 in its 10 o'clock position at approx 5 NM and converging. The trainee, wrongly believing the radar heading of 005° was for the B737, duly passed the instruction to that flight. It was at that point the trainee called across to the assistant and requested the fpps on the B737.

Although the mentor was aware of the procedure to be followed in the event of a Mentor Box failure, as detailed in MATS Part 2, this was, in his opinion, impractical. It required unplugging his headset from the Mentor Box and plugging it directly into the headset socket. He then had to operate the switch, on the headset panel, to select his headset as the 'live' one. Having completed these actions, he would have to make use of one of the hand press to transmit (PTT) switches situated to the L and R of the trainee but access to these is likely to be obstructed by the presence of the keyboard and fpps display. Alternatively, the mentor would have to move the trainee away from the workstation in order to utilise the foot PTT switch which, due to the layout of the workstation as discussed above, is the usual method of operation by controllers. The mentor stated that, with hindsight, use could have been made of the hand microphone but this would have activated the speakers on the sector.

At 0820:55, the trainee saw that STCA had activated between the B737 and the B777, and asked the crew of the B777 whether they could maintain FL 330. They replied that they were passing FL 325 and so, as an 'avoiding action' manoeuvre, the trainee instructed the B737 to turn right heading 040° and passed TI. There

was no reply to this transmission. The trainee then instructed the B777 (0821:20) to turn L onto N and asked the crew to "...expedite turn". The crew of the B777 reported the other traffic in sight - it was in their 2 o'clock range 2.7 NM at the same level - and so the trainee repeated the instruction for the B737 to turn R onto 040°. This time the pilot replied and reported: "...we're in the turn just rolling out zero four zero".

UKAB Note (2): Lateral separation continued to reduce to a minimum of 1.5 NM at 0821:36 when vertical separation was 600 ft, but thereafter, both lateral and vertical separation quickly increased.

Standard separation was restored at 0821:54 when the B777 passed FL 310 descending, now on a diverging heading from the B737. Both crews reported receiving TCAS TAs but not RAs.

ATSI Recommendations

The MATS Part 2 entry should be revised to make it clear exactly where northbound flights approaching BARLU are released for climb or descent, as the existing wording is ambiguous. Consideration should be given to marking this position on the radar video map.

The procedure to be followed in the event of the failure of a Mentor Box should be reviewed to assess whether the existing procedure can be made less unwieldy.

The information contained within the SIS should be reviewed for accuracy and clarity to ensure that the process to be followed to enable an electronic blocking strip to be produced can be accomplished without undue delay.

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 extensive report. It was clear that the LACC S19 Mentor and trainee were unaware of the presence of the B737

when they gave descent instructions to the B777 and it was this that had led to the Airprox. However, there appeared to be 4 contributory factors in this incident. Firstly, the fps on the B737, though available at the printer, was not placed in a holder nor delivered to the Tactical position prior to the incident. Secondly, the ATSA and 2 Planner controllers were all distracted, for over 10 min, with the SIS. This had diverted the Planners' attention from their primary operational task and delayed the delivery of the B737 fps by the ATSA to the Tactical position until it was requested by the trainee after the B737 had called on frequency. Thirdly, the B777 was cleared for descent by the trainee before the 'transfer of control' point when it was only just visible on the trainee's display; this went unchallenged by the Mentor. Members agreed that the Tactical team should have checked the radar, looking at both displays, i.e. the trainee's and the mentor's respectively, for other potential conflicting ac before clearing the B777 for descent. Finally, the situation was not helped by the failure of the Mentor's Training Box. After the Mentor had tried twice to intervene on the RT, he had tried to resolve the situation by relaying his intended actions through the trainee. Unfortunately, the trainee relayed his words, intended for the B777, to the B737 as it called on frequency; this was odd since the trainee was unaware of the B737 up to that point, but it had the same company prefix and there appeared to be no urgency to the Mentor's instruction so it seemed the trainee, unwittingly, had simply linked it to the last transmission. With hindsight, the use of the correct c/s by the Mentor to the trainee with the use of 'avoiding action' would have imparted the required urgency into the situation to resolve the conflict. The Board were unanimous in endorsing the ATSI recommendations - each item addressed had contributed to the incident.

Some pilot members wondered why the B777 crew did not challenge ATC when they received a TA alert during their descent as, in some circumstances, this may be the first occasion that ATC would be made aware of a confliction. Without more information, however, this matter could not be pursued further.

Looking at risk, the S19 Tactical team had eventually given the B737 an avoiding action R turn onto 040°, after the initial erroneous L turn, and a L turn to the B777 the outcome of which

eventually put both ac on diverging tracks. The B777 had received a TCAS TA simultaneously with ATC asking him if he could stop his descent at FL 330; after replying that he was passing FL 325 he was given an 'expeditious' L turn onto N, which he complied with, during which he visually acquired the B737 2 NM away, he thought, to his R. The B737 crew also received a TCAS TA alert and had followed the ATC R turn whilst watching the B777 throughout pass on his LHS. All of these elements combined persuaded the Board that any collision risk had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The S19 Tactical Team was unaware of the presence of the B737 when descent instructions were given to the B777.

Degree of Risk: C

Contributory Factors:

- a. The fps, though available, was not placed in a holder at the Tactical position.
- b. The Mentor allowed his trainee to descend the B777 early.

- c. Mechanical failure of the Mentor's Box.
- d. Both Planners, plus the ATSA, were all distracted for a period of more than 10 min.

Recommendations:The UKAB endorsed the following ATSI recommendations:

- a. The MATS Part 2 entry should be revised to make it clear exactly where northbound flights approaching BARLU are released for climb or descent, as the existing wording is ambiguous. Consideration should be given to marking this position on the radar video map.
- b. The procedure to be followed in the event of the failure of a Mentor Box should be reviewed to assess whether the existing procedure can be made less unwieldy.
- c. The information contained within the SIS should be reviewed for accuracy and clarity to ensure that the process to be followed to enable an electronic blocking strip to be produced can be accomplished without undue delay.

AIRPROX REPORT NO 81/02

Date/Time: 17 June 1527

Position: 5546 N 0508 W (262° Glasgow Airport
24 NM - elev 26 ft)

Airspace: Scottish FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Shorts SH360 Tornado GR4

Operator: CAT HQ STC

Alt/FL: 5000 ft FL 50↓
(QNH)

Weather NK NK CLOC

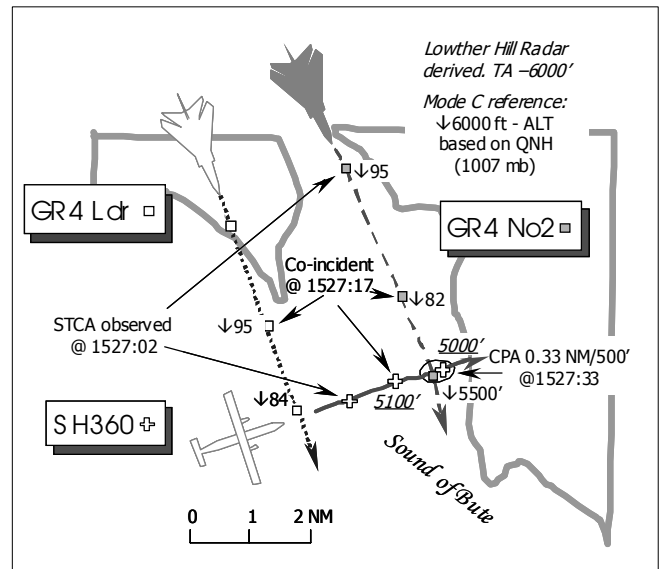
Visibility: 30 km 20 km

Reported Separation:

100 ft V/nil H 1000 ft V/0.5 NM H

Recorded Separation:

0.33 NM H/500 ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SHORTS SH360 PILOT reports he was inbound to Glasgow from Islay at an altitude of 5000 ft and under a RAS from Glasgow APPROACH (APP) on 119.1 MHz. A squawk of A5014 was selected with Mode C, but TCAS was unserviceable. Heading 090° at 175 kt, about 22 NM W of the GOW VOR, a fast jet – possibly a Tornado – crossed from L – R 100 ft directly above his ac, descending from the 10:30 position to his 4:30, with a "high" risk of a collision.

UKAB Note: A subsequent telephone conversation with the SH360 pilot's Flight Operation Director, revealed that the Captain in the LHS had not seen the reported Tornado. It would appear that the 100 ft vertical separation was reported by the first Officer, who observed the Tornado at the 4:30 position from the RHS, after the jet had passed astern descending to starboard and opening to the S.

THE TORNADO GR4 PILOT reports he was flying as the LHD No2 of a pair of camouflage grey Tornados in 4 NM battle formation – with the leader on his starboard beam - descending VFR at 380 kt. The formation was not in receipt of an ATS; a squawk of A7000 was selected with Mode C, but neither TCAS nor any other form of CWS is fitted.

Whilst descending VFR to low-level at 380 kt in the FIR - 4NM clear of cloud – heading 190° at about 255° GOW 26 NM, he spotted a SH360 at 2 o'clock crossing their track about 2 NM away. To avoid the other ac he climbed his jet to pass 1000 ft above and turned to pass 0.5 NM astern of the airliner. He assessed the risk of a collision as low, because he had detected the SH360 early enough to manoeuvre away from it.

THE GLASGOW APPROACH RADAR (APR) CONTROLLER reports the SH360 was inbound to Glasgow IFR, squawking A5014 with Mode C, under a RAS at 5000 ft Glasgow QNH (1007 mb). Two A7000 squawks – the Tornado pair - were noticed at FL 100 - above the SH360 - heading towards it. After about one sweep of the Glasgow Watchman SRE, she noticed the unknown ac were descending and passed traffic information to the SH360 crew. The SSR returns merged and the 2 ac passed behind the SH360. When the SSR data blocks separated, the two A7000 squawks were indicating about 3000 ft ALT descending. No avoiding action was issued, as there was no time; she opined that any instruction she might have given to the SH360 crew would have put the airliner in greater conflict with the other ac.

ATSI reports that the SH360 was inbound to Glasgow Airport from Islay, maintaining an

altitude of 5000 ft in class G airspace. About 3 min before the incident, two fast moving contacts, squawking A7000 - the Tornado pair - indicating FL 155 Mode C, are shown on the Lowther Hill radar recording about 25 NM N of the SH360, tracking S towards it. The Glasgow ATS Unit report states that the APR had been aware of the presence of this traffic but, as the pair were indicating level at FL 155, did not consider them to be a threat to the SH360 at that stage. At 1526:00, the Tornado pair commenced a descent; the westerly ac – the leader - indicated FL 147, whilst the subject No2 - passed FL 150 at a range of 9 NM from the SH360 on a converging track.

At 1526:13, following transfer from the ScACC WEST COAST Sector, the SH360 crew established communication with the Glasgow APR, reporting at level "five zero" and routeing direct to ROBBO (an inbound reporting point). The APR placed the flight under a RAS, issued the current Glasgow QNH (1007 mb) and instructed the crew to head 080°. Though quoting 'five zero' as a level it is believed from the APR's flight progress strip marking and the pilot's written report that the ac was flown at 5000 ft ALT or had adjusted to it, though this was never confirmed with the pilot on the RT.

By the time the crew of the SH360 had completed the readback of the initial transmission from the APR at 1526:40, the Tornado Ldr was at a range of 5 NM, passing FL 117, but on a track that would take it behind the SH360. The other jet - the No2 - was at a range of 6 NM, still on a converging track and descending through FL 123. It would appear from her written report that the APR had not detected that the Tornado pair had commenced a descent until she observed them passing FL 100. By this time, their Mode C indicates a RoD of about 8000 ft/min. At 1527:17, she transmitted to the SH360 crew, "(C/S) there's two unidentified traffic going over the top of you..descending looks like they're unconfirmed at passing seven thousand feet in the descent very high speed I expect they're jets military jets". There was no response from the crew until over 1 min later, when the pilot asked the APR how close she estimated the Tornado pair had been. The reply was "very close" and the pilot responded by declaring that he would be filing an Airprox. In amplification, the controller then stated "...when I saw him (referring, it is assumed, to the easterly No2) he was passing seven nine in the descent

and when I saw him once you'd stopped merging he was passing four four in the descent." At no stage did the SH360 crew report sighting the traffic.

The radar recording shows that at the commencement of APR's warning transmission at 1527:17, the No2 Tornado was in the SH360 crew's 9:30 position at a range of 2 NM passing FL 82 Mode C and by the end of the transmission the two target symbols have merged. The radar update at 1527:33, shows the No2 jet descending through 5500 ft ALT, passing 0.33 NM astern of the SH360, which is level at 5000 ft ALT. By this time the westerly Tornado Ldr was passing astern of the SH360 by about 2 NM, descending through FL 84.

MATS Pt 1, Sect 1, Chap 5 Pages 2-3, para 1.4.1 states that *"A RAS is an air traffic radar service in which the controller shall provide advice necessary to maintain prescribed separation between aircraft 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 conflict. Where time does not permit this procedure to be adopted, the controller shall pass advice on avoiding action followed by information on the conflicting traffic. Even though the service is an advisory one, controllers shall pass the 'advice' in the form of instructions. One of the conditions applicable under a RAS and stated in para 1.4.1 (e) is that "Controllers shall pass avoiding action instructions to resolve a conflict with non-participating traffic and, wherever possible, shall seek to achieve separation which is not less than 5nm or 3000 feet, except when specified otherwise by the CAA. However, it is recognised that in the event of the sudden appearance of unknown traffic, and when unknown aircraft make unpredictable changes in flight path, it is not always possible to achieve these minima."*

In her report, the Glasgow APR states that *"No avoiding action was given as there was no time and to give any instruction to the SH360 would have put it in greater conflict with the 7000 squawks."* Given the relative flight profiles and vastly different performances of the subject ac, the ability to offer effective avoiding action at that late stage was limited. Nevertheless, it is

disappointing that the APR, having undertaken to provide a RAS did not detect that the Tornado pair had commenced a descent until they were passing FL 100. Although unlikely to have affected the final outcome, even the provision of traffic information on the unknown traffic at the earliest opportunity, would have at least alerted the pilot of the SH360 to the presence of the jets and assisted him visually to acquire it.

THE TORNADO PILOT'S UNIT comments that, as the result of good look-out and the pilot's prompt action, no risk of collision existed.

HQ STC comments that as the reporting SH360 pilot did not sight the Tornado (the first Officer saw it after the incident) it would appear that his reported distances are guessed at from the ATC information he received. The radar recorded miss distances accord with those reported by the Tornado pilot, who saw and avoided the SH360 by a safe margin. However, fast-jet crews should note that comfortable separation distances for fast-jets are sometimes not seen as such by transport aircraft crews.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available 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.

Under the RAS that pertained the APR was aiming to achieve 5 NM separation where possible against unknown/unverified traffic not under her control descending through the altitude of the SH360, but clearly to afford that degree of separation she had to be able to spot the confliction early enough in order to do something about it. A civilian controller member suggested that a RAS was impractical in this area of the FIR, which was a known area for fast-jets routeing around the Scottish TMA. Indeed, Airprox 63/02 was a very similar occurrence that had involved a single GR4 only 3 NM S of the location of this Airprox less than 4 weeks earlier. Here, the APR spotted the jets were at FL 155 before the Airprox, but perhaps crucially before the SH360 had called on the frequency, whereupon the flight

had been placed under the RAS. The Board considered next whether it was reasonable for the APR to have spotted the GR4s' descent any earlier than she did. Clearly the jets had dived rapidly – 8000 ft/min according to the ATSI report - only 13 sec before the SH360 crew called the APR, which gave little time for the controller to detect the change or pass advisory avoiding action with traffic information about the confliction to the SH360 crew. There was nothing to indicate the APR's workload, but one controller member thought that possibly she might have placed the flight under a RAS automatically and wondered if it was wise to try and provide this form of radar service here. If the APR was potentially that busy and unable to afford the time scanning for conflicts in the FIR, and once detected, provide advisory avoiding action in the time available – possibly at the same time as higher priority traffic situations in the TMA – then it was misleading for pilots to be offered a service that could not be realistically achieved. ScACC area controllers no longer provide a RAS in Class G airspace, but the NATS adviser said the aim was always to provide the service where possible, but he was not aware of the APR's workload at the time. Here, vectors were required for sequencing and entry into CAS, but another member opined that vectors cannot be provided under RIS. However, it was pointed out that the MATS Pt 1 does permit a controller to provide vectors to sequence traffic tactically - prior to entry into CAS for example - and vectors can be issued to GAT under such circumstances. Even so, the Board agreed that the APR had unfortunately been caught out by the GR4s' rapid descent, which had proceeded unnoticed until 1527:17, when she passed traffic information to the SH360 crew; the radar recording shows the jets were passing FL 82 at this point 2 NM away from the SH360 and 15 sec before the CPA. Since the SH360's TCAS was unserviceable the last remaining 'safety net' was see and avoid. A controller member was concerned at the content of the traffic information, which some thought not very helpful and did not paint a clear enough picture for the SH360 crew, nonetheless, it did provide a warning. However, in the Board's opinion this warning came too late to be of any benefit to the crew, indeed it was apparent that only the First Officer saw the jets and then only after they had passed astern of his ac.

Turning to the view from the other cockpit, the No2 GR4 pilot had – without the benefit of an ATS

- spotted the SH360 2 NM away and turned to pass behind and above it. Some members noted that the jet's fast rate of descent could be a problem for TCAS, but this was legitimately executed in good VMC. Whilst the No2 GR4 pilot thought he had passed 0.5 NM astern and 1000 ft above the airliner, the radar recording showed his estimates were a little optimistic, the CPA being 0.33 NM horizontally and 500 ft above the Shorts. Nonetheless, he had spotted the conflict and promptly taken action to afford separation, hence the Board concluded that this Airprox resulted from a conflict in Class G airspace, resolved by the

No2 Tornado GR4 pilot and that no risk of a collision existed in the circumstances that pertained.

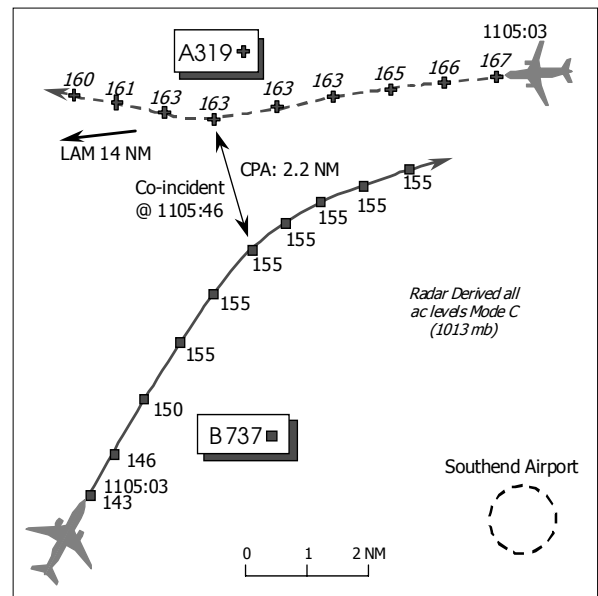
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict in Class G airspace resolved by the No2 Tornado GR4 pilot.

Degree of Risk: C.

AIRPROX REPORT NO 83/02

Date/Time: 5 Jun 1105
Position: 5140 N 0037 E (7 NM NW Southend)
Airspace: LondonTMA (Class: A)
Reporting Aircraft Reporting Aircraft
Type: B737 A319
Operator: CAT CAT
Alt/FL: FL 145 ↑ FL 158 ↓
Weather IMC IMC
Visibility:
Reported Separation:
 1-2 NM H, 700 ft V 2 NM H, 800 ft V
Recorded Separation:
 2.2 NM H, 800 ft V



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports he was climbing at 280 kt in IMC from Gatwick having been cleared to FL 170 on a radar heading of 040°. At about FL 145 the crew received a TCAS Traffic Advisory (TA) with associated "TRAFFIC" aural alert. TCAS indicated descending traffic about 2000 ft above. He asked ATC to "confirm this traffic" to which ATC responded with a heading change to 090°, together with a heading change for what he believed to be the conflicting traffic. No TCAS Resolution Advisory (RA) was triggered, and the separation from the conflicting traffic was

assessed using TCAS as about 1 – 2 NM and about 700 ft. The TCAS TA was considered "necessary" and the risk was assessed as "high".

UKAB Note (1): Analysis of the radar recording shows that the B737 pilot also stopped climbing and flew the avoiding action turn level.

THE A319 PILOT reports that he was inbound to Heathrow, descending in IMC at 300 kt, heading West. The descent clearance was to FL 90. At FL 158 the crew received a TCAS TA, with traffic

indicating 11 o'clock, 5 NM converging and 1000 ft below. He was about to question the descent clearance when he heard what was believed to be the other ac crew also questioning their clearance. He was then given avoiding action which was to turn onto 290°. The descent was arrested and the turn flown level at about FL 158. The minimum separation seen on TCAS was about 2 NM and 800 ft.

The pilot expressed concern that an incorrect descent clearance may have been issued and observed that both the controller's turn and the crew's action to arrest the descent were required to *"prevent a potentially serious situation"*. However, the actual risk was assessed as *"nil"* due to the crew's TCAS assisted awareness of the developing situation.

UKAB Note (2): The radar recording shows that although the A319 eventually descends to FL 158, it is actually at FL 163 at the Closest Point of Approach (CPA).

UKAB Note (3): The call to ATC from the B737 pilot to *"confirm this traffic"* appears from the tape transcript to have been blocked by a transmission from another ac. The A319 pilot did hear this transmission however, though was unsure of the call sign due to the simultaneous transmission.

THE LTCC NE LAM SC reports that he was providing a Radar Control service to both ac at the time of the Airprox. The B737 called on his frequency whilst climbing to FL 130, as he observed the A319 inbound to LAM VOR. The A319 routing was the subject of a "standing agreement" between TC East and TC LAM whereby it would be at FL 150 by position SABER [12 NM East of the Airprox position]. With this in mind, he cleared the B737 to climb to FL 170, which was also in accordance with the agreement. Shortly after, the A319 called on frequency and he cleared it to descend to FL 90. Soon after this the STCA triggered. Believing that separation would not be maintained, avoiding action was given to both ac. The controller reported that the A319 was *"too high"* in this case and had not made the agreement level. He believed that separation had been maintained as the SMF had not been triggered.

UKAB Note (4): MATS Part 2 Sect EAS para 3.1.1.1. details the standing agreement between TC East and TC LAM/LOREL for traffic inbound to designated LTMA airfields. From TC Saber to TC LAM the quoted level is FL 150 at SABER for Heathrow and Northolt inbounds. Note 2 to the para states

"TC LAM is responsible for separating Gatwick Departures from Heathrow and Northolt arrivals that are operating under the terms of the Standing Agreement".

LTCC ATCI reports that all systems were serviceable and the RTF indicates a moderate controller workload.

At the time the clearance to climb to FL 170 was issued to the B737 the A319, which was working another frequency at this stage, had only been cleared to FL 200. It was not cleared to descend to FL 150 until 5 NM past SABER and hence it crossed SABER at FL 203. The A319 was transferred to the controller's frequency immediately after the clearance to FL 150 had been issued, and it called on frequency at 1103:42, having just passed SABER, and reported descending through FL 200. Although the controller was aware that the A319 had not made the agreement level, he did not adjust his plan of action. The subsequent avoiding action, taken after the STCA had triggered was effective in resolving the conflict, but did not ensure that separation was preserved, for at 1105:55 the two ac passed at a range of 2.2 NM and with 800 ft vertical separation.

UKAB Note (5): Where the terms of a standing agreement are not met, the controller handing over would normally be expected to alert the next controller to the situation. In this case, there was no landline contact between TC East and TC LAM.

ATSI reports that it concurs with the LTCC report.

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

controller involved and reports from the appropriate ATC and operating authorities.

In considering the sequence of events leading up to this Airprox, the Board concentrated first on the actions of the controller concerned (TC LAM) and of the TC East controller. Clearly the Standing Agreement between the two sectors was a significant aspect, at least in the initial stages. ATC specialists observed that such agreements were relied upon heavily and were very surprised that the TC East controller had not notified the TC LAM controller of the non-compliance with the agreement. The ATC specialist members felt, and the Board as a whole agreed, that it was a serious omission to pass an ac to the next sector at an incorrect level. No reason was given for the omission in the ATCI report and the Board could not deliberate further on this aspect. However, the Board could not escape the conclusion that the handover of the A319 was a significant factor and formed the first stage in the series of events that lead to the Airprox.

Notwithstanding the circumstances of the handover, the Board acknowledged that the TC LAM controller was aware of the A319's flight profile and considered his actions in light of this. The observation was made that although only one ac inbound to Heathrow (the A319) was being discussed, the reality was that it would have been just one of a relatively steady flow of inbounds along that route. The controller would have needed to monitor continually these inbounds in order to carry out his task of separating Gatwick

departures from them. This being the case, the Board was unable to offer a reason for the controller's actions in clearing the B737 or the A319 as he did, and then leaving the situation to develop for as long as it did, but agreed they were part of the cause behind the encounter that followed.

The Board then considered the actions of the two ac crews, concluding that both had shown good awareness and commending their prompt actions. It was noted that both crews initiated action to restrict their climb or descent, but acknowledged that such actions may be necessary if the commanders believed the safety of their ac to be in doubt.

Finally, the avoiding action given by TC LAM together with the TCAS assisted manoeuvres flown by the two pilots had proved timely and effective in ensuring there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: TC LAM did not ensure the prescribed separation between the B737 and the A319, compounded by the lack of warning from TC East about non-compliance with the Standing Agreement.

Degree of Risk: C

AIRPROX REPORT NO 85/02

Date/Time: 18 June 1455

Position: 5159 N 0141 W (Moreton-in-the-Marsh disused aerodrome)

Airspace: London FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: Ventus BT glider Harrier T10

Operator: Civ Club HQ STC

Alt/FL: 3900 ft FL 40

(QNH 1017 mb)

Weather VMC CLOC VMC CLBC

Visibility: 20 km+ >10 km

Reported Separation:

200 m H, nil V 1 NM H, 500 ft V

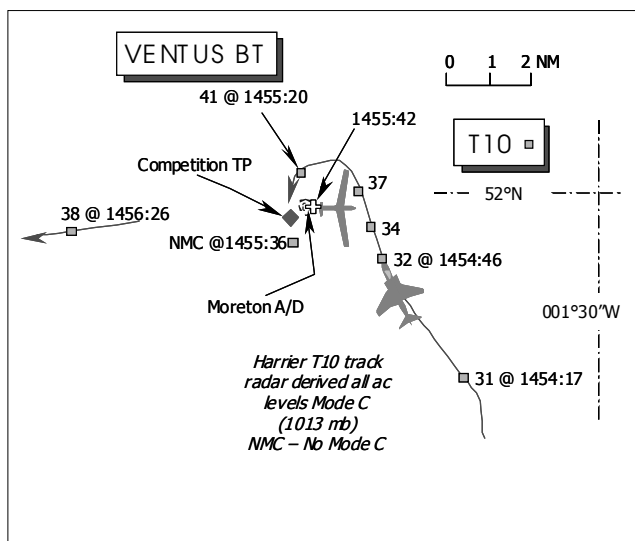
Recorded Separation:

Not recorded

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE VENTUS BT GLIDER PILOT reports his glider has a white colour scheme, with red ailerons and rudder. He was listening out on the 'Glider frequency' of 130.1 MHz after departing Bidford, whilst participating in a glider competition routeing - Burley Gate – Bicester Rail Bridge - Northampton - Bidford; no SSR transponder was carried.

Heading 095° at 75 kt, after a competition turning point – centred on the A44 road bridge over the railway line at Moreton-in-the-Marsh station (the TP) – whilst passing overhead Moreton-in-the-Marsh disused aerodrome, in level cruise at 3900 ft QNH (1017 mb), a military jet was spotted 400 m away crossing in front of his glider from R – L. The jet - that he originally thought might have been a midwing ac with two engines, but subsequently identified from recognition profiles later as a Harrier - then performed a knife edge turn off his port wing tip and disappeared from view astern, before reappearing in his 5 o'clock position, flying directly towards his glider. It appeared as though his ac was "being used as a target" and that the Harrier pilot was going to take avoiding action. However, when the Harrier had closed to about 200 m, he dived his glider L "to avoid being hit" he opined, but then lost sight of the jet.



The risk was assessed as very high unless it was a "deliberate attack" by the military pilot intending to take late avoiding action. He added that the area was "busy", with a number of gliders flying in a NOTAM'd competition. Even if the jet pilot had seen him, there would have been a high risk to others.

THE HARRIER T10 PILOT reports he was flying as the No 3 of a 3 ship formation, acting as bounce to the other 2 formation ac. His ac has a grey camouflage scheme, HISLs were on and a squawk of A7000 selected with Mode C, but neither TCAS nor any other form of CWS is fitted. He was not in receipt of an ATS and was listening out on the squadron private frequency.

Descending through FL 40 – he thought - 3 gliders were spotted 4 NM away above Moreton-in-the-Marsh, but below his ac. He executed a 360° turn overhead Moreton-in-the-Marsh whilst waiting to join up with the other formation ac, but was visual with all the gliders throughout and maintained a minimum separation of at least 1 NM/500 ft. No avoiding action was necessary. He added that he could appreciate how a relatively large jet moving fast might appear closer than it actually is, which might give cause for concern to a glider pilot, but there was no risk of a collision.

UKAB Note (1): The LATCC (Mil) Clee Hill radar recording does not illustrate this Airprox clearly but several primary contacts - which in all probability are gliders - are shown in the vicinity of Moreton-in-the-Marsh. The identified and tracked Harrier is shown approaching Moreton-in-the-Marsh A/D from the SE after executing a 60° dog-leg turn, and shown at 3200 ft (1013 mb) at 1454:46. Thereafter, the Harrier climbs to 4100 ft at 1455:20, in a L turn but radar contact is then lost. A single Harrier contact is shown SSW of Moreton-in-the-Marsh A/D, but no Mode C (NMC) is detected. However, the glider pilot also provided a GPS competition plot of his track in the vicinity of Moreton-in-the-Marsh. This plot shows the glider passed 0.2 NM N of the TP at 1455:18, at 3553 ft GPS (orthometric altitude). A descent of 128 ft is shown to 3425 ft GPS at 1455:30, when the glider was just under 0.5 NM NE of the turning point, overhead the A/D, which might be indicative of the avoiding action descent reported by the glider pilot. About 12 sec later at 1455:42, a radar contact is shown slightly E of the A/D, which may or may not be the Glider flown by the reporting pilot, which at this time was shown at 3599 ft GPS and thereafter climbs to 3645 ft GPS at 1455:54. The 360° L turn reported by the Harrier pilot is not shown in its entirety as the jet is not shown again until after the Airprox has occurred, whilst proceeding westbound at 3800 ft some distance to the W. Hence, neither the geometry nor the minimum separation can be determined accurately.

UKAB Note (2): A review of the British Isles Daily Navigation Warning Summary (BIDNWS) for 18 Jun revealed that UK NOTAM H2174/02, promulgated a general warning of gliding within a 3 NM radius of BIDEFORD(sic) – 52°08N 001°50W, 0930-1900 up to 10000 ft agl. A telephone number was included for further information on routes and times. However, enquiries through LFBC subsequently revealed that NOTAM UKLB 3322 was transmitted at 1238:39 UTC on the day of the Airprox. This warned of up to 24 gliders within 10 NM either side of route co-ordinates equating to Bidford - Burley Gate – Bicester Rail Bridge - Northampton – Bidford, which included the location of the Airprox; from ground level to 2000 ft agl but specifying that the activity may extend to 4000 ft.

HQ STC comments that there can be no certainty that there were only 3 gliders in the vicinity of the

Harrier over Moreton-in-the-Marsh, and therefore, no certainty that the Harrier pilot actually saw the glider whose pilot filed this report.

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 GPS plot from the Glider pilot and reports from the appropriate operating authority.

The Board noted that NOTAM H2174/02 was transmitted as a warning to general airspace users within the BIDNWS, which had warned of gliding activity within 3 NM of "*Bideford*", with the latitude & longitude for the gliding site at Bidford. There were two potential areas of confusion here. Firstly, that the NOTAM had incorrectly stated the location of the gliding activity as "*Bideford*", which at first sight might suggest this activity was in Devon - not Warwickshire - thus potentially being discounted by anyone not flying in that vicinity unless the co-ordinates were plotted. Secondly, that as the Airprox occurred in excess of 10 NM from the stated co-ordinates, crews might consider that it would not effect any flight in the vicinity of Moreton-in-the-Marsh. Military pilot members explained that most pre-flight planning arrangements would be based on a map display with plotted latitude & longitude locations for the various warnings – hence the incorrectly named location would not necessarily be a factor. However, the information transmitted in the military NOTAM was only sent as co-ordinates removing any potential for confusion. It was evident that the gliding competition had been duly notified to AIS (Mil), but it was not received at LATCC (Mil) West Drayton until 1127 UTC for a competition start time of 1200 UTC. This information then had to be processed through to LFBC, who would then plot the route and cross-check the data before transmission of a UKLB series NOTAM to military flying units. Hence, the UKLB was transmitted at 1238 UTC, about 2¼ hours before the Airprox occurred and 38 min after the theoretical launch time of the competition gliders. It is generally accepted that a minimum of 4 hours notice is needed to get NOTAM information transmitted and distributed to those who can make use of it before flight. Although UKLB series NOTAMs warn of activity in

the UKLFS below 2000 ft msd in the main and this Airprox took place above the LFS, the Board was aware that the pilot intended to operate at low-level with the rest of his formation, but here it was unclear if the T10 pilot had access to this particular NOTAM (warning of gliding activity near his planned route) before he walked out to his ac. If not, the pilot would not have been aware of the gliding competition route making it co-incidental that he had spotted 3 gliders as he approached Moreton-in-the-Marsh from the S prior to his delaying 360° orbit. While turning it appears that he climbed not descended as reported but there was no indication at all that he had spotted the Ventus flown by the reporting pilot amongst the three he saw. Equally there was no evidence to support the glider pilot's contention that the Harrier pilot had used his glider as a target; the Board could not imagine that the latter would have hazarded his ac in this manner. It seemed far more likely that, as the bounce ac of the formation the Harrier pilot would have been absorbed in searching below for his formation colleagues. The tail-on white glider would have been very difficult to spot and members suggested that here was the key to this Airprox - in all probability, the Harrier pilot had not seen the Ventus glider at all during the orbit, while searching for the formation pair. The Board was briefed that a pair of fast jets was shown intermittently on the radar recording, which the Harrier then followed westbound and the pattern of the T10's hold was very similar to the glider pilot's report. The GPS plot made it clear where the glider was, but this was difficult to relate to the Harrier's position on the radar recording, because of the loss of radar contact on the jet at the critical moment; the minimum horizontal separation could therefore not be determined.

However, the separation distances reported differed so widely between the respective pilot's reports, they convinced members finally that the Harrier pilot had not seen the Ventus. It was concluded therefore, from the information available, that the cause of this Airprox was a probable non-sighting of the glider by the Harrier T10 pilot.

Turning to risk, the GPS plot supported the glider pilot's contention that he dived in the vicinity of Moreton-in-the-Marsh to avoid the jet, but members found it difficult to reconcile the range at which this dive was initiated. With regard to the speeds involved, 200 m would have equated to about 1 sec of flight time, not enough to react and change the flightpath of the glider. Discussion centred on whether the glider pilot had done enough to remove the risk of a collision – which some thought self evident because no collision had resulted. Although the glider pilot had watched the Harrier start to turn around him and had reacquired it as it approached from 5 o'clock, he could not be sure what the jet pilot would do. Moreover, the glider pilot did not know at the time whether the jet pilot had seen his ac. This left him in a very difficult position with little option but to dive in avoidance. This led the Board to conclude unanimously that the safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Probable non-sighting by the Harrier T10 pilot.

Degree of Risk: B.

AIRPROX REPORT NO 86/02

Date/Time: 10 June 1110

Position: 5433 N 0347 E (36 NM SE of SKATE)

Airspace: London FIR (Class: G)

Reporting Aircraft Reported Aircraft

Type: KC 135 Jaguar x 2

Operator: Foreign Mil HQ STC

Alt/FL: FL 220 FL 220

Weather VMC VMC

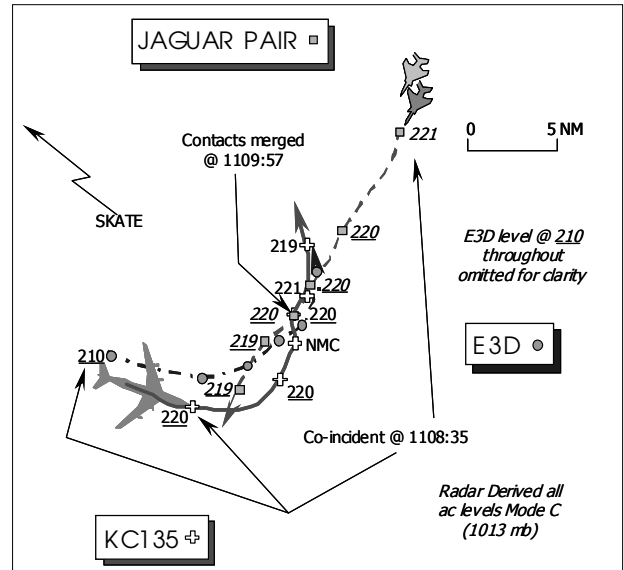
Visibility: Unlimited 10 km

Reported Separation:

0.5 NM H, nil V 0.75 - 1 NM H, nil V

Recorded Separation:

Contacts merged

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE KC 135 PILOT reports he was tasked to provide Air-Air Refuelling (AAR) support for Exercise CLEAN HUNTER and was established at FL 220, flying at 300 kt under an Air Defence Service (ADS) from CRC Neatishead. The assigned squawk was selected with Mode C and TCAS is fitted.

They were "cleared" to block FL 200-230, during a join with a NATO AWACS E3D flying at FL 210. During a L turn onto N at the bottom of the racetrack he received a TCAS TA on traffic - the Jaguar pair - 10 NM to the N. The "TCAS hit" then disappeared for about 30 sec. When it reappeared the Jaguar pair was within 3 NM, at the same level heading toward his ac. They called the traffic to the AWACS E3D crew, but he was forced to "punch off" autopilot and make an aggressive turn reversal to the R to avoid a collision.

The Jaguar pair passed about 0.5 NM ahead of his ac at the same level and the incident was reported to Neatishead. The AWACS E3D maintained 1000 ft separation from his tanker and the Jaguar pair. CRC Neatishead gave no traffic information calls, he thought, and was not apparently in contact with the Jaguar pair.

UKAB Note (1): The KC135 TCAS RA function is inhibited during AAR to prevent unwarranted RAs during receiver joins.

THE JAGUAR PILOT reports he was leading a Jaguar pair - flying in arrow 100 m apart - returning to Coltishall from Vaerlose at 450 kt in level cruise at FL 220. The assigned squawk was selected with Mode C, but neither TCAS nor any other form of CWS is fitted.

They were handed over from COPENHAGEN to LATCC (Mil) and instructed to call London MILITARY on a UHF frequency for a RIS - squawking the assigned squawk - as they approached DANDI. They were unable to make contact with London MILITARY, or back with COPENHAGEN so he free-called London INFORMATION on 125.47 MHz who gave them another London MILITARY frequency to try. After successfully contacting London MILITARY on a new VHF frequency he asked for a RIS. Shortly afterwards - he estimated 3-4 min from memory - the No2 saw the KC135 Tanker and AWACS E3 joining about 5 NM away at the same level. To increase the separation he initiated a turn to the R, whereupon London MILITARY passed traffic information about the other ac. They passed 0.75 - 1 NM to the W of the observed ac 'port to port' with no risk of collision.

MIL ATC OPS reports that the Jaguar pair free called London MILITARY in the vicinity of DANDI and was allocated to Controller 12 (CON 12). Communications are notoriously poor in that area of the N Sea and it took some time to establish satisfactory contact. UHF proved unworkable so a VHF frequency was allocated. Initial contact with Con 12 was made at 1108:21: *"London Mil, [garbled + C/S]"*. The leader was immediately asked to *"report position"* which at 1108:35, was *"...50 miles on the 220 from DANDI direct track Colt FL 220"*. Thereafter the type of service was specified at 1108:52, *"C/S... radar information service, limited from all around as you transit the base and edge of radar cover"*. At 1109:14 CON 12 opened the landline to Norwich APPROACH, situated at Coltishall, to commence an inbound handover on a civil ac, however, this was immediately interrupted and traffic information passed to the Jaguars about the KC135 at 1109:19, *"C/S traffic left 11 o'clock, 3 miles, crossing left right, indicating FL 220"*. Five seconds later Norwich was again instructed to standby and further traffic was called to the pair's leader about the E3, *"standby Norwich, [C/S] roger, further traffic 12 o'clock, 5 miles, crossing right left, indicating FL 210"*. On the recording the words *"Standby Norwich"* are believed to have obscured the Jaguar leader reporting visual with the traffic. Having called the traffic, CON 12 then continued with the handover to Norwich.

CON 12 was using the Claxby Radar, which has a range of 210 NM. The ac were at the limits of this range, therefore, CON 12 correctly and sensibly limited the radar service provided. Analysis of the radar recording initially suggests the KC135 & E3 would cross the Jaguar pairs track R- L well ahead, which is probably why CON 12 elected to start a handover of other traffic. As soon as it became apparent that the KC135 & E3D were turning both tracks were called in good time, indeed, although the first track is called at a range of 3 NM this appears to be an underestimate.

Normally, AAR is carried out in recognised AARAs. AAR National Instructions (AARNIs) states that *"AARAs have the status of National Airspace Reservations"* and as such *"other airspace users are co-ordinated to avoid AAR traffic"*. AARNIs go on to say that: *"Operational considerations may occasionally dictate the need to set up tactical AARA (ie outside the established AARAs). All units which may provide an air traffic service in*

the relevant airspace are to be informed by the controlling unit....". The Airspace Co-ordination Notice (ACN) for Exercise CLEAN HUNTER, states that *"subject to traffic and co-ordination with the appropriate airspace control authorities, tactical towlines may be established as required by CRC Neatishead"*. CON 12 was unaware that tactical tanking operations were being conducted in that area. As LATCC (Mil) were unaware an Airprox had been filed until sometime after the event it can only be assumed that the Unit also had no knowledge of the tactical towline (TTL).

Considering the lack of prior notification on the tanker traffic on the TTL, the radio communication problems and the need to handover an ac to another agency CON 12 appears to have done a good job in keeping the Jaguar pilots apprised of the traffic situation under the limited RIS that pertained.

ASACS SSU comments that the KC135 tanker was operating on a TTL NE of AARA 8 in company with a VC10 tanker. The KC135 was under a RIS at FL 220 from the CRC with the E-3D positioning to join the tanker at FL 210 and at the time of this incident had been cleared to the boom frequency by the Neatishead controller.

The Neatishead report suggests that the Jaguars were a late 'pop-up' contact, but from the radar tracing provided of the incident that would appear not be the case. The Jaguars were painting on the Trimmingham T93 radar at a separation distance of some 35 NM. The Weapons Controller (WC) would have been switching between radars to provide the best possible picture (only one radar source may be selected at any one time), although plots from unselected sensors still generate tracks on the WC's display. We believe the WC would have been concentrating primarily on the join of the E-3D to the KC135; before he detected the Jaguars about 15 NM away and tried to co-ordinate with London MILITARY, whose squawks the Jaguars were displaying. The narratives and tape transcript indicate that there was some confusion at London MILITARY. Thus the WC, was unable to coordinate with London MILITARY and called the Jaguar formation to the KC135 crew at a range of 10 NM under the terms of the RIS, whereupon the KC135 crew acknowledged and acquired the Jaguars visually at 5 NM separation. The WC correctly offered a proximity warning without an avoidance

resolution, additionally he was aware that the E-3D was on the boom frequency below the KC135 with the VC10 further below the E-3D. This placed the KC135 tanker pilot in the best position to effect separation from the Jaguar formation. Why the Jaguar leader chose to remain at the same level and pass so close to an obvious tanker combine instead of climbing to increase separation is unclear.

The WC detected the Jaguar pair relatively late, whilst concentrating upon a join with an E-3D. However, under the terms of the RIS he did provide sufficient warning to the KC135 crew to enable them to affect visual separation. There appears to have been some confusion at London MILITARY during the initial check-in by the Jaguar formation and from the information available to the ASSU for analysis, it is unclear if London MILITARY were aware that there was a tactical towline operating in the airspace.

UKAB Note (2): This Airprox is shown on the Claxby radar despite the location being over 180 NM from the radar head and below theoretical coverage. The Jaguar pair are shown SW'bound squawking A6122 at FL 220 Mode C at 1108:35, the time the first position report was passed to CON 12. Meanwhile, the KC 135 is shown maintaining FL 220 in a wide port turn with the E3D joining from astern and level at FL 210 throughout. The ac converge and the tracks of the Jaguar pair and KC 135 merge at 1109:57, with no discernable horizontal separation – in part because of the small scale of the recording. Both the KC135 and Jaguar pair indicate FL 220 at the CPA in conformity with the respective pilot's reports. The avoiding action R turn to increase separation reported by the Jaguar leader is not discernible at this small scale, but the KC135 pilot's avoiding action R turn reversal is clearly shown.

HQ 3 AF comment that the need to take avoiding action in the form of a reversed turn is never welcome and particularly so when the ac required to carry out such a manoeuvre is a heavily loaded tanker about to engage in AAR. There are contradictions in each of the foregoing reports but it seems likely that this Airprox would not have occurred if LATCC (Mil) had been aware of the existence of the tactical towline.

HQ STC comments that despite an extensive inquiry into this Airprox there are still key questions unanswered. The first 'link' in the chain of events was the view of CRC Neatishead and the KC135 crew that they were operating on a TTL, and had reserved airspace status. However CON 12, and the Jaguar pilots, had no knowledge of this TTL. The ACN for the exercise did not establish any TTLs, but simply gave warning that CRC Neatishead 'may' establish them. What procedures did the CRC employ to 'establish' the TTL, and how did it inform 'all units which may provide an air traffic service'? Since the TTL was to be in Class G airspace, how were the legitimate VFR users of this airspace informed? Was a NOTAM issued, and would it have been available to the Jaguar pilots briefing in Denmark? Since no mention of a NOTAM is made in the inquiry reports, it is assumed that none was issued, and therefore neither the Jaguars nor CON 12 could have planned to avoid the 'non-promulgated TTL'. (STC will seek clarification of how CRCs establish and promulgate TTLs).

The initial radio contact difficulties between London MILITARY and the Jaguar pilots were caused by trying to use UHF at long range rather than VHF. (Aircrews should request a VHF frequency for long-range comms if UHF is erroneously offered.) CON 12 first called the conflict at '3 miles' (1109:19), 38 seconds before the 'merged' call to the KC135 from the WC. Thus it is possible that the radar performance was the limiting factor for London MILITARY and not the radio difficulties.

The CRC WC first reported the conflict to the KC135 crew at 1109:27, "*Stranger...northeast 10 heading towards, co-level. request when you're ready come left*" - 30 sec before the merge; the KC135 crew's reply "*..visual manoeuvring*", was at 1109:48. Thus the relatively late warning of traffic was a major factor in this Airprox. CRC Neatishead established telephone contact with London MILITARY for co-ordination at 1109:47, one sec before the KC135 crew reported "*..visual manoeuvring*". This call from the WC to London MILITARY was too late to effect co-ordination, or, to prevent the Airprox. The Jaguar pair sighted the KC135 at approx 5 NM and turned to pass in front. However, fast-jet crews should note that comfortable separation distances for fast-jets are sometimes not seen as such by transport ac. There are important lessons to be learnt from this

incident, but it is likely that the KC135 pilot was surprised by the lateness of the traffic warning, and also presumed that he was in reserved airspace and thus not operating purely under 'see and avoid' rules.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

No NOTAM was issued for the TTL, hence the Jaguar pilots would have been unaware of its existence before they left Denmark, but AAR8 was notified active and the ASACS adviser was surprised that the Jaguar pair had planned to fly back through it. Members wondered whether the KC135 crew was aware of the nature of the Class G airspace they were flying in and the extant RIS with all that that entailed – did they think they were operating in an exclusive airspace reservation where separation would be afforded to them? If the TTL had been notified to London RADAR, then ARNIs would have required CON12 to co-ordinate the passage of the Jaguars through the vicinity and standard separation could have been afforded - even under the RIS that pertained. However, no such notification had been given so London RADAR only provided traffic information. The Mil ATC Ops adviser emphasised that CRC Neatishead had not co-ordinated the establishment of the Tactical Towline in the MAS with London RADAR in the first instance. Hence the Jaguar pair had been accepted into the London FIR from Copenhagen at a level which would conflict with the TTL – unbeknown to anyone at the time. The sparse radar coverage at this point in the vicinity of DANDI and the poor radio communications on UHF had complicated the situation further. The Board endorsed the STC view that VHF should be used in preference in this vicinity. This would provide better communications, but it was acknowledged that the number of VHF channels available to London RADAR was very limited. A military controller member voiced concern about the information provided by the CRC about TTLs; in the absence of any update to the contrary, the ASACS SSU adviser was unable to explain why

London RADAR had no record of any notification of the establishment of the TTL by the CRC - this should have been done. Neither were the Jaguar pair aware of the TTL until the No2 reported sighting the tanker combine to his leader - 5 NM away. At that stage the KC135 was turning through N and some pilot members thought it would have been difficult to resolve the range visually at that aspect with both formations opposing each other almost head-on. It was not clear if the Jaguar pilots had spotted the tanker combine before CON12 passed traffic information. Nonetheless the lead Jaguar pilot elected to turn away to increase separation. The R turn – not evident on the radar recording – was designed to take the pair astern of the tanker combine, but at that stage it would not have been apparent that the KC135/E3D combine would be continuing to turn about, thereby eroding still further any anticipated gains of increased separation engineered by the lead Jaguar pilot.

From the ASACS report it was clear that the KC135 crew had been given traffic information about the Jaguar pair at a range of 10 NM, but this was only 30 sec or so before the Jaguar pair got into close quarters. Time was a critical factor here and the KC135 crew – in their heavy ac – needed more of it to effect change safely. Members believed that the WC should have passed the traffic information at an earlier stage. The HQ3AF adviser did not think that the KC135 crew should have been surprised by the Jaguar pair following traffic information from the CRC and the TCAS TA. However, when taking the E3D into account below his tanker, stopping the L turn and reversing into a R turn was probably the only means of avoiding the Jaguars at that late stage while still keeping them in sight. In the end, 'see and avoid' had worked; both crews had seen each other's ac in time to take avoiding action. The Board concluded that this Airprox had resulted from a conflict in an unnotified TTL. This need never have occurred however, if the TTL had been notified correctly to London RADAR, who could then have assigned a transit level clear above the tanker combine. Some members wondered why the Jaguar pair had not climbed above the tanker combine of their own volition. FJ pilot members thought the ac should have been capable of manoeuvring out of the way and it would have been more considerate to have done so, but in the end it was evident that the combined avoiding

seated position afforded him a good view of the radar, the fps display was partially hidden by the trainee, necessitating him having to stand up to obtain a clear view. He described the workload and traffic loading as low at the time of the incident.

The DC10 established communication with the Hurn Sector at 0725, reporting at FL 270 with an IAS of 300 kt. The trainee acknowledged the call and instructed the flight to continue at that speed. Shortly afterwards, the DC10 was cleared to descend to FL 220 and to route direct to Goodwood (GWC) VOR. The DC10 was one of a number of ac, routeing eastbound on UAR UR8, inbound to Gatwick. About 16 NM ahead of this flight was a B747 (AC3), which had also been cleared to descend to FL 220, on its own navigation to GWC.

The A320 made its initial call on the frequency at 0726, its pilot reporting passing FL 128, climbing to FL 150, on track to Southampton (SAM) VOR. The A320 was cleared, by the trainee, to climb to FL170. Its routeing meant that it would cross the tracks of both the B747 (AC3) and the DC10. The trainee's initial plan was to ensure vertical separation existed between the flights. Accordingly, the B747 (AC3) was cleared to descend to FL 190 and the A320 was instructed to climb to FL 180. The latter was then given a 10° R turn heading 220°. The mentor commented that, whilst monitoring the same trainee on a previous occasion, he had experienced a similar situation, when ac on crossing tracks had been cleared to descend/climb through each other's level, without ensuring lateral separation. On that occasion, if he had not intervened, separation would have been lost. For this reason, he said that he was watching the trainee's actions this time very closely. The trainee decided to dispense with vertical separation, at 0728:22, when he cleared the two flights to FL 130 and FL 210 respectively. At the time, the A320 was passing FL 172, 21 NM NE of the B747 (AC3), which was passing FL 207. The mentor said that he judged that lateral separation would not be maintained during the level change. He explained that he allowed his trainee to continue with his plan, expecting him to realise the situation, subsequently, and take appropriate action. If that was not forthcoming, he would take timely action himself. Therefore, he had picked up the training box, in possible anticipation of the need for its

immediate use, should the need arise. When the A320 queried the presence of traffic ten miles ahead, the mentor thought that the trainee would react to the call straight away. However, he cleared another southbound ac (AC4), routeing via SAM and 15 miles behind the A320, to climb to FL 190 first, before instructing the A320, shortly after 0729:10, to turn R heading 235°. The mentor believed that this action would ensure lateral separation (i.e. 5 NM) was maintained between the B747 (AC3) and the A320 but, in fact, as the two ac passed through each other's levels (0729:48), they were 4.4 NM apart, their closest point of approach.

The trainee's next action was to instruct the DC10 to descend to FL 200 (shortly after 0729:30), on top of AC4 climbing to FL 190. However, this clearance did not take into account the A320, which was in its eleven o'clock, on a crossing track, 20 NM away, climbing to FL 210. At that juncture the A320 was climbing through FL 182 and the DC10 was descending through FL 224. The mentor admitted that he had not registered the trainee's transmission, clearing the DC10 to descend to FL 200, and did not realise, therefore, the potential confliction between the subject ac. He could not readily explain why he had missed the call, possibly, he thought, he had been distracted by an operational query but he could not substantiate this theory.

The mentor confirmed that, as he watched the B747 (AC3) and the A320 pass each other, he was still not aware of the developing situation between the subject ac. He commented that he observed the DC10 descend below, what he believed was its cleared level (FL 220) and he stood up in order to view the fps display, to check the level annotated on the DC10's fps. The trainee had correctly annotated the fps with the cleared level of FL 200; STCA activated shortly afterwards. As the mentor realised the situation and queried the DC10's cleared level with the trainee, the latter issued an 'avoiding action' turn to the A320 onto a heading of 180° and instructed the ac to expedite its climb through FL 220. The two ac were now 9.4 NM apart (0730:20), the A320 at FL 192 with the DC10 at FL 212. Following his transmission to the A320, the trainee issued the DC10 with an 'avoiding action' turn heading 360°, this time after prompting by the mentor. No response being received, the transmission was repeated, with the addition of TI

"twelve o'clock six miles turning south". The pilot reported sighting the traffic.

Radar recordings of the event reveal that the closest point of approach occurred at 0730:58, at which time the lateral separation was 3.2 NM and the vertical distance was 200 ft. The subject ac were now on diverging tracks; the DC10 was descending through FL 209 and the A320 was climbing through FL 207. The mentor then took over the RT to confirm with the pilot of the DC10 that he would be maintaining FL 200 (because of AC4 still climbing to FL190) and to issue a heading to resume its track towards GWC. Subsequently, the A320 and the DC10 were cleared to resume their own navigation on track to ORTAC and GWC respectively.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

It was clear that the mentor had been monitoring his trainee closely as he had needed to intervene on a previous occasion in a similar situation. ATCOs were aware of ergonomic constraints placed on mentor controllers during 'on the job' training. The mentor had afforded himself with a good view in front of an adjacent radar display but this had been to the detriment of a clear view of the fps display. He was fully aware of the need on occasions to 'stand up' to obtain a full view of

the fps display but, for whatever reason, he had neither heard the trainee pass the 'descend' instruction to the DC10 pilot nor seen him annotate the fps. This had put the subject acs' flight paths into conflict and had caused the Airprox.

The A320 pilot was understandably vexed that, after pointing out conflicting crossing traffic ahead (AC3), he had been vectored into conflict with the DC10. It was noted that good situational awareness had alerted him to the potential conflict; he had monitored the other ac on TCAS, acquired it visually and also quickly complied to the ATC avoiding action L turn and 'expedite climb' instructions. There was no criticism of the mentor who had thought that separation would be maintained between the A320 and AC3, after the trainee had turned the Airbus, which resulted in the two ac passing 4.4 NM apart. Thereafter, the mentor very quickly noticed the DC10 descending below FL220 and, following activation of STCA and after querying its cleared level with the trainee, the trainee/mentor team gave prompt 'avoiding action' L turns to both ac. These elements combined led the Board to conclude that any risk of collision had been effectively removed.

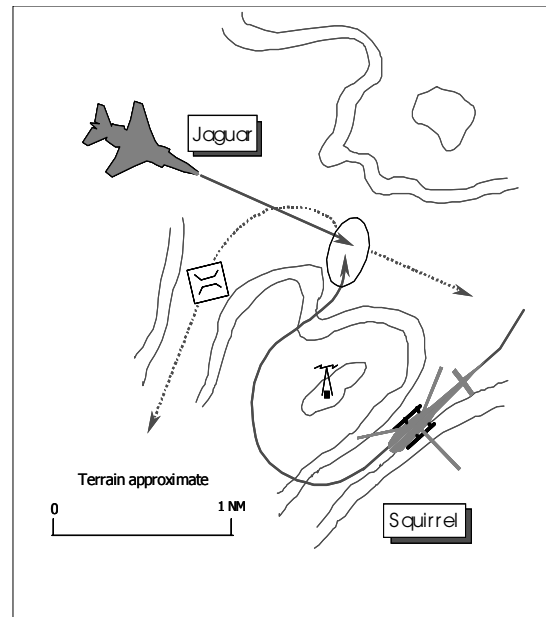
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The bandboxed (S19/20/21) Tactical Controller Mentor allowed his trainee to vector the DC10 and A320 into conflict.

Degree of Risk: C

AIRPROX REPORT NO 88/02

Date/Time: 19 June 1135
Position: 5241 N 0327 W (25 NM W of Shrewsbury)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Squirrel Jaguar
Operator: HQ PTC HQ STC
Alt/FL: 100 - 200 ft agl 250 ft
 (RPS 1018 mb) (Rad Alt)
Weather VMC CLBC VMC CLBC
Visibility: 50 km 10 km +
Reported Separation:
 100-200 ft H, Nil VNR
Recorded Separation:
 Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SQUIRREL PILOT reports that he was conducting an instructional low level sortie with a student navigator occupying the left seat and a nav instructor in one of the rear seats. His ac was painted black/yellow, HISL and transponder were all on and he was squawking 7000 with Mode C. TCAS was not fitted. He was not receiving an ATS but was monitoring Guard frequencies and the UKLFS common frequency. The ac had just crossed a main E-W valley at 90 kt, tracking about 190° whilst searching for a navigational feature (a bridge) in a small subsidiary valley. Realising an error, the student asked for a right turn whilst attempting to identify the feature. While stabilised on a heading of 040° [flying back towards the main valley] the student identified the feature just to the left of the ac. A descending turn left was started to overfly the feature, but as the ac turned through about North, a Jaguar was seen to pass left to right about 100 – 200 ft in front of the Squirrel. The Jaguar did not appear to take any avoiding action. He assessed the risk as "very high".

The initial closing angle would have been from the student navigator's side and it was considered that terrain masking may have been a factor in the late sighting. The nav instructor in the ac rear

would also have a restricted view due to the window arrangement in the ac. Additionally the Squirrel was "slightly higher than normal" as it was descending into the valley from higher ground.

THE JAGUAR PILOT reports that he was operating as a singleton and that the reported Airprox position coincides with a point very shortly after a planned target run, and therefore at a time of high cockpit workload. His ac was painted in grey camouflage, HISLs were on, and he was squawking 7001 with Mode C, TCAS was not fitted. In the reported position he would have been flying straight and level, at 250 ft MSD, 450 kt, and would not have been receiving an ATS. He did not see the Squirrel and was only informed of the encounter after landing.

UKAB Note (1): The Airprox occurred below the coverage of recorded radar.

THE SQUIRREL PILOT'S UNIT comments that a conspicuity study into the colour schemes of DHFS helicopters had already identified that "look down" detection can be very difficult, and it is this aspect that the Jaguar pilot would have been presented with [the Squirrel, though co-altitude

was banked towards the Jaguar's line of approach].

THE JAGUAR PILOT'S UNIT comments only that the Airprox occurred at a high workload time for the Jaguar pilot. Further comment was not possible as the pilot had been unaware of the helicopter's presence.

HQ PTC comments that this was saved from being a collision by chance alone. There is a growing conviction that the DHFS colour scheme is far from conspicuous against a valley floor or side. Further study has been instigated, either to increase the amount of yellow on top of the ac (as recommended by a recent QinetiQ study) or to render the rotors more eye catching but neither has a guarantee of success at this stage.

HQ STC comments that this Airprox occurred in the UKLFS. Reviewing the tracks of the 2 ac it would appear that the low flying terrain masking tactics of both ac were effective. Both ac probably had only 10 seconds in which to see each other, and both would have been presented against a terrain background. Since the helicopter was coming from higher ground than the Jaguar was flying over, the vertical separation was diminished.

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 Chairman opened the discussion by seeking clarification from the HQ STC representative of his report's closing remarks. It was explained that the Squirrel pilot would not normally aim to operate in the height band known to be used by low flying fast jets, but that the mechanics of this encounter had forced the helicopter into this band and thus reduced vertical separation. HQ PTC restated that the conspicuity study for DHFS helicopters was on-going and would in all probability remain so for some time. The issue of

coloured rotor blades was raised and members agreed that this could be very effective in certain cases but that ac modification was a complicated and expensive process. Additionally, this had been shown to be less effective with modern helicopter types, where the coloured blade tended to blur in the faster rotor disc and was less conspicuous than older types with the same arrangement. It was noted that landing lights can add greatly to an ac's conspicuity and it was felt that these should be used at all times where possible. However, although this is standard practice for DHFS helicopters, it was acknowledged that many ac did not have landing lights which were designed to operate almost continuously and that to try to do so may lead to technical problems such as blown filaments and severe overheating.

The known dangers of crossing valleys and other "funnel features" at low level were raised and it was felt that the Squirrel crew may have become overly concerned in locating their navigation feature at the expense of lookout, particularly as their flight path re-entered the valley where the risk of encountering fast jet traffic increased significantly. Ultimately, the terrain did serve to mask each ac, and as this was the very reason for the ac exercising at low level, it is understandable that the Squirrel crew did not see the Jaguar until late and the Jaguar pilot did not see the helicopter at all. Some Board members thought that, whilst definitely a close encounter, the ac were not at risk of colliding, but the majority of members agreed that, considering neither pilot's ability to alter the outcome, the geometry of the encounter was such that even a very small change in any variable could have resulted in the ac's flight paths meeting.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Squirrel crew and non-sighting by the Jaguar pilot.

Degree of Risk: A

AIRPROX REPORT NO 89/02

Date/Time: 7 June 0841

Position: 5309 N 00220 W (10 NM SW MCT VOR)

Airspace: Manchester TMA (*Class: A*)

Reporting Aircraft Reported Aircraft

Type: DHC8 BA46

Operator: CAT CAT

Alt/FL: FL 180↓ FL 180

Weather VMC CLOC VMC CLOC

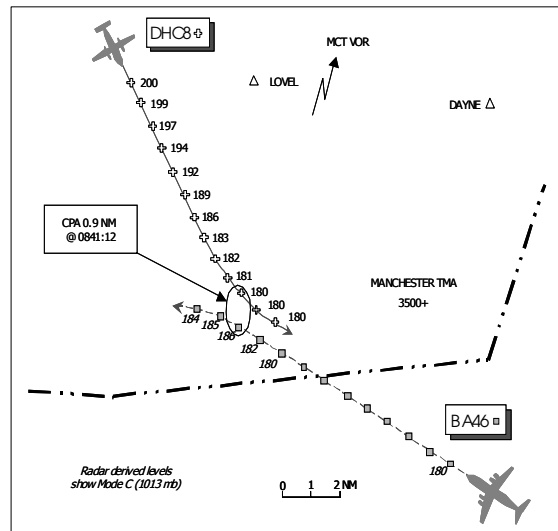
Visibility: 10 km >10 km

Reported Separation:

400 ft V/ 1 NM H 400 ft V/ 2 NM H

Recorded Separation:

600 ft V/ 0.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DHC8 PILOT reports that he was inbound to Birmingham from Edinburgh, squawking 5167 with Mode C and in contact with Manchester on 134.42 MHz. Whilst in descent to FL 170, in VMC, on radar heading 170° at 280 kt, TCAS enunciated with a RA to monitor vertical speed. Simultaneously, a left turn to heading 130° was given by Manchester, although this was not notified as avoiding action. A BA46, first seen at approximately 3 NM, passed down the right hand side, at approximately one NM and above. He assessed the risk as high.

THE BA46 PILOT reports that he was en route Isle of Man from London Gatwick squawking 5061 with Mode C and in contact with Manchester on 134.42 MHz. Cruising at FL 180 in good VMC on the WAL 125 radial 30 DME and heading 305° at 275 kt, descending opposite direction traffic became TCAS proximate traffic, a TA and then RA. A climb was initiated immediately during which ATC instructed a left turn heading 290°. Maximum deviation from cleared level was 700 ft and minimum separation on TCAS indicated 400 ft V and 2 NM H. He assessed the level of risk as low.

ATSI reports that the MACC STAFA Radar (RAD) Controller had been in position for about 7 min and, on taking over the moderately busy sector, had agreed for the SE Sectors (STAFA/TRENT) to

be handboxed onto his position. Accordingly, he had started to receive fps from the other sector for incorporation into his display. Additionally, shortly after he took over, and before either of the subject ac contacted his frequency, a Birmingham outbound twice exceeded its cleared level. He considered that both factors presented a distraction from his other operational tasks and added to his workload.

In accordance with the Standing Agreement between MACC Sector 29 and the STAFA Sector for Birmingham inbounds, the DHC8 was transferred descending to FL 200 to be level at MCT. The flight established communication with the STAFA Sector, at 0837, reporting passing FL 206 descending to FL 200, on a radar heading of 165°. This heading positioned the flight to the W of the expected routeing to the MCT VOR to ensure compliance with the procedure promulgated in the MACC MATS Part 2, Page SEACC 1-13, whereby "*MACC Sector 29 will ensure that inbound traffic is positioned over or west of the MCT VOR with the East Midlands inbounds to the east of any Birmingham/Coventry inbounds. Should it be necessary for traffic to be routed west of the MCT, Sector 29 will ensure co-ordination with the appropriate Sectors is carried out*". STAFA RAD could not recollect having been informed that the DHC8 was routeing west of the MCT; nevertheless, he could see its position on his

radar display and instructed it to continue on its present heading.

In order to minimise ATC delay, a procedure was introduced nationally whereby some flights are 'level-capped' to move excess demand from the higher levels to less used lower levels. One such ac was the BA46, which normally would have been operating above the level of the STAFA Sector but on this occasion, because of 'level-capping', had been flight planned at FL180, a level usually reserved for slower, propeller driven ac. Accordingly, the pilot made his initial call on transfer from the Trent Sector, at 0838:18, reporting at FL 180 and turning left heading 305°. Though the STAFA RAD Controller was unable to remember if the TRENT Radar Controller had pointed it out on his radar display prior to transfer, he would have expected to be informed since the MACC MATS Part 2, Page SEACC 1-2, states that: "*Trent Sector Controllers shall not permit aircraft to come closer than 5 NM to the sector boundary without prior co-ordination with the STAFA sector*". The sector division is a line MCT-Lichfield-Daventry. Nevertheless, the STAFA RAD Controller was aware of the BA46's position and routeing as it called and instructed it to continue on the heading. The radar photograph, timed at 0838:17, reveals that the subject ac were 36 NM apart when the BA46 made its initial call on the STAFA frequency at which time the DHC8 was passing FL 202.

At 0839:30 STAFA RAD instructed the DHC8 to descend from FL 200 to FL 170 having previously turned it left turn onto 155° for tactical positioning towards Birmingham. This descent clearance was issued against traffic outbound from Birmingham, which he had cleared to climb to FL 160. However, when issuing the descent instruction, the presence of the BA46, opposite direction at FL 180, was overlooked. At 0839:30, radar shows the subject ac, on conflicting tracks, 22.2 NM apart with the DHC8 passing FL 200. Moreover, the fps display board did not effectively show the conflict between the subject ac because the BA46's fps was displayed under the STAFA designator, whereas that for the DHC8 was in the MCT bay. Having issued the DHC8 with descent clearance, the STAFA RAD Controller turned his attention back to the previously mentioned Birmingham outbound that had 'bust' its level twice. It was only when he had dealt with this ac that he noticed, whilst scanning his radar

display, that the subject ac were in conflict. He immediately instructed the DHC8 to turn left heading 130°. Radar shows the 2 ac were about 7 NM apart at the time (0840:38), with the DHC8 descending through FL 186. The heading of 130° was amended shortly afterwards to 090°, when information was passed to the pilot on "*traffic in your 12 o'clock er a range of about 5 miles*". The pilot responded by saying he had received a TCAS "*advisory*". By the time the BA46 was instructed to turn left heading 290° (0840:41), the lateral separation had reduced to 3.9 NM, with the DHC8 at FL 182. Thereafter, observing that the BA46 was climbing, presumably in response to a TCAS RA, the STAFA RAD Controller instructed the DHC8 to maintain FL 180, the level it was approaching. The DHC8 pilot replied that he had the traffic in sight. The controller could not readily explain why he had instructed the flight to maintain FL 180, when its clearance had been to FL 170. However, he was confident that, because of action taken, no risk of collision existed. The BA46 pilot then reported having received a TCAS alert and was now returning to FL 180, on heading 290°. Radar shows that, when the 2 ac were 2.3 NM apart, the BA46 was climbing through FL 182 and the DHC8 was passing FL 181 (0841:03). The BA46 had climbed quickly to FL 186 as the DHC8, at FL 180, passed on its starboard side 0.9 NM away. Although the STAFA RAD Controller could not recall whether he noticed activation of STCA during the incident, another controller, in position on an adjacent sector at the time, confirmed that his own attention had been drawn to the incident by its activation on his radar display.

In giving avoiding action to the subject ac, the STAFA RAD controller did not use the words "avoiding action", although he had practised this during TRUCE [UKAB Note: Training For Unusual Circumstances and Emergencies] training sessions. He stated that there may have been an element of "denial" in his failing to utilise the term. Previous incidents have indicated that there is sometimes a reluctance on the part of controllers (and pilots) to recognise the potential gravity of situations in which they find themselves and this may have been the case here. This is not a deliberate downplaying but rather seems to stem from the element of surprise inherent in these events. It may also arise from a need to see the situation as more normal and therefore more manageable.

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 recording, reports from the air traffic controllers involved and reports from the appropriate ATC authority. There was no doubt as to the cause of the incident, the descent of the DHC8, nor to the degree of risk since both pilots reacted in compliance with respective RAs thereby removing actual risk of collision. Consequently, the Board's discussions centred on peripheral aspects.

During discussion of the non-use by civil controllers of the attention-getting RT prefix "avoiding action", the question was posed as to whether any stigma was attached to its use. Civil ATC members explained that controllers were encouraged to use it during TRUCE training, but the view remained widely held that operational use still had connotations of consequential report filing; hence there remains a residual element of reluctance. But the Board was encouraged to hear that some units have already taken action to allay this concern through revision of administrative procedures.

Some Board members queried the fact that the STAFA RAD controller agreed to assume responsibility for another sector despite his sector being moderately busy; in the event, this added to his workload especially so in light of his level-bust problems. Civil ATC members expressed the view that there was a tendency for controllers to be too obliging and too quick to accept responsibility for a quieter sector permitting closure of the latter. Although such a decision would be subject to supervisory approval, one

trap to avoid was basing judgement upon the quantity of fps rather than the complexity of the prevailing traffic situation. This watchpoint was worthy of further circulation amongst controllers and supervisors alike.

The Board also noted that, as in Airprox 76/02, the incident occurred when level-capping procedures were in force. These procedures resulted in the BA46 flying within MACC airspace whereas normally it would have been operating at higher levels controlled by LACC. The NATS adviser acknowledged that although level-capping was a useful tool in reducing traffic at higher levels, it does increase traffic levels at MACC (and LTCC) necessitating closer liaison/co-ordination to ensure traffic levels and procedures are adjusted accordingly. Since this Airprox the level capping procedures have been reviewed and the following actions have taken place at MACC:

- All MACC staff have received a briefing on level capping and associated issues.
- Closer liaison/co-ordination with LACC has been introduced during periods of level capping.
- Flow measures have been introduced at MACC for use during periods of level capping to ensure that traffic levels are managed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: STAFA Radar controller descended the DHC8 into conflict with the BA46.

Degree of Risk: C

AIRPROX REPORT NO 90/02

Date/Time: 18 Jun 1306

Position: 5039 N 0138 E (RATUK)

Airspace: UAR UL613 (Class: B)

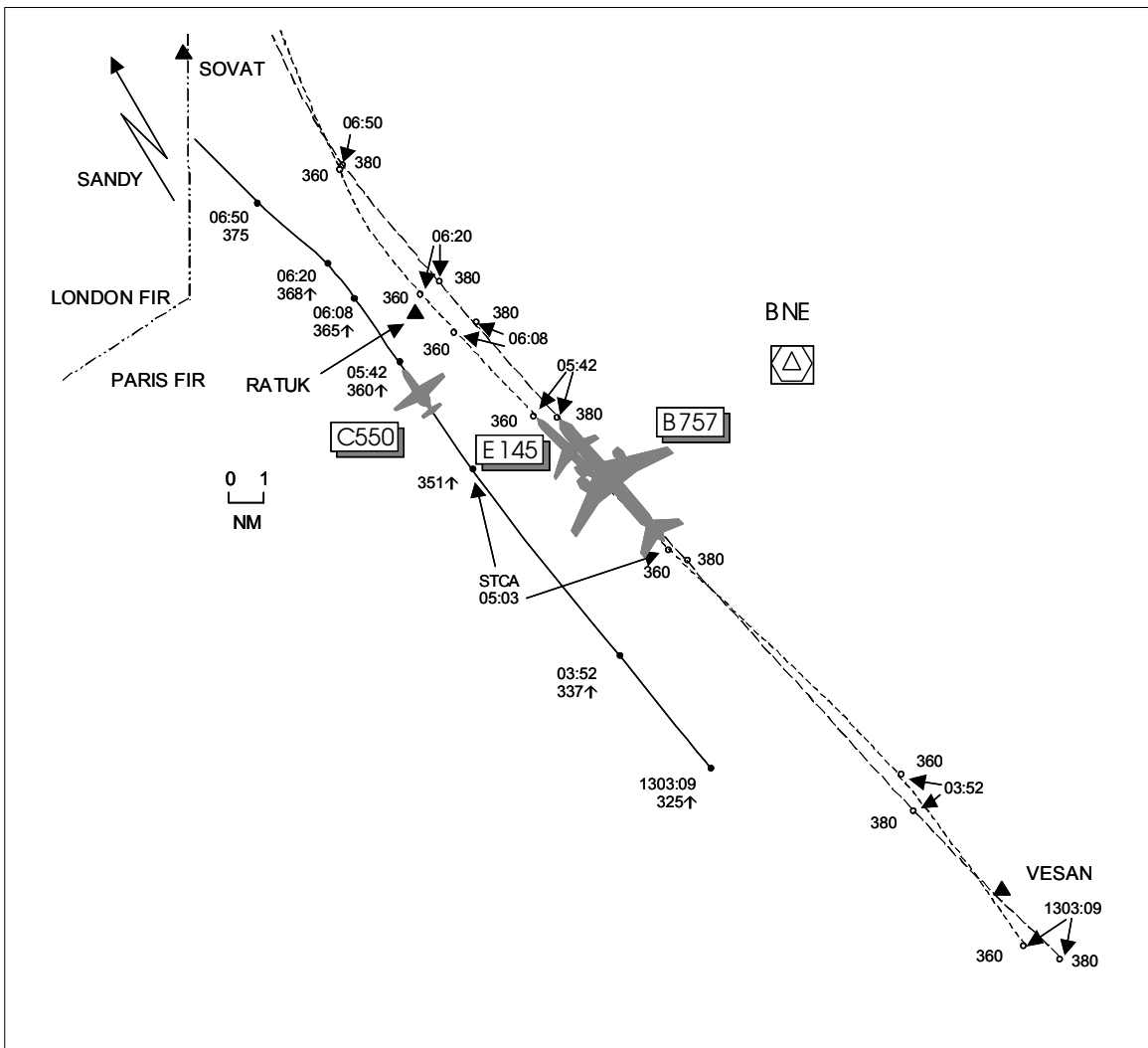
Reporter: LACC S1/2

	<u>First Aircraft</u>	<u>Second Aircraft</u>	<u>Third Aircraft</u>
<u>Type:</u>	C550	EMB145	B757
<u>Operator:</u>	Civ Exec	CAT	CAT
<u>Alt/FL:</u>	↑ FL 400	FL 360	FL 380
<u>Weather</u>	NK	NK	NK
<u>Visibility:</u>	NK	NK	NK
<u>Reported Separation:</u>			
	NK	NK	NK

Recorded Separation:

500 ft V 3.2 NM H 500 ft V 2.8 NMH

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB



THE LACC S1/2 TACTICAL CONTROLLER reports that the C550 called approaching RATUK at FL 340 requesting FL 390 with another ac (AC4) to the E at FL 360 cruising speed M 0.78. He gave both ac radar headings, the C550 315° and AC4 325°. 12 miles behind AC4 was an E145 at FL 360 M 0.76 and a B757 at FL 380. Not believing these two following ac to be conflicting traffic to the C550, he cleared the C550 to climb to FL 400 (the level agreed with C550 pilot for the ac's route) as he anticipated the C550 would be level well before lateral separation would be lost. Thereafter several other ac called on frequency, which were acknowledged, whilst he was monitoring a couple of other traffic scenarios elsewhere on the sector. At that stage the S1/2 Planner began pointing out other traffic that would be climbing into his sector in the SANDY area. Looking back at the C550 he noticed it was climbing through FL 360 abeam the E145 so he instructed the Citation pilot to expedite his climb. However, he immediately realised the B757 was flying at FL 380 almost exactly above the E145 but this was difficult to see from the radar picture as the radar labels were superimposed and only the E145 was visible owing to his previous 'hooking' of the ac label. He then instructed the C550 pilot to fly heading 300° and to stop climb at FL 370, the radar showed it climbing through FL 365, followed by radar headings of 335° and 330° to the E145 and B757 respectively. The C550 climbed up to FL 375 before descending back to FL 370.

THE C550 PILOT was traced through a handling agent at his intermediate stopover en route to the USA. However, despite attempts to contact the pilot and the ac owner at the registered address via telephone and surface mail, no response was obtained from either one.

THE EMB145 PILOT reports approaching LONDON airspace in the cruise at FL 360 with another ac flying in close proximity following the same routeing but separated vertically. He heard a third ac request climb to FL 400 through his level which ATC approved following a heading change. Later, he became aware of this third ac on TCAS which led to a visual acquisition of a business jet, wide on his LHS (he was unable to recall the range); the assigned heading given by ATC to this business jet had put it on a diverging track. At about the same time, he saw the 'business jet' climbing through its cleared level, he

thought, and heard ATC telling it to stop its climb. He thought that he may have received a TA alert, but no RA, during the encounter. Owing to the wide displacement of the other ac and its 'widening heading', at no time did he feel that this had been an Airprox incident.

THE B757 PILOT was contacted through the airline Flight Safety Dept and neither he nor his FO could recall any incident /Airprox occurring during the flight.

ATSI reports that the Airprox took place at RATUK, close to the London/Paris FIR boundary, in Class B airspace. The three flights involved were all inbound to UK airspace: a C550 was en route to Dublin while a B757 and an E145 were both inbound to Manchester. At the time of the incident, the flights were being provided with an Area Control service by a single Tactical controller (SC), operating LACC Sectors 1 and 2 combined. A Planner supported the Tactical controller and both controllers had been in position for about 15 min. The workload on the combined sector was assessed as moderate.

At 1301:20, following transfer from Reims control, the C550 made its first call on the Sector frequency, reporting passing FL 301 for FL 340. The SC acknowledged the call and requested the flight's desired cruising level - the pilot advised FL 390. To facilitate this climb the SC instructed the C550 to turn L 5° onto a radar heading of 315° to provide separation from traffic to the E, not involved in the incident. At 1302:10, the B757 established communications with the sector, reporting at FL 380, followed one min later by the E145, reporting at FL 360. These two flights, the radar recording shows, are about 1 NM apart at this point, with the E145 ahead. They are astern of the C550, in its 5 o'clock position, at a range of approximately 10 NM on a parallel track displaced by approx 4 NM. The SC advised the C550 that FL 390 would not be available but FL 400 was, which the pilot accepted. The SC reports that, before issuing the climb clearance to the C550, he considered the position of the E145, at FL 360, and the B757, at FL 380, and was confident that the C550 would safely reach FL 400 before the minimum horizontal separation (5 NM) was eroded. At 1303:55, the SC instructed the C550 to climb to FL 400. Over the course of the next min the SC was occupied attending to other traffic and monitoring scenarios taking place in different

parts of the sector. It is apparent from the radar recording that during this period, the E145 and the B757 were catching up the C550 fairly quickly, but this was not detected by the SC. He cannot explain this oversight, but it appears most likely that he had become so involved in other situations in the sector that there was insufficient time for monitoring or conducting a review of the 'climb through' being undertaken by the C550. The filed TAS of the flights involved, which appear on the sector fps, show the E145 and the B757 respectively 44 kt and 88 kt faster than the C550. However, an examination of the comparative ground speeds on the radar recording shows that, in actuality, the E145 and the B757 were between 120 and 140 kt faster, than the C550. (G/S is available on the radar display as a selectable option). At 1305:03, STCA triggered a warning between the C550 and the E145. At this point, the C550 was climbing through FL 351 with the following ac in the same relative positions but the E145 now at a range of 6 NM. This warning, however, did not immediately prompt the SC into a closer examination of the developing situation. Once again, other events were occupying the SC, but reflecting, he does state that, the range of the radar selected for the banded sector may have temporarily caused him to misjudge both the rate of closure of the following traffic and their range from the C550. It was not until some 40 sec later, when the C550 was passing FL 360, that the SC recognised the deteriorating situation. At 1306:00 he instructed the E145 to turn R on to heading 335° and the C550 L on to 300° (from 315°), but this would have little immediate effect and neither flight was provided with TI nor was the term 'avoiding action' employed. By now, however, standard separation had been eroded, with horizontal separation reducing to a minimum of 3.2 NM as the C550 climbed through FL 365. To restore standard vertical separation with the E145, the SC instructed the C550 to expedite its climb (1306:20). However, a second conflict was now developing with the B757, at FL 380, which the controller had not recognised as, he reports, the B757's Traffic Data Block (TDB) was obscured by the TDB of the E145 which he had earlier 'hooked'. (Note: The process of 'hooking' enables operations specific to a flight to be carried out. When a flight is 'hooked' an opaque 'flag' is displayed as a background to the TDB information. Consequently, the TDB text of other flights in close proximity will be obscured, albeit temporarily. Controllers at LACC are instructed

not to leave flights in a hooked state because of these implications). However, the situation soon became clear to him and in his next transmission (1306:30) the SC instructed the C550 to stop the climb at FL 370, which the pilot acknowledged. Unfortunately, the C550's climb continued above FL 370, reaching briefly FL 375, before descending again to its cleared level. During this excursion, separation with the B757 reduced to a minimum of 2.8 NM and 500 ft, though standard vertical separation was restored very soon afterwards. It is disappointing to note that, once again, no TI was issued and the term 'avoiding action' was not employed. Thereafter, the respective tracks diverged to permit the C550 to be once again cleared to FL 400. No comments were made by the crews of the flights involved and there were no reports on the RT of any TCAS 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, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

ATCO members were familiar with the performance characteristics of a C550 ac and these needed to be taken into account by the SC when he cleared it to climb to FL 400. Admittedly he had initially thought that the 'climb through' would be achieved before horizontal separation would be lost but it appeared that he had become distracted by events occurring on other parts of the busy sector and did not continue to monitor the C550's progress. Consequently, the significant rate of closure that existed between the subject ac went undetected and, despite an STCA warning, he only noticed the deteriorating situation after separation was lost. In resolving the confliction the SC initially told the C550 pilot to expedite his climb but this was then changed to a 'level off' when he noticed the B757's proximity. It was not surprising that the C550 went on to fly through its 'new' cleared level owing to the short time that had elapsed between both ATC instructions. Members agreed that the SC had climbed the C550 into conflict with the

AIRPROX REPORT No 91/02.

E145 and the B757 and this had caused the Airprox.

Pilot members had noted an increasing trend by ATCOs in issuing 'expedite climb' instructions to ac. This was perceived by some controllers to be a good way to deconflict a situation, but in most cases these ac were already climbing at their best RoC. In asking for more climb performance, unless the ac was using a derated climb profile when further power could be used, the only other option open to the crew was to trade speed for height. This short-lived energy exchange could then subsequently cause the ac to run out of any further climbing performance.

It was noted that there had been an apparent reluctance by the SC to issue TI and more crucially to use the appropriate phrase/words "avoiding action". ATCO members were aware that 'stigma' attached to their use, as it was perceived as an admission that something had gone wrong. However, the intention of the phrase 'avoiding action' was to attract the pilot's attention and to let him know that immediate action was required in time to prevent things going wrong, or to limit any loss of separation.

Turning to risk, the SC had only noticed the conflict after separation had been lost as the C550 was climbing through the E145's level; he had turned both the C550 and E145 onto diverging headings as well as expediting the C550's climb-through to resolve matters. Unfortunately, his 'expedite climb' then 'level-off' instructions had led the C550 to climb above his new 'stop off' level which had led to another loss of separation, albeit temporarily with the B757. From the limited information available from the subject ac pilots, the E145 pilot had only received a TA alert and visually acquired the C550 displaced well to his L. Although less than ideal, these elements combined with the known geometry of the encounter persuaded the Board that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The LACC Tactical Controller climbed the C550 into conflict with the E145 and the B757.

Degree of Risk: C

AIRPROX REPORT NO 91/02

Date/Time: 20 June 1303

Position: 5429 N 00132 W (4 NM WSW of Teesside - elev 120 ft)

Airspace: Teesside CTA/R (*Class: D*)

Reporter: Teesside APP/APR

First Aircraft **Second Aircraft**

Type: B737 C182

Operator: CAT Civ Comm

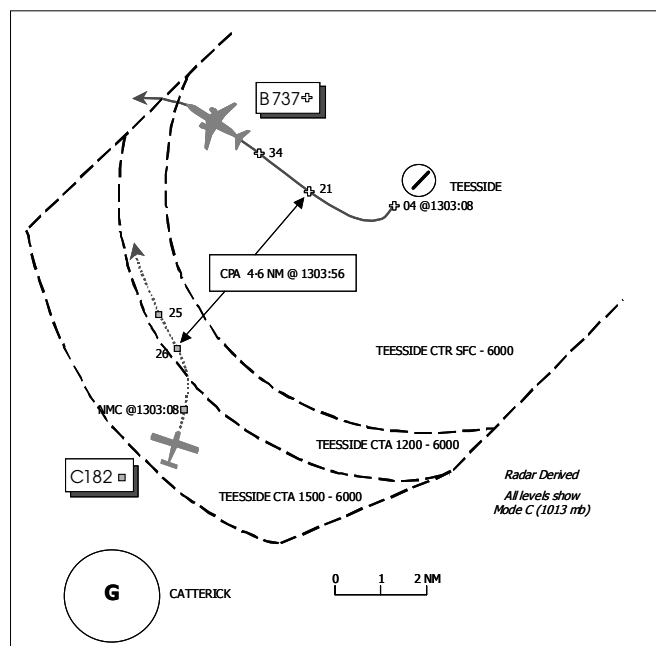
Alt/FL: 400 ft↑ 2000 ft
(QNH 1019 mb) (QNH 1019 mb)

Weather: VMC CLOC VMC SKC

Visibility: 10 km 20 km

Reported Separation:
NR NR

Recorded Separation:
500 ft V, 4.6 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TEESSIDE APPROACH CONTROLLER (APP/APR) reports that the C182 was orbiting Catterick Airfield conducting a parachute drop under FIS from Leeming Zone controller. The B737 taxied for departure from RW 23 and was instructed to depart on heading 260° climbing to FL 110 with SSR code 4462. At 1258 Leeming was informed of the impending departure, iaw the Teesside/Leeming LOA. The C182 (SSR code 0033) was then observed to have left Catterick and seen to be tracking NNW into the Teesside CTA. Leeming was immediately contacted and, simultaneously, Teesside Tower controller, via intercom, to try and stop the B737 departing; but it was too late. So Teesside Tower was told to turn the B737 on to a heading of 310° in order to remain clear of the C182. Leeming Zone was instructed to turn the C182 immediately on to E in order to clear RW 23's climbout area. The C182 continued to track NNW and separation reduced to 0 ft V/ 2 NM H. Once separation was regained, the B737 was turned, initially onto 270°, and then direct RIBEL. The C182 contacted Teesside APP/APR after the incident was over.

UKAB Note (1): The Teesside/Leeming LOA states:

"21. a) Teesside Traffic. Departures to the Southwest are to be pre-notified to Leeming 3 minutes before departure. Co-ordination will be effected as necessary to deconflict the departure from aircraft on the SIDs from Leeming.

b) Leeming Traffic. (1) Departures

22. All other traffic will be co-ordinated case by case by the controllers at both aerodromes in accordance with the priorities detailed in"

THE B737 PILOT reports that he had just departed Teesside RW 23, en route Dublin, and was in contact with Teesside Tower on 119.8 MHz squawking 4462 with Mode C. Heading 260° at 235 kt and passing 400 ft (QNH 1019 mb), he was instructed by ATC to turn onto heading 310°. Though in good VMC, he did not see the other ac. The B737 was grey with a red tail section.

THE C182 PILOT reports that he was jump pilot for a military parachute team display into Catterick Airfield. Having departed Peterlee he was cleared through the Teesside CTR at 2500 ft before being released to Leeming. Under a FIS from Leeming he climbed to 6000 ft (QFE) for the free fall display before descending to 3000 ft so as to advise Leeming when all canopies were on the ground and both drop zone and MATZ were clear. During this time Leeming was providing flight information to another ac with 4th and 5th registration letters identical to those of his own ac and the other ac seemed to be acknowledging all Leeming's transmissions addressed to the common abbreviated callsign. Moreover, the Leeming frequency was busy with other traffic and at the first opportunity, using his full callsign, he requested further descent and hand over to Teesside. Leeming's response was that they had been trying to contact him and their calls had been acknowledged. However, he believes that Leeming's instructions had been acknowledged by the other ac. He was then told abruptly to pass W abeam Teesside CTR/CTA and to contact Teesside on 118.85. At this point he was W abeam Teesside heading 010° at 120 kt and N of the 05/23 centreline. On changing to Teesside Radar he was informed that he had entered their CTA stub and another ac had been given avoidance action instructions. He was then told to head E towards the Teesside overhead and then N to continue his own navigation towards Peterlee. At no point did he see another ac, despite the perfect VFR conditions, or receive any avoidance instructions from Leeming or Teesside Radar.

He also reports that the C182 was white with a red stripe and that he had SSR code 0033 and Mode C selected on. The radios in the C182 were excellent and transmissions from Peterlee Radio, Newcastle, Teesside and the display's hand held 'ICOM' were all received at strength 5; whereas those from Leeming were, at best, strength 3. It was only after he reminded Leeming of his full callsign that Leeming subsequently used it to avoid callsign confusion with the other ac. Despite his best efforts to keep both Leeming and Teesside informed of the display and his intentions, in order that other traffic could be

given the most accurate FIS, he felt that he was "*receiving the poorest service*".

UKAB Note (2): Correlation between timing provided with the Leeming RT tape transcript and that provided with the Teesside RT transcripts and the radar data video recording reveals that the Leeming times are between 2.5 and 3 min in error. Accordingly, reference to Leeming RT transcript times has been eliminated to avoid confusion.

MIL ATC OPS reports that Leeming Zone (ZONE), manned by a trainee and mentor, was busy working numerous ac. The C182 pilot free-called ZONE whilst overhead Teesside at 2500 ft (Teesside QNH 1019 mb, but erroneously reported by the C182 pilot as QFE), having departed Peterlee en route for a parachute display at Catterick. Although the C182 pilot believed that he was the subject of hand over to Leeming and that ZONE had his details, this was not the case. Consequently, there followed a landline conversation with Teesside APP/APR during which the intentions of the C182 were clarified, and a more formal handover conducted concluding with Teesside APP/APR instructing ZONE "*... put him back on 7037 when you've finished with him going northbound back towards Peterlee*".

Communications with the C182 pilot were not of the highest quality and ZONE had considerable difficulty in getting the pilot to squawk the desired code. Nevertheless his intentions were established and pertinent traffic information was passed to fellow Leeming controllers. After the C182 pilot reported "*climbing to 6000 ft and we'll give you a call when we're ready to run in*" his SSR code was changed to 0033 (the paradrop squawk). ZONE passed further traffic information to Teesside on the C182, which by that time was "*north of Catterick Airfield 2 NM manoeuvring...*" and was advised "*OK we have nothing to affect at the moment*". Having established that the C182 pilot had amended the parachute drop times promulgated in the relevant NOTAM, clearance to commence drop was given and Teesside informed accordingly. Two min later Teesside Assistant called ZONE with information on traffic, the B737, about to depart RW 23 on track GASKO.

Another ac with the same 4th and 5th registration letters as the C182 called ZONE, after which point ZONE addressed both ac using their full

registration callsigns although the pilot of the other ac continued to abbreviate his callsign in response. The C182 pilot subsequently reported "*parachute display is complete and returning to Peterlee*". [UKAB Note: At 1302:30 Teesside APP/APR called Leeming to request information on the C182, which by that time had entered the Teesside CTA. Leeming Director answered the call initially. When ZONE came onto the landline Teesside APP/APR instructed him to turn the C182 right onto E immediately.] Following a slight delay caused by the transmission of another ac, the instruction "*... from Teesside turn right on to E immediately*" was relayed to the C182. This was initially queried by the C182 pilot but eventually acknowledged and shortly thereafter the C182 was transferred to Teesside.

It is evident that ZONE worked hard to ensure all relevant parties were kept informed of the progress of the parachute display. Thereafter it would appear that ZONE's attention was drawn elsewhere in response to numerous requests from other agencies. When ZONE's attention returned to the C182 it had already entered the Teesside CTA. Despite Teesside APP/APR advising ZONE that the C182 was in receipt of a FIS, no service contract was established on frequency, although both parties appear to have accepted continuity of FIS. Iaw JSP 318A Reg 235.125.1b, under FIS "*The controller may attempt to identify the flight for monitoring and co-ordination purposes only. Such identification does not imply that a radar service is being provided or that the controller will continuously monitor the flight*". Had ZONE been less busy he may have been able to remind the C182 pilot of his proximity to Class D airspace. Nevertheless, onus remained on the C182 pilot not to enter Class D airspace without appropriate clearance.

UKAB Note (3): Met Office archive data reveals that the Barnsley RPS on 20 June were: 1200-1300 1015 mb and 1300-1400 1014 mb.

UKAB Note (4): Analysis of the Gt Dun Fell radar data recording reveals the C182 entering the Teesside CTA at 1301:57 tracking NNE on a 0033 SSR code with Mode C displaying 029. At 1302:21 SSR contact is lost although Primary contact is retained. The B737 first appears at 1303:08 with Mode C displaying 004, and then turns onto NW. The C182 turns onto a NNW track and SSR contact is regained at 1303:56, when SSR code

7037 appears and Mode C shows 026. CPA occurs at 1303:56 as the B737 overtakes the C182 on its starboard side at 4.6 NM.

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 recording, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities. Discussion centred upon the service given to the C182 pilot and, more specifically, his perception of that service. Members were agreed that the FIS he received was correct although the pilot seemed confused about the service agreement and, probably, had higher expectations in view of the nature of his flight. Nevertheless, the fact that he was in

receipt of FIS from Leeming did not absolve him from the responsibility of obtaining a clearance to enter the Teesside CTA and this omission had caused the Airprox.

As to risk, it was clear to the Board that the actions taken by Teesside APP/APR controller, together with the very prompt reaction of the B737 pilot, achieving 4.6 NM horizontal separation, were effective in removing any risk of actual collision.

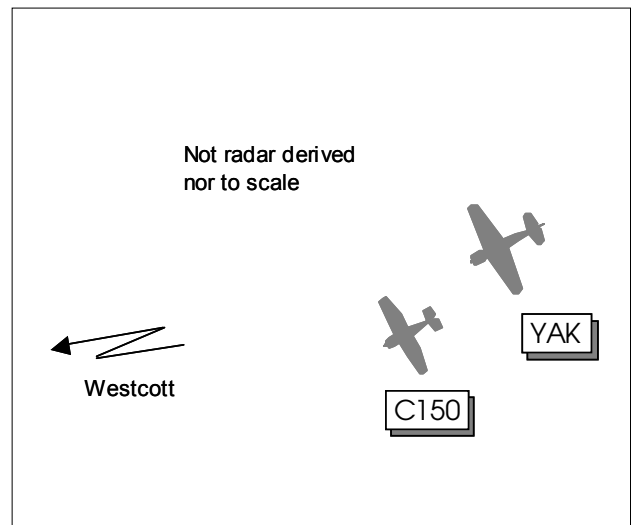
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: C182 pilot entered the Teesside CTA without clearance.

Degree of Risk: C

AIRPROX REPORT NO 92/02

Date/Time: 23 Jun 1349 (Sunday)
Position: 5152 N 0047 W (4 NM ENE WCO)
Airspace: FIR (Class: G)
Reporting Aircraft *Reported Aircraft*
Type: C150 Untraced YAK
Operator: Civ Pte NK
Alt/FL: 3000 ft NK
 (QNH 1021 mb)
Weather VMC CLBC NK
Visibility: >10 km NK
Reported Separation:
 0 ft V 100m H
Recorded Separation:
 not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C150 PILOT reports flying solo returning to Old Sarum from the PFA Rally at Cranfield heading 245° at 85 kt and 3000 ft QNH 1021 mb squawking 7000 with Mode C. The visibility was >10 km 1000 ft below cloud in VMC, the ac was coloured white/red and strobe lights were not fitted. He had planned a route to pass over

Leighton Buzzard on a heading of 257° to turn over the WCO NDB on Westcott disused airfield onto a new heading of 193°. Subsequently, he elected to 'cut the corner' to avoid flying directly over the WCO, passing no closer than 2 NM. About 5 NM before Westcott, he noticed two ac ahead; one was a YAK type ac overhead the

disused airfield heading NE at about his level (3000 ft) and the other ac was a low winged cabin monoplane, at a similar height and on a similar heading. The YAK appeared to manoeuvre close to the other ac, looking as if a collision was possible for although he was unable to judge the horizontal separation accurately, nil vertical separation existed. The other ac continued on a steady course and may have been unaware of the YAK. The YAK then turned steadily to the R until it was in his 6 o'clock and began to close. He thought that its pilot may not have seen him so he waggled his wings to increase his conspicuity but the YAK continued to close. When it was about 300 m away, he decided to take evasive action by rolling his ac L, beyond the vertical, and making a steep descending turn which involved about 500 ft height loss and 90° heading change. On levelling out, he saw the YAK had followed him and was still in his 6 o'clock. He repeated the evasive manoeuvre, levelling at 2000 ft. A few seconds later the YAK overtook him on his RHS, at a distance of 100-150 m, and then turned away. He had no doubt that the manoeuvres performed by the YAK pilot had been a deliberate attempt to formate on his ac without his permission. The actual risk of collision had been hard to judge but during his evasive manoeuvres he had lost sight of the YAK owing to the restricted visibility caused by his high wing configuration. Also, other passing ac could have been placed at risk, as the area at WCO is a known 'choke point'.

AIS MIL reports that despite extensive tracing action the identity of the YAK remains unknown. The recorded radar displays extensive clutter owing to the density of traffic in the immediate area participating in the PFA Rally at Cranfield. The primary only radar return on the YAK is intermittent and so consequently could not be tracked from or to an airfield. A procedural trace of all YAK based in the area did identify one possible ac airborne about the time of the incident. The pilot was contacted and had agreed to complete a CA1094 Airprox form for his flight in the area. Subsequently when the pilot was contacted, owing to the lack of response to the UKAB request, he had declined to complete the form as he had later believed that he had been operating further to the NE and had not flown in the WCO area.

UKAB Note (1): Met Office archive data shows the QNH in the Westcott area as 1021 mb whilst the Cotswold RPS 1300-1400Z was 1018 mb.

UKAB Note (2): Analysis of the Clee Hill, Heathrow and Debden radar recordings proved inconclusive. Correlation to the C150 pilot's GPS logged position when the encounter occurred shows the C150 at 1348Z 4.5 NM ENE of Westcott tracking 240° at FL 028 (3000 ft QNH 1021 mb). Approx 1 min later the C150 is then seen to turn L 90° and descend 500 ft which is followed 15 sec later by a further 180° turn to the NW and a further 500 ft descent. An intermittent primary only return, possibly the untraced YAK, is seen 1 min prior to the incident, flying in close proximity to another ac tracking NNE at FL 028, both ac pass about 0.5 NM to the W of the C150. However, the close encounter, as described by the C150 pilot, is not seen on recorded radar.

UKAB Note (3): Extracts from CAP393 Air Navigation: The Rules of the Air Regulations 1996 Rules for avoiding aerial collisions Rule 17 (1) General states:

- b) An aircraft shall not be flown in such proximity to other aircraft as to create a danger of collision.
- c) Aircraft shall not fly in formation unless the commanders of the aircraft have agreed to do so.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the C150 pilot and radar video recordings.

From the limited information available to the UKAB, it was difficult to obtain a balanced view of the incident. Although the recorded radar had shown the C150 clearly throughout the encounter, the YAK ac had only been seen intermittently as a primary only return immediately prior to and post Airprox. The avoiding action manoeuvres, as described by the C150 pilot are seen but no radar contact is observed in close proximity during the manoeuvring. The C150 pilot had supplied a full report which described in great detail the events leading up to and during this incident and it was on this information that the UKAB assessed the Airprox. Members commended his 'wing

wagging' actions in an attempt to make himself more conspicuous. However, some pilots thought that the initial robust L turn, almost a wing over, followed by further steep turning, could have sent the wrong message to the YAK pilot who may have thought it to be an invitation to follow him. Members took a dim view of this and agreed with the C150 pilot's comments. The YAK pilot's actions, in flying in formation behind the C150 without agreement, had caused the Airprox, contrary to ANO Rule 17 (1) b) and c).

In these circumstances, any unplanned manoeuvring, not previously agreed between the pilots, was inherently unsafe owing to the close

proximity of the subject ac and the unpredictable nature of the situation. This led the Board to conclude that during this encounter the safety of the ac had not been assured.

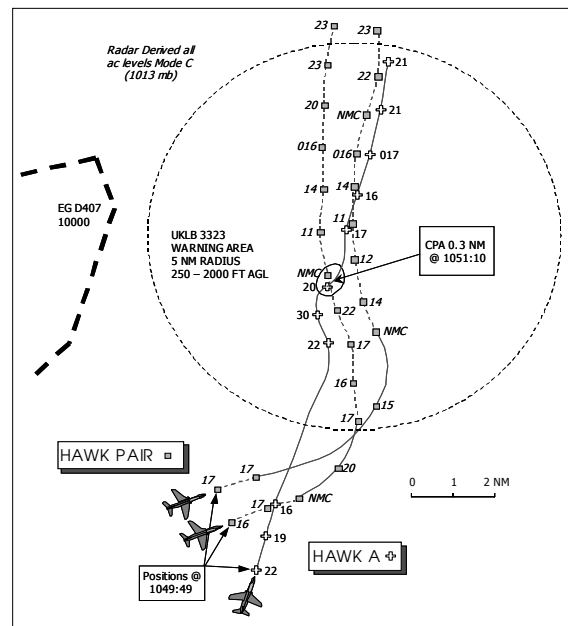
PART C: ASSESSMENT OF CAUSE AND RISK

Cause:The untraced YAK pilot flew in formation behind the C150 without the C150 pilot's agreement in contravention of ANO Rule 17 (1) (b) and (c).

Degree of Risk: B

AIRPROX REPORT NO 93/02

Date/Time: 20 June 1051
Position: 5435N 00206W (Grassholme Reservoir, 6 NM NW Barnard Castle)
Airspace: UKDFLS LFA 17 (Class: G)
Reporting Aircraft Reported Aircraft
Type: Hawk Hawk
Operator: HQ STC HQ PTC
Alt/FL: 1000 ft 1000 ft
 (agl) (agl)
Weather VMC Sky Clear VMC CLBC
Visibility: 40 km 30 km
Reported Separation:
 Nil V, 100 m H 500 ft V, 500 ft H
Recorded Separation:
 NR V, 0.3 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

HAWK (A) PILOT reports that he was conducting a 'pop' attack on a simulated target whilst engaged in a Close Air Support (CAS)/ Forward Air Controller (FAC) training exercise centred on a position 6 NM NW of Barnard Castle and working with a FAC on 340.35 MHz. On leaving the nominated Initial Point (IP) heading 018°(T) for the run into the target area, he saw a pair of Hawks out to his left in battle formation heading E; these crossed the nose of his ac

approximately 2 NM ahead. Three NM from the target he turned left onto 348°(T) and climbed before 'tipping in' right onto 048°(T) in a 10° dive. As he was accelerating through 400 kt and approaching 1000 ft above target level, another Hawk emerged slightly below the left side of the nose of his ac. This ac, heading NW, had already crossed ahead by an estimated 100 m. His immediate reaction was to level off and check for further conflicts. He then turned N in an

attempt to identify the other Hawk by its markings at which point he realised that it was one of a pair that, by now, was exiting the target area. He assessed the risk of collision as extremely high.

He also reports that his ac was black in colour, that HISLs were selected on and that the weather at the time of the incident was good. However, his workload during the simulated attack was high and his eyes were into the target area, hence the need for NOTAM warning. Nevertheless, although the exercise was the subject of a NOTAM notifying both activity and an appropriate contact frequency, neither he nor the FAC staff can recollect a call from the Hawk formation. However, a call had been received from a pair of Jaguars, which had transited to the S of the target area some mins before the incident.

UKAB Note (1): NOTAM UKLB 3323 notified "... B. 200900ZJUN02 C. 201600ZJUN02. E. Warning: Forward Air Control Exercise. 1 x Hawk will participate in a Forward Air Control Exercise with a 5 NM radius of position N5437.09 W000204.32 (NY954 248). Aircraft will be conducting intensive training manoeuvres and may be unable to comply with the national rules of the air. Crews are strongly advised to contact Jackpot Control on 370.200 if intending to transit this area. F. 250FT AGL G. 2000FT AGL. Activity extends to 15000FT AMSL. ..."

THE HAWK PAIR LEADER, a QFI, reports that his formation was conducting a Simulated Attack Profile (SAP) student training exercise landing at Leuchars; he was the PNF. The FAC exercise NOTAM had been plotted in the planning stage and it was decided to call the FAC prior to transiting the area. The location of the exercise area made it difficult to transit at low level from northern England to the Borders region without passing through it, owing to weather over the Pennines. After entering low-level, the trainee pilot leading the formation was working hard to achieve his planned time on target, and the formation changed to the notified FAC contact frequency later than had been intended. Shortly before the frequency change, No 2 called "*Tally, right 2 o'clock high, one Hawk*" to which the formation leader responded that he was visual. Approximately 30 sec before entering the NOTAM area, RT contact was established with the FAC who advised that he had a Hawk operating at 250 ft. During a battle formation turn onto a northerly

heading, at about 1000 ft agl, a Hawk was spotted at 9 to 10 o'clock, performing what looked like a dive attack towards them and across their projected track. A climb was initiated and he crossed just ahead of the other ac, which eventually passed about 500 ft below and 500 ft behind. Had he not climbed, there would have been a risk of collision.

He adds that at the time of the encounter his ac was on the left, was heading 360° at 420 kt and 2000 ft beneath cloud with good forward visibility. Also that his ac was black and that HISLs, navigation and landing lights were all selected on.

UKAB Note (2): Analysis of a transcript of the audio channel of the Hawk Leader's Gunsight Video Recording System (GVRS) reveals that the student in the Lead aircraft called on the notified frequency, iaw the NOTAM, prior to entry reporting "*we are presently 4 NM S of your boundary, heading northbound of the ... transiting through 3 mins*". The response from the ground party, however, was addressed erroneously not to the Hawk formation callsign but to that used by a Jaguar unit. When advised of the presence of Hawk(A), the student responds "*Visual. He was about 2 o'clock as we rolled heading E*". The instructor is then heard, on intercom, telling the student to climb and thereafter transmitting, to the ground party, "*We have good visual with Hawk, we have just seen him*". The instructor then transmits "*If you want we can stay above 1000 ft during 3 mins. Jackpot, your Hawk is climbing, now we descend to 250 ft.*" Unfortunately, no timing is provided with the audio transcript.

HAWK (A) PILOT'S UNIT states that the complex nature of CAS/FAC training justifiably warrants the issue of a NOTAM. For ac to penetrate such an area without a radio call is poor airmanship. However, the Hawk formation that entered the area may contest the claim that they did not call. To make all CAS/FAC training areas a permanent avoid would further reduce the airspace available for low flying and potentially concentrate ac in other areas. An alternative is to remind crews of the requirements to call the controlling authority and/or only permit access once 2-way RT has been established.

HQ STC comments that Hawk Pair contacted the notified FAC frequency, but received misleading

information that Hawk (A) was operating at 250 ft; hence, the impression that it would remain low. It would have been more useful had the FAC ground party given a better description of the dynamic nature of the exercise being conducted. With the information provided, the formation took the sensible precaution of flying at 1000 ft to avoid the exercise ac. It is recognised that promulgation by NOTAM of FAC training is a warning and not an avoid, in part because the FAC exercise was located in very busy training and transit airspace. To make this exercise an avoidance it would have to be relocated to less popular airspace. Finally, this is a reminder that aircrew must maintain a good lookout in all areas, despite expectations formed by dialogue with advisory agencies.

THE HAWK PAIR'S UNIT states that the task of the unit is such that, frequently, syllabus sorties have to chase reasonable weather in order to achieve sufficient objectives to progress student training. This was the case for this formation, which planned a medium level transit, an IMC letdown with Leeming and a 2-ship SAP sortie to Leuchars. The weather and the lack of excess fuel required the formation to route through the NOTAM area, in order to allow sufficient fuel to prosecute 2 IP – Tgt runs required by the sortie profile. Although later than planned, the formation contacted the FAC in sufficient time to be advised of the single Hawk operating in the area. Furthermore, the Formation Leader was visual with the ac prior to the turn onto N and again just prior to the reported incident. Already at 1000 ft agl, the Leader's decision to climb to 2000 ft was appropriate and timely. It would appear that this prevented serious risk of collision.

With hindsight, an earlier call to the FAC would have allowed more time for the participating Hawk to have been advised of the transiting formation and, perhaps, 2 min is sufficient time to allow for adequate deconfliction. However, when operating areas are limited by weather and range, there will be occasions when warning areas promulgated by NOTAM will need to be transited. In these instances, procedural deconfliction and 'see and avoid' techniques will have to be relied upon.

HQ PTC comments that after full investigation they are satisfied that the Hawk Pair saw and

avoided Hawk (A) during both encounters. Satisfactory explanation was also provided as to why it was necessary for the Hawk Pair to pass through the NOTAM area. Moreover, it is evident that there was a 2-way conversation with the FAC control (iaw the NOTAM), although after No 2 had already called Hawk (A) to Lead during the first encounter. Nevertheless, the need for a more timely call before entering such areas has been noted.

UKAB Note (3): Met Office archive data reveals that the 1000 UTC Barnsley RPS was 1017 mb.

UKAB Note (4): Analysis of the Gt Dun Fell radar data recording reveals that at 1048:55 Hawk (A) is turning about to the right with the Hawk Pair 4.5 NM to the NW, tracking NNW in battle formation. Just before Hawk (A) completes the right turn onto a NNE track, returns from the Hawk Pair are lost. They reappear at 1049:17 tracking ENE at 9 o'clock to Hawk (A) at 4 NM converging. At 1049:46 Hawk (A) makes a slight adjustment of track to the left putting the Pair into his 10 o'clock. The Hawk Pair cross 0.5 NM ahead, both ac indicating 017 on Mode C, whilst Hawk (A) indicates 019. The next sweep shows Hawk (A), indicating 016 on Mode C, crossing 0.6 NM behind the right hand ac. Only one return is evident on the next sweep, which indicates 020 on Mode C; this is believed to be the right hand ac of the Pair. At 1050:36 2 returns are evident, which are believed to be those of the Hawk Pair during their left turn to a northerly heading. However, the next sweep shows only one return, possibly that of the right hand ac as it crosses over to the left. All 3 returns appear on the next sweep, at 1050:51, with Hawk (A), indicating 022 on Mode C, to the west of the left hand ac at a range of 0.5 NM. The next sweep shows the Pair, indicating 022 and 014 left and right respectively, overtaking Hawk (A) to its right; Hawk (A) indicates 030 on Mode C. The next sweep, at 1051:07, shows Hawk (A) crossing 0.3 NM behind the left hand ac; unfortunately no Mode C is evident. This is consistent with the right turn onto 048°(T) reported by Hawk (A) pilot. It would appear, therefore, that the reported encounter occurred just prior to this. Mode C on the left hand ac indicates 020. Once again the return from Hawk (A) is lost but reappears on the next sweep at 6 o'clock to the right hand ac, on a NNE track at a range 1.2 NM, thereafter continuing in trail to the Pair.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included reports from the pilots of both ac, transcript of the audio channel of the Lead Hawk GVRS, map used by Hawk Pair, radar video recording, and reports from the appropriate operating authorities.

It was unfortunate that investigation of this incident has been unnecessarily protracted due to the late receipt of F765A. It would appear that, in some cases, insufficient urgency or importance is attached to this phase of the UK Airprox Reporting Procedure, suggesting it need be given greater publicity on mil Flight Safety courses.

Given notification of the CAS/FAC training exercise provided by the NOTAM, together with the planning necessary for the student training exercise conducted by the Hawk Pair, the Board expressed some surprise that this encounter could occur where, apparently, appropriate safety nets were in place. However, as events transpired it was recognised that such safety nets proved inadequate. In the first instance, some Board members took the view that the planning of the Hawk Pair to fly directly through the exercise area was unwise where appropriate alternative options existed. Safe penetration of the exercise area relied upon establishing RT contact on the notified frequency in sufficient time; though planned, in the event contact was late and, from the GVRS audio transcript, would appear to have been effected only as the Pair was entering the area. This provided insufficient time to enable notification to the Hawk(A) pilot who remained oblivious of the pair until the reported encounter. Moreover, ATC Board members questioned the use of "Control" in the callsign used by the ground party since this implied provision of services that the ground party clearly was unable to provide.

Misunderstanding arose from the initial call by Hawk Lead, as ac type was not reported. The ground party made a false assumption that not only was the calling ac a Jaguar, but also that it was passing to the S of the area. Further

confusion arose when the ground party reported, inaccurately, that Hawk (A) was operating at 250 ft. Aware that his student's call was late and told that Hawk(A) was operating at 250 ft, members regarded understandable the instructor's decision to climb to 1000 ft for transition through the area. This information, however, was not relayed to Hawk (A) and, as events unfolded, this action proved to compound the situation. From the transcript of the GVRS audio channel it would appear that as the Leader of the Hawk Pair climbed, so he saw Hawk (A), by now above him, as it tipped into the dive. Although all pilots had equal responsibility to see and avoid, at this juncture the Board considered that only the Hawk Leader could reasonably have been expected to see the quickly developing situation. It was probable, therefore, that he pushed down to cross beneath Hawk (A). The Board concluded therefore that confliction had developed following a breakdown of the warning links, and was resolved by the actions of the Hawk Pair Leader, which though removing risk of actual collision left a situation where safety had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Confliction in a NOTAMed exercise area resolved by the Hawk Pair Leader.

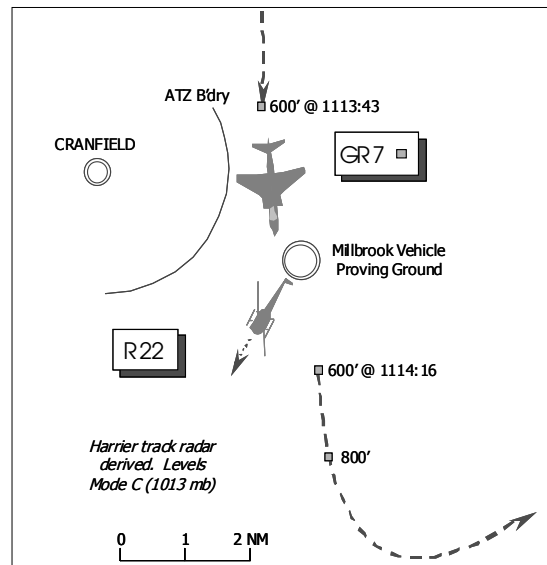
Degree of Risk: B

Contributory Factors:

- a. The Hawk Pair made RT contact with Jackpot late.
- b. Jackpot assumed that Hawk Pair Leader was a Jaguar and passing to the S.
- c. Jackpot told Hawk Pair Leader that Hawk (A) as operating at 250 ft.
- d. Jackpot did not warn Hawk (A) of the presence or intentions of the Hawk Pair in the time available.

AIRPROX REPORT NO 94/02

Date/Time: 14 June 1214
Position: 5202 N 0032 W (Millbrook - Vehicle proving Ground)
Airspace: London FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Robinson R22 Harrier
Operator: Civ Comm HQ STC
Alt/FL: 200 ft 250 ft
 (aal) (Rad Alt)
Weather VMC CAVOK VMC into sun
Visibility: 10 km 10 km +
Reported Separation:
 200 ft H Not seen
Recorded Separation:
 Not recorded

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE ROBINSON R22 PILOT reports his helicopter has a blue colour scheme, but HISLs are not fitted. He was flying one of three Robinson R22s which were all engaged in training flights in CAVOK conditions at a temporary licensed aerodrome established at Millbrook circuit.

Two of the R22s had already lifted and were turning crosswind in the RHD Cct ahead of him when he took off heading 200° at 60 kt. Whilst in the climb at about 200 ft aal a Harrier was sighted at L 9 o'clock and overtook his helicopter heading S after approaching from astern through the Millbrook overhead. The jet passed 200 ft to port at the same height with a high risk of a collision and then continued southbound before turning to the E about 2-3 NM away.

He added that a CANP had been filed for the activity.

UKAB Note (1): Enquiries with the STC LF Ops revealed that no CANPs had been filed through the LFBC for this activity.

THE HARRIER GR7 PILOT reports his ac has a grey camouflage scheme, but HISLs were on whilst engaged on a low-level sortie. He was in communication with Henlow on 121.1 MHz, and

squawking A7001 with Mode C, but neither TCAS nor any other form of CWS is fitted.

At the reported Airprox location he was heading 180°, into sun at 420 kt. At the time, he was resolving an in-flight emergency involving an "uncommanded extension of the air-air refuelling probe" on the port side of his ac. This required him to start a shallow climb up from 250 ft Rad Alt and slow down to 200 kt while dealing with the problem. He did not sight the helicopter to starboard flown by the reporting pilot, nor see it pass down the starboard side and was unaware that an Airprox had occurred, so was unable to provide any further detail.

UKAB Note (2): Enquiries with the CAA's Aerodrome Standards Dept (ASD) reveal that a temporary aerodrome [heliport] seasonal license was issued for Millbrook Vehicle Proving Ground on 29th May 2002. This seasonal license permitted operations through the year, on specific dates, to be notified to the CAA a minimum of 2 weeks in advance and this was the second occasion that Millbrook had been used in this way. This type of event required a 'licence' only because it included an element of "flying training", in that the client was permitted to try out the effects of controls during a 10 min helicopter experience flight. Were the event to be

a "pleasure trip", then no aerodrome licence would be required, and ASD would not be involved. An ATZ was not requested, but an Air/Ground service was to be provided on 130.50 MHz (dependent on frequency availability), whenever the event took place. The operator was apparently required to inform Cranfield ATC when operations took place, and they, in turn, would advise ac in the locality.

ASD did not in this case insist on a NOTAM, because it was believed that notification to Cranfield ATC would suffice. Promulgation by NOTAM had been discussed with the operator in the past, but ASD had been assured that arrangements whereby Cranfield, once advised, would pass on the information to all traffic in the area which contacted them, were sufficient.

As a result of this Airprox and following discussions with DAP, it was decided that an ATZ was not appropriate for this event because of the confined airspace in this vicinity. However, ASD have ensured that in future a NOTAM will be promulgated in advance of each event. Furthermore, STC LF Ops will also be notified beforehand, so that a UKLB NOTAM can be issued for the benefit of military crews in addition to the civilian NOTAM from AIS.

UKAB Note (3): The LATCC (Mil) radar recording does not illustrate this Airprox as the Robinson R22 helicopter is not shown at all. The Harrier is shown southbound approaching the vicinity of Millbrook at 600 ft Mode C (1013 mb), but radar contact is lost at 1113:43. The Harrier is seen again 1.5 NM to the S of Millbrook about 33 sec later - still indicating 600 ft - before climbing to 800 ft (1013 mb), which is maintained for a short while before descending back to 600 ft and turning ENE.

HQ STC comments that it is pleasing that lessons have been learnt from this Airprox, and more robust notification procedures will now be employed.

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 authority.

Despite the R22 pilot's assertion that a CANP had been filed this was apparently not the case. However, it was evident that the helicopter pilot's company had effected appropriate co-ordination with ASD to enable this 'training' activity to take place, but the arrangement put in place was inherently flawed. An assumption had been made that all traffic in the vicinity would be in RT communication with Cranfield ATC, an assumption proved erroneous by the Harrier, whose pilot had, for whatever reason, elected to call Henlow not Cranfield – as he was entitled to do. Nevertheless, several members who regularly fly in this area agreed that Cranfield was invariably contacted by GA pilots, as the most commonly used ATSU since the demise of the Wyton LARS several years ago, but there was clearly no compunction to do so when flying in the FIR. This led the Board to conclude that the decision not to issue a NOTAM, warning other airspace users of the establishment of this temporary aerodrome at Millbrook Vehicle Proving Ground for the R22 helicopters that would be circuiting there, was unwise. Therefore, the activity was not promulgated and thus the Harrier GR7 pilot's pre-flight planning would not have revealed this helicopter 'training' with no apparent reason to plan his route to avoid this area. It was encouraging to note the revised arrangements for promulgating this activity by NOTAM, which included Mil LF Ops in the notification and consultation process; the change would go a long way to removing the potential for a recurrence, such as happened here.

Turning to the incident itself, a helicopter pilot queried whether any 'clearing' turn had been made by the R22 pilot before taking off from the temporary aerodrome at Millbrook, as this was not clear from his report. However, it was pointed out that the speed of the GR7 at about 7 NM/min would probably have precluded sighting the jet before the helicopter started to climb. Some members thought this part of the cause, but most believed the R22 pilot would have been unable to sight the jet as it approached from astern until it overtook his helicopter to port, rendering him powerless to effect the outcome of this close encounter - in what was the 'Open FIR'. It was apparent that the Harrier GR7 pilot was also powerless to effect the outcome if he had not

seen the R22 either. This very small helicopter – without the benefit of HISLs – at a tail-on aspect to the Harrier, climbing from below the jet’s nose with little lateral motion would have been extremely difficult to spot indeed; R22 helicopters are notable for their lack of conspicuity. This, coupled with the added distraction of resolving his in-flight emergency, had allowed the helicopter to climb unseen by the jet pilot, which the Board determined was the cause of this Airprox. With regard to risk, it was impossible to verify the reported separation without the benefit of recorded radar evidence. However, the R22 pilot said that the jet passed 200 ft to port at the same height when he first saw it, which was very close. One fast-jet pilot member suggested that whilst safety had certainly been compromised there was no actual risk of a collision, because if the R22 had been directly in the Harrier’s path its pilot

would certainly have seen it as it ‘bloomed’ in his windscreen. However, this was a solitary view. As the helicopter was climbing from below the jet’s height other members were not convinced that even if the GR7 pilot had spotted it late, at these distances there would have been time to do anything about changing the jet’s flightpath. Thus any separation that existed was purely fortuitous and the Board concluded, therefore, that an actual risk of a collision had existed in the circumstances that pertained.

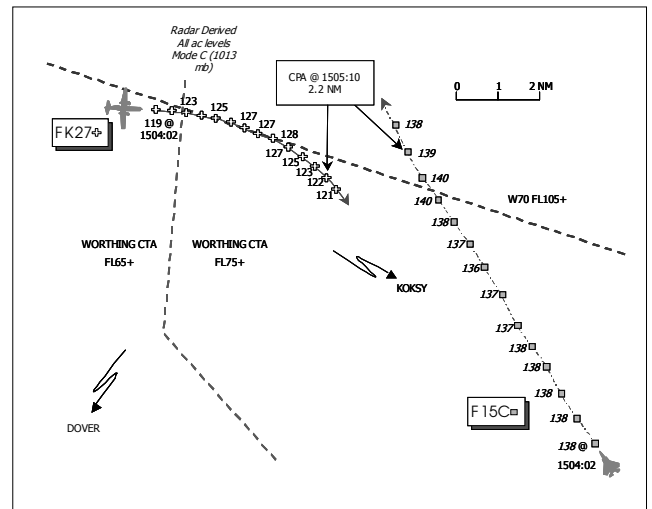
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the Harrier GR7 pilot.

Degree of Risk: A

AIRPROX REPORT NO 95/02

Date/Time: 13 June 1505
Position: 5118 N 00138 E (12.5 NM NE of Dover)
Airspace: Worthing CTA (Class: A)
Reporter: LACC
First Aircraft Second Aircraft
Type: FK27 F15C x 3
Operator: CAT Foreign Mil
Alt/FL: FL 127↑ FL 140
Weather IMC VMC CLBL
Visibility: <1 NM NK
Reported Separation:
 700 ft V, 2-3 NM H NK
Recorded Separation:
 1700 ft V, 2.2NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

LACC SECTOR15/16 TACTICAL CONTROLLER reports that at the time of the incident RTF and traffic was assessed as medium to high. At approximately 1500 the FK27 was climbing out of Southend towards KOKSY. Several Cleared Flight Path requests were submitted by a military sector in quick succession and, after

discussion with S15/16 Planner, the ac concerned were cleared to cross the sector. As a consequence the FK27 was stopped off at FL 130 against one of these military tracks, an F15 formation at FL 140, and traffic information was given. At approximately 1503 S15/16 Planner drew his attention to the SSR Mode C of the F15

formation, which showed FL 138. He immediately gave the FK27 avoiding action and traffic information. The FK27 reported IMC and unable to establish visual contact. Moreover, the FK27 did not report a TCAS RA. Although it was too busy to ascertain exact miss distance it was, in his opinion, less than prescribed minima.

THE FK27 PILOT reports that he was outbound from Southend, en route to Saarbrücken, under Radar Control from London Control on 134.9 MHz and squawking 0547 with Mode C. He was heading 100° and climbing in IMC at 180 kt. His ac is white/green in colour and nav lights were selected on. Earlier London Control had advised that a 4-ship military formation would pass overhead and he was hoping to break out on top to be visual with the formation. However, passing FL 127, whilst still in a thin layer of cloud, a TCAS audio alert was received and at the same time ATC gave instructions to turn S and descend to FL 120 for avoidance. As he turned away, TCAS showed a contact 700ft above, at FL 131-132 he thought, which ultimately passed 2 – 3 NM down the left side although nothing was seen as he had remained in cloud. Nevertheless, he assessed that the risk would have been very high had the avoiding action not been taken.

UKAB Note (1): It appears that the LACC electronic flight strip for the F15s indicated the formation comprised 4 ac, whereas it was subsequently confirmed by the ac operating authority that the formation comprised 3 only.

THE F15C PILOT reports that he was leading a flight of 3 ac returning to Lakenheath from France. He reported, erroneously, that he was at FL 160. He was operating IFR, heading 330° at 300 kt and in receipt of a Radar Control Service from London Mil. He was given instructions to climb by London Mil and, after climbing as instructed, advised that he had been cruising 300 ft low. He checked that his altimeter setting was 29.92 in and that he was showing on altitude. However, his wingman advised that he had also been showing the formation as 300 ft low. After further crosschecking within the formation, he confirmed that his altimeter was in error by 300 ft. He was told that the other ac was co-ordinated 1000 ft below but was not seen.

The pilot also reports that the colour scheme of his ac was grey, that HISLs were selected on and

that he was clear of cloud between layers. However, because the other ac was not seen he is unable to provide an assessment of risk. On landing the ac was given to maintenance for resolution of the altimeter problem.

MIL ATC OPS reports that the F15 formation was routing DVR-WD7-CLN EGUL at FL 140 on a Cleared Flight Path. The F15C pilot called LJAO SE sector at 1501:07, having been the subject of a military prenote from Mazout Radar a French mil ATC unit. The formation was identified at FL 140 and placed under a Radar Control Service. The LJAO SE controller was unable to approve a request for climb to FL 200, information subsequently repeated, which was accepted by the F15C pilot with the response *"now we could just take 140 at this point we're going to need to descend here pretty quick anyway"*. At 1504:37 the controller called traffic, the FK27, *"C/S traffic left 10 o'clock range seven miles crossing left right co-ordinated one thousand feet below. Maintain FL 140 climb FL 140"*. As the transmission was made, the controller noticed Mode C readouts drop to FL 137 and 136. Therefore, this was immediately reinforced, at 1504:52, with *"C/S avoiding action climb FL 140 there's co-ordinated traffic left 10 o'clock range of 5 miles now"*, to which the F15C pilot responded *"C/S level 140"*. There then followed further discussion between controller and pilot as to the FL being maintained since SSR Mode C had shown FL 136 and subsequently, after the reported incident, was showing FL 137. At this point the controller requested that a *"wingman pick up the squawk"*. Thereafter no further problem with Mode C occurred.

In anticipation of heavy traffic demand resulting from recovery of exercise traffic, the Mil Supervisor was at the controller's workstation. He considered that despite the high workload, the controller immediately noticed the decreasing Mode C readout and proceeded to issue a sequence of unambiguous traffic information and avoiding action instructions.

Analysis of the radar recording shows the F15C, squawking 6437, with Mode C indicating FL 139 or FL 138 until 1504:34, when it drops to FL 137, and then FL 136 at 1504:46. This is followed by a sharp climb to FL 140 at 1505:04. Although the F15C was indicating FL 139/8 for some miles, it was not necessary for the controller to challenge

the pilot until the readout went outside level occupancy criteria promulgated in JSP 318A Reg 601.115.3. As soon as this occurred the controller was quick to react in order to resolve the confliction with the co-ordinated traffic. Throughout the incident the controller kept the F15C pilot apprised of the traffic situation and the need to maintain FL 140.

UKAB Note (2): JSP 318A Reg 601.115.3a. states that "*In Level Flight. An aircraft may be considered to be at an assigned level provided that the Mode C readout indicates 200 ft or less from that level.*"

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The HQ 3AF USAFE adviser explained that the altimeter of the F15C had been checked post-flight, found incorrect, although within prescribed tolerances, and had been recalibrated. No further

altimetry problems were noted in the ac maintenance log. He also advised the Board that the issue of flying off altitude had been discussed with the F15C formation after the flight and it had been agreed that other members of a formation would advise the leader if he were cruising >100 ft off altitude for an extended period of flight.

The Board had extended discussion as to whether the reported incident constituted an Airprox since, despite the unauthorised excursion from assigned level by the F15 formation, prescribed separation minima had been maintained. It was clear, however, that both controllers perceived that there was potential for confliction and took resolution action accordingly. This persuaded most members that the incident was an Airprox precipitated by an altimeter malfunction of the lead F15C. All agreed, however, that there had been no possibility of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F15 formation flew below their assigned level.

Degree of Risk: C

AIRPROX REPORT NO 96/02

Date/Time: 25 June 1512

Position: 5125 N 00121 W (5 NM N Oxford/
Kidlington - Elev 270 ft)

Airspace: Oxford AIAA (Class: G)

Reporting Aircraft Reported Aircraft

Type: PA28R AC12

Operator: Civ Trg Civ Pte

Alt/FL: 1800 ft 2000 ft
(QNH 1027 mb) (RPS 1019 mb)

Weather VMC CLOC VMC CLBC

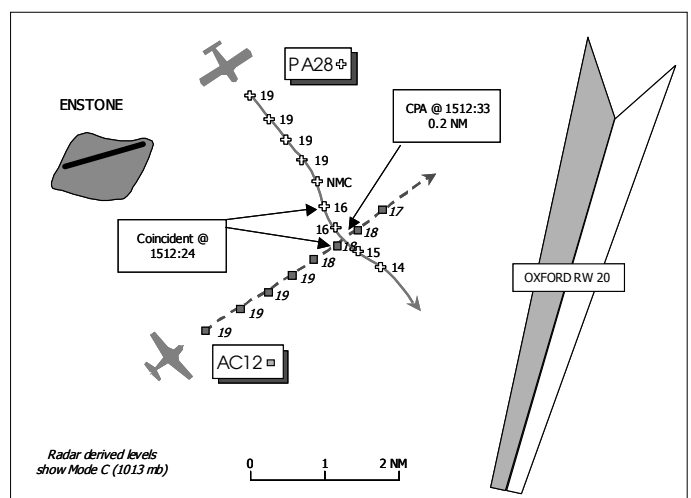
Visibility: >6 NM 30 km

Reported Separation:

Nil V, 100 m H 1000ft V, 1.5NMH

Recorded Separation:

200 ft V, 0.2 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PA28R PILOT, a QFI, reports that he was inbound to Oxford from Coventry on an instructional sortie and was in contact with Oxford Tower on 133.42 MHz squawking SSR code 7000 with Mode C. Whilst heading 200° at 4.2 DME on final approach to Oxford RW 20, he thought, at 90 kt and passing 1800 ft (Oxford QNH 1027 mb) in descent, another ac, similar to a Rockwell Commander, was first seen at the same altitude, approximately 150 to 200 m closing from R to L. He immediately took control and dived below the conflicting ac. He assessed that there was a high risk of collision. He adds that his ac was white and orange with black trim and that HISLs and landing light were selected on.

UKAB Note (1): In a subsequent conversation with the pilot, it transpired that the PA28R was actually tracking 150/160° and turned onto final approach after the reported incident.

THE ROCKWELL COMMANDER (AC12) PILOT reports that he was flying in good VMC from Brize Norton to Hinton in the Hedges and was in receipt of a FIS from Brize Radar on 119.00 MHz, squawking 3707 with Mode C. At 4 NM NE of Enstone Airfield, he thought, whilst heading 045° at 120 kt and flying at 2000 ft (Cotswold RPS 1019 mb, he thought), a PA28R was seen at 11 o'clock, initially at approximately 10 NM and below. In law the rules of the air he maintained course expecting the PA28R to alter course to the R and pass behind. It was evident, however, that the PA28R pilot, did not see his ac until the last minute and then reacted by descending further to pass beneath. He estimates that the PA28R, which he saw early and monitored throughout the encounter, passed 1.5 NM clear and 1000 ft below. It had not compromised safety of the AC12.

The AC12 pilot also reports that his ac was white with blue stripes, had white wings and that wing and tail HISLs, together with red fin anti-collision beacon, were all selected on.

UKAB Note (2): At the time of the incident another ac was approximately 1.5 NM to the ENE of the AC 12 and also crossing the track of the AC12. However, this ac, which was also

proceeding in the direction of Oxford/Kidlington, crossed 0.75 NM ahead and 200 ft below the AC12.

MIL ATC OPS reports that the AC12 pilot called Brize Norton Zone (ZONE) at 1504:38 on a Burford Departure. Approval was given for direct routing to Hinton climbing to 2000 ft on the Cotswold RPS, 1023 mb. The AC 12 pilot reported leaving the CTR at 1508:14 and, as requested, was given FIS and warned of Hinton parachuting activity. At 1512:10, the AC12 pilot advised ZONE that he was changing to Hinton and would be squawking 7000. After acknowledgement by ZONE, the AC12 left the frequency at 1512:20.

UKAB Note (3): Met Office archive data confirms that the 1500 – 1600 Cotswold RPS was 1023 mb.

UKAB Note (4): Analysis of the Clee Hill Radar data recording reveals the AC12, squawking 3707, clearing the Brize Norton CTR at 1508:24 and thereafter maintaining a steady NE track. Meanwhile, the PA28R is shown tracking SSE closing with the AC12 on a steady bearing until, at 1512:17, it is seen altering course to the right to pass behind and below. Shortly after the encounter, the AC12 changes to SSR code 7000.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar data recording and reports from the appropriate ATC authority.

It was explained to members that on initial viewing of the recorded radar data, it proved impossible to correlate the PA28R pilot's report with any event on the radar data, although the track of the AC12 could be readily identified. However, discussion with the PA28R pilot revealed that the incident actually occurred prior to turning on to final approach and, on re-examination, corresponded with geometry shown on the recording and as plotted on the diagram. Nevertheless, such are the disparities between the reported separation distances that it was possible that the AC12 pilot had seen another

PA28R; indeed another PA28R, also inbound to Oxford/Kidlington, was 1.5 NM to the ENE. This was discounted, however, because the geometry did not fit. Accordingly, pilot members of the Board considered that the PA28R pilot could well have underestimated the separation distance, probably because of late sighting, whereas the AC12 pilot may have overestimated. Whilst acknowledging that the AC12 pilot had right of way iaw Rules of the Air, pilot members queried his prudence in that he was content to maintain track and altitude even though it was evident to him that his ac had not been seen until late. There seemed no obvious reason for this late acquisition – flying conditions were good – other than the aspect presented by the AC12 and its

probable lack of relative movement in the PA28R's windscreen. But, in the event, the PA28R pilots eventually acquired the AC12 and resolved the situation by turning and descending to pass behind and below the AC12. It was this action that resolved the encounter and removed any risk of collision, safely.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the PA28R pilots.

Degree of Risk: C

AIRPROX REPORT NO 97/02

Date/Time: 22 Jun 1412

Position: 5604 N 0344 W (5 NM SSE of GRICE)

Airspace: TMA (Class: D)

Reporting Aircraft Reported Aircraft

Type: B737 Wx Balloon

Operator: CAT N/K

Alt/FL: ↓ FL 140 (NK)

Weather VMC CBLC NK

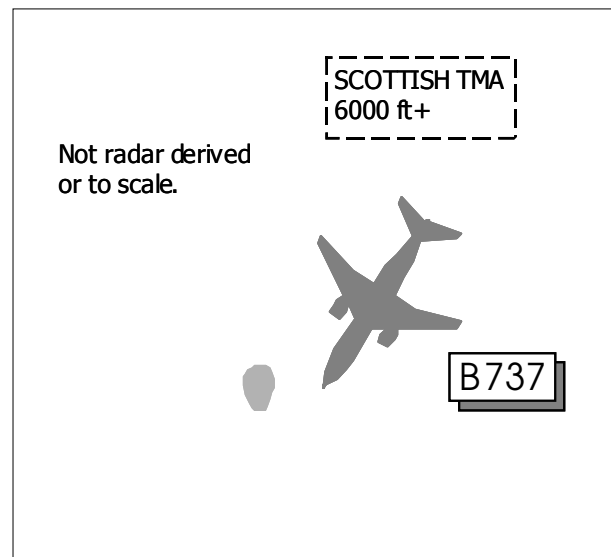
Visibility: NK

Reported Separation:

0 ft V 20 ft H

Recorded Separation:

not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports heading 210° at 320 kt inbound to Prestwick, descending to FL 140, and in receipt of an ATC service from ScACC. When approx 5 NM S of GRICE descending in VMC through FL 155, he thought, the FO noticed a red coloured weather balloon pass 20 ft to his R over the RH wing. He informed ATC of the encounter and assessed the risk of collision as high.

UKAB Note (1): The RT transcript shows the B737 pilot's initial call to ScACC shortly before 1411:30

with another transmission 30 sec later revealing "B737 c/s just to advise er we had a near miss with a weather balloon there went through our er starboard side". The ScACC controller acknowledged the call and requested ".....how close was it you think". The B737 pilot replied "A red weather balloon and it was very close about twenty feet".

UKAB Note (2): Analysis of the radar recording at 1412:00 shows the B737 5 NM SSE of GRICE

tracking 210° and descending through FL 170 but no other radar returns are showing in the vicinity.

UKAB Note (3): The UK AIP ENR 1-1-5-5 Airspace Restrictions, Danger Areas and Hazards to Flights para 3.5 Radiosonde Balloon Ascents details launch sites within the UK and describes the typical balloon as either being of 1.5 m diameter coloured off-white to brown or 100 gm weight coloured red, both attached to small parachute and a 390 gm radiosonde package by a 33m suspension string. The UK Met Authority carried out an investigation using timings, atmospheric wind observations and average properties of a weather balloon to produce a likely launch area. This indicated that the balloon would probably have been launched approx 9-12 NM WSW of the reported Airprox position. The Met Office confirmed that no launches of radio-sonde balloons took place in the area around the time of the incident and contact with other known users of weather balloons did not identify any originating locations. AIS MIL tracing action through AUS and DAP did not uncover any reports of breakaway balloons in the vicinity.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available to the UKAB included a report from the B737 pilot, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

From the limited information available to the UKAB, the incident was only seen by the FO on the RHS of the B737 as the balloon passed 20 ft away and over the RH wing. He had described it as a red weather balloon but had made no mention of seeing an attachment below. Members were surprised that even after tracing action, the releasing agency of the balloon in this incident could not be identified. Moreover, of

more concern was the compatibility of balloon releases with safe ac operations, particularly if a package such as a radio sonde was attached by suspension. This was the third Airprox in a three month period involving unmanned balloons and members agreed that a safety review should be carried out by the relevant authorities on the whole 'balloon release' 'modus operandi'. As for this incident members could go no further than conclude it had been a conflict between the B737 and an untraced balloon within the Scottish TMA (Class D).

There was no doubt that the B737 pilot had seen the balloon at a very close range during his descent. However, with little information available to members on the aerodynamic properties of a balloon relative to an ac's flight path and whether or not there was a package attached to it, the Board concluded that there was insufficient information on which to assess the risk of colliding with it.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Conflict with an untraced balloon in Class D airspace.

Degree of Risk: D

Recommendation: In light of 3 incidents during the months May - July 2002, involving encounters with untraced balloons, the CAA and MoD should consider conducting a review of arrangements on:

- a. Notification and permission procedures, on the release of balloons in UK airspace, particularly those with payloads.
- b. Risk analysis involved for other airspace users.

AIRPROX REPORT NO 98/02

Date/Time: 26 Jun 1915

Position: 5349 N 0225 W (30 NM N
Manchester - elev 257 ft)

Airspace: UIR (Class: A)

Reporting Aircraft Reporting Aircraft

Type: Embraer 145 (A) Embraer 145 (B)

Operator: CAT CAT

Alt/FL: FL 260 FL 265↓

Weather VMC VMC

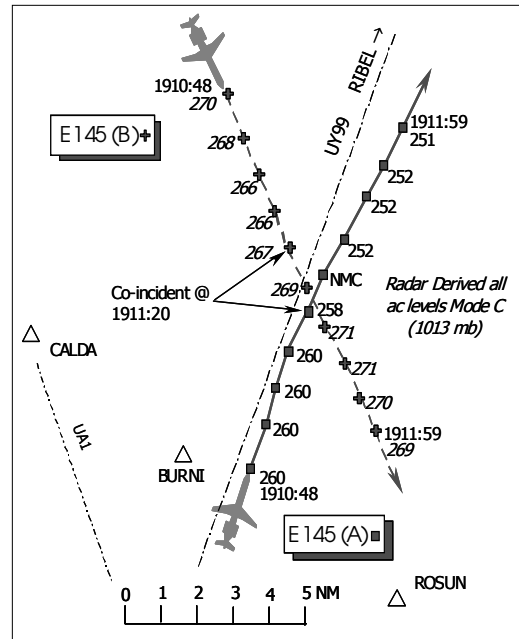
Visibility: 40 km 40 km

Reported Separation:

3 NM H, 500 ft V N/R H, 800 ft V

Recorded Separation:

2.7 NM H, 600 ft V

**BOTH PILOTS FILED****PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

THE EMBRAER 145 (A) PILOT reports that he was approaching RIBEL heading, he thought, 340° towards MARGO at FL 260 and M 0.76 whilst receiving an ATS from Manchester. [UKAB Note (1): The Airprox actually occurred at an earlier stage of the flight, whilst it was still inbound RIBEL, tracking about 020°] He was aware of opposite direction traffic at FL 270 which was given descent clearance to FL 240. This was followed by a TCAS Resolution Advisory (RA) with "DESCEND" aural warning, and this was complied with promptly. The other ac was not sighted, but TCAS indicated that it passed close overhead with 500 ft vertical separation. During the encounter, ATC cleared his ac to descend to FL 240. The TCAS alert was considered "necessary" and the risk was assessed as "high".

THE EMBRAER 145 (B) PILOT reports heading 185° at FL 270 and M 0.76. He was receiving an ATS from Manchester, who cleared him to descend to FL 200, to be level at MCT VOR. When passing FL 265 in the descent, a TCAS RA was received with "ADJUST VERTICAL SPEED" aural warning. Shortly after this, the crew received an instruction from ATC to return to FL 270, which was promptly complied with, and the controller

explained that he had made an error. The opposite direction traffic was then seen in what appeared to be a right hand turn. The TCAS alert was considered "necessary" and the risk was assessed as "medium". Horizontal separation was not reported, but vertical separation was assessed using TCAS as 800 ft.

ATSI reports that both ac were under the control of the MACC Sector 29 Area Radar Controller. Workload at the time was low and all systems were serviceable.

The Northbound ac established comms with the Radar controller at 1900:05 as it was approaching NITON. The Southbound ac established comms at 1904:40, reporting level at FL 270 and heading 170°. It was one of a number of ac to be handed over from ScACC, and its position at that time was 10 NM South of Dean Cross. The flight progress strips (fps) for the two ac were in the controller's central bay but he believed there would have been several other strips between them. As the Southbound ac was inbound to Birmingham, its route was subject to a Standing Agreement which is to be at FL 200 by MCT VOR. The "normal" place to issue the descent clearance

for this is around CALDA, about 30 NM North of MCT.

The controller stated that he was conscious of the need to descend the Southbound ac and would normally check the fps and confirm the overall picture on radar before issuing descent clearance. He could not explain why he had not followed this procedure on this occasion but accepted that he had not. At 1910:30 he instructed the Southbound ac to *"...descend now flight level two hundred, level by Manchester"*. At this time the ac was 35 NM North of Manchester, with the Northbound ac, level at FL 260, in its 2 o'clock position at a range of 14.8 NM, crossing from right to left. The descent clearance was correctly read back. The controller explained at interview that it had not been his intention to try and descend through the level of the other ac at FL 260 whilst maintaining lateral separation, and so he concluded that he had temporarily overlooked its presence.

Another ac then called on the frequency but the controller, having noted the developing conflict, ignored it and less than fifteen seconds after issuing the original descent instruction, transmitted *"...cancel that (c/s) Manchester just maintain flight level two seven zero..."*. There was no reply from the crew. At 1911:00, the two ac were seven miles apart and so the controller transmitted *"(c/s) Manchester maintain flight level two seven zero....."*. Again there was no reply and so, for the third time, the controller repeated his instruction to maintain FL 270. The crew responded to this call, at 1911:10.

At the same time, the radar recording shows the Mode C readout of the Southbound ac indicating FL 268, with the Northbound ac located 5.1 NM south of it maintaining FL 260. The controller, in an attempt to provide additional separation, instructed the lower ac to descend to FL 240, which was acknowledged first time. Throughout these exchanges the controller did not use the words 'avoiding action' which the controller later accepted, would have been appropriate, certainly in the case of the Southbound ac. However, to have said, *"Avoiding action maintain flight level two seven zero"* did not seem to him to be appropriate at the time. Similarly, it would have been prudent to pass traffic information to the ac involved.

When the Northbound ac was instructed to descend, the separation between the two was 3.2 NM and 600 ft, with the Northbound ac maintaining FL 260 and the Southbound one at FL 266. Vertical separation temporarily remained at 600 ft as the ac continued to converge. When lateral separation had reduced to 2.7 NM, vertical separation started to increase as the lower ac commenced its descent and the Southbound ac climbed back to FL 270. By the time the ac were 1.2 NM apart, 1000 ft vertical separation had been re-established.

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 discussions started with the reported fact that the radar controller had made an error in issuing descent clearance to the E145(B) which he then tried to correct, albeit unsuccessfully. Attention quickly moved next to the initial lack of response from the E145(B) crew and how this affected the situation. Opinion was divided as to whether this aspect was a direct cause or a contributory factor, but the Board unanimously agreed that the lack of response from the crew was disappointing. In mitigation it was pointed out that the crew would have been carrying out actions in the flight deck to initiate the descent; these would have involved communication between the pilots regarding instrument settings and annunciations and possibly checklists, all of which absorbed attention. Though not an excuse, this might explain why the calls were missed, reinforced further when a third ac called on frequency between the 'descent' and 'maintain' instructions. The crew of E145(B), having heard the other ac's call, would probably have subconsciously regarded the *"maintain"* instructions as applying to that ac, as it would be an unusual sequence of instructions for them to receive. An additional factor may have been the controller's use of the term "now" with his descent instructions, which would have led to the crew organising their descent without delay and may

have added to their belief that the subsequent instructions were not for them.

Whilst acknowledging the controller's error, some members understood his reluctance to use the term "avoiding action" with the passive instruction to maintain level. However, it was felt that as the term was not used, the instructions to maintain level should have been followed by traffic information which may have attracted the crew's attention.

Despite further debate, the Board remained divided on the subject of the late response from the E145(B) crew, though it was agreed that the onus was on the crew to understand, acknowledge and act on the controller's first instruction regardless of distractions. A majority of members regarded their shortcoming in this

respect to be a contributory factor. However, the actions of all parties were subsequently effective in removing any actual risk of collision between the two ac.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: MACC Sector 29 Area Radar Controller issued a descent clearance to E145(B) without taking E145(A) into account.

Degree of Risk: C

Contributory Factors: The E145(B) pilot did not respond to the controller's first two corrective instructions.

AIRPROX REPORT NO 100/02

Date/Time: 30 June 1126 (Sunday)

Position: 5225 N 00107 W (3 NM SW Husbands Bosworth glider launching site)

Airspace: London FIR (Class: G)

Reporting Aircraft Reported Aircraft

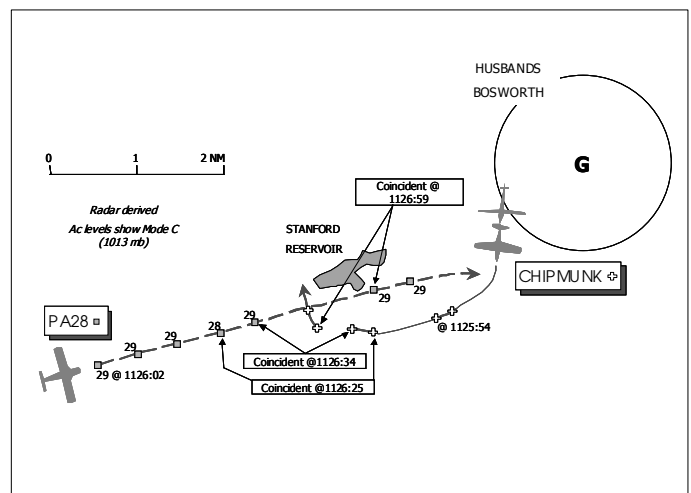
<u>Type:</u>	Chipmunk	PA28
<u>Operator:</u>	Civ Club	Civ Pte
<u>Alt/FL:</u>	2800 ft (QNH NK)	2500 ft (Coventry QNH 1014 mb)

Weather VMC CLBC VMC CLBC

Visibility: >10 km 10 km

Reported Separation:
10 m V, 50 m H NK

Recorded Separation:
NR



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CHIPMUNK PILOT reports that he was towing a Puchacz glider at 2800 ft ASL, he thought, about 0.5 NM S of the E end of Stanford Reservoir and heading about 270° at 65 kt when he saw a large blue single-engine ac in his 1

o'clock on a reciprocal heading at approximately 100 m and slightly above. He initiated a hard, diving turn to port and the glider pilot also turned to port and released. He assessed the risk of collision was very high.

He adds that his ac was yellow and that HISLs, nav lights, landing light and taxi light were all selected on. At the time of the incident he was in contact with both Husbands Bosworth Soaring Centre and the glider on tow on 129.975 MHz.

THE PA28 PILOT reports that he was PNF on the second leg of a triangular, cross-country flight. His ac was light blue with stripes on side, tail and wings. The fin-mounted, red anti-collision beacon was selected on. Having departed Coventry en route Norwich, he was heading 085° at 110 kt and in receipt of a RIS, he thought, from Coventry Approach and squawking 4560 with Mode C. Previously he had been climbing to FL 60, but passing 3000 ft had immediately descended back to 2500 ft (Coventry QNH (1014 mb), having been advised by Coventry not to infringe Birmingham's airspace. Although he was fairly sure that he was clear of Birmingham, he had spent some time with his map to clarify his position. He was then advised that he was clear of Birmingham and started to climb to his cruising level.

He also reports that he was aware of the Husbands Bosworth glider site and was routing to the south of it. At no time did he see, nor was aware of, the reporting ac.

ATSI reports that correlation of Coventry RTF recording with the radar recordings corroborates the PA28 pilot's report regarding confusion with Coventry ATC as to his position relative to Birmingham's airspace.

Although not to be used as a Surveillance Radar, the Coventry aerodrome traffic monitor (ATM) is approved for certain uses in addition to those stated in MATS Part 1. A Coventry Standing Instruction (03/02) reminds controllers that: "*The ATM should not be used in isolation, controllers should endeavour to use it in conjunction with other aids and information (i.e. D/F, pilots reports, ATC instructions to aircraft etc) to make a reasoned assumption that a contact observed on the ATM is in actual fact the correct aircraft*". (ATSI Note: Coventry is not equipped with SSR.) For an unknown reason it appears that misidentification occurred on this occasion. The radar data recording, timed at 1123, shows 3 ac

on the Coventry SSR conspicuity code 4650. One is SSW of the airport and one to the E. The latter is undoubtedly the PA28 as its squawk is, subsequently, seen to change to 7000 when requested by Coventry. At this time the controller informs the PA28 pilot that he has not yet crossed the Birmingham CTA boundary where the base is 1500ft; it would appear that he has mistaken the PA28 with the radar return of another ac subsequently seen to change to 4651 when instructed by Coventry ATC. As this other ac is observed to clear the lower portion of the Birmingham CTA, so the Coventry controller informs the PA28 pilot accordingly. However, by this time the PA28 is well to the E. Nevertheless, apart from causing the PA28 pilot some initial confusion as to his position, since Coventry ATC was providing FIS there was no responsibility on the controller for the Airprox.

UKAB Note (1): The UK AIP ENR 5-5-1-3 promulgates Husbands Bosworth aerodrome, elevation 505ft amsl, as a Glider Launching Site centred on 522626N 0010238W where winch and tug ac/motor glider launches may be encountered to 3000ft agl during daylight hours.

UKAB Note (2): Met Office archive data reveals that the Barnsley RPS for 1100 – 1200 was 1006 mb.

UKAB Note (3): Analysis of the Clee Hill radar data recording shows the PA28, squawking 4650 with Mode C, on a steady track from Coventry Airport. In the vicinity of Husbands Bosworth a primary return, thought to be that of the Chipmunk, tracks S until it is lost. A primary return tracking W then appears for 2 sweeps, the latter timed at 1125:54, but is not apparent on the following 3 sweeps. A primary return reappears at 1 o'clock to the PA28 tracking WNW. On the sweep, at 1126:34, the primary return is 1.2 NM from the PA28. No primary return is evident on the next 2 sweeps, but reappears at 1126:59 to the W, suggesting that a left turn has been made. This is consistent with the manoeuvre described by the Chipmunk pilot. Thereafter, this primary return tracks N. Although the CPA is not shown, it is estimated that min horizontal separation was in the order of 0.2 to 0.25 NM.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, a radar data recording and a report from the appropriate ATC authority.

It was evident to the Board that although the reported weather conditions were good and into sun, visibility was not a factor, the see-and-avoid principle applicable in Class G airspace almost failed. Therefore, other factors were presumed to have been instrumental in preventing the Chipmunk pilot from visually acquiring the PA28 until late and the PA28 pilot from seeing the Chipmunk/glider formation. It was possible, some thought, that the Chipmunk pilot had restricted forward visibility because of a nose-high attitude of his ac whilst towing the glider. Board members also thought it probable that the misleading information given to the PA28 pilots by Coventry ATC had proved a significant distraction

resulting in 'heads-down' chart consultation inside rather than maintaining an all round scan outside. With regard to the false information provided by Coventry ATC, ATC members questioned the practice of providing position information using an ATM, particularly to an ac in receipt of a FIS.

Board members noted that separation distances reported by the Chipmunk pilot remain uncorroborated. However, given the admission of late sighting by the Chipmunk pilot together with the fact that both he and the glider pilot turned to port to avoid the PA28, members inclined to the view that safety had been compromised.

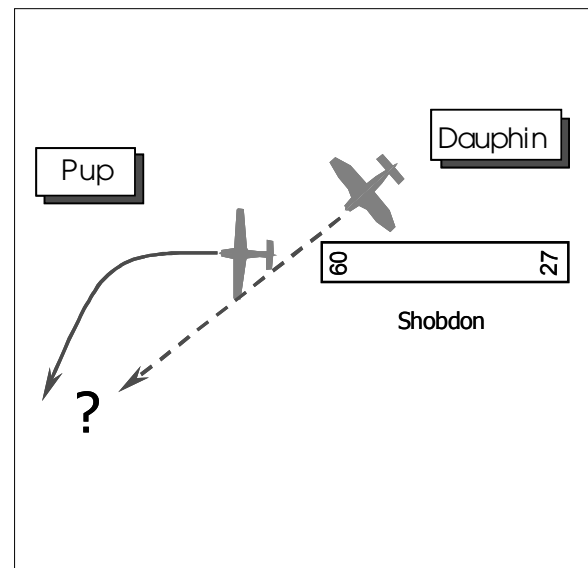
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sighting by the Chipmunk pilot and non-sighting by the PA28 pilot.

Degree of Risk: B

AIRPROX REPORT NO 101/02

Date/Time: 29 Jun 1045 (Saturday)
Position: 5214 N 0253 W (Shobdon Circuit - elev 318 ft)
Airspace: Shobdon ATZ (Class: G)
Reporting Aircraft Reported Aircraft
Type: B121 Pup DR221 Dauphin
Operator: Civ Pte Civ Pte
Alt/FL: 800 ft ↑ 1200 ft ↓
 (QFE 1014 mb) (QFE 1005 mb)
Weather VMC CLBC VMC CLBC
Visibility: 10 km+ 10 km+
Reported Separation:
 Nil H, 2-300 ft V 400yd H, 400ft V
Recorded Separation:
 Not Recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B121 PUP PILOT reports that he was crosswind in the Shobdon circuit, having just departed from RW27 (left hand circuit) and prior to clearing the circuit. He was heading 210°,

climbing through 800 ft at 60 kt. At the mid point of the crosswind leg the reported ac, which was first sighted above and to his right, having passed close overhead, was seen heading about 290°

before turning *right* to join the downwind leg for RW27. The climb was stopped, with vertical separation assessed as 2-300 ft. The pilot assessed the risk as "high" and also observed that "good VMC" conditions prevailed.

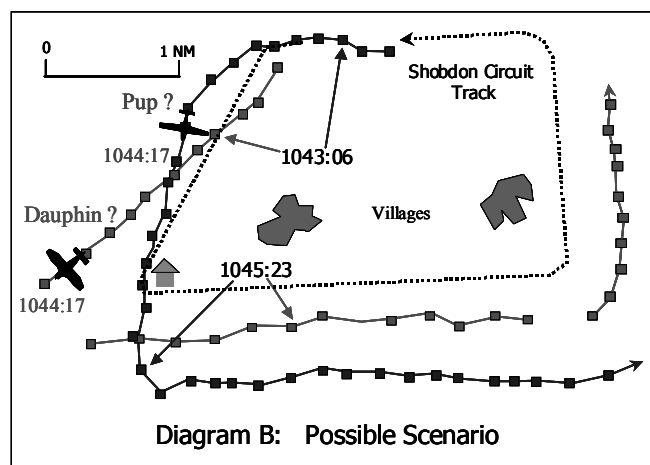
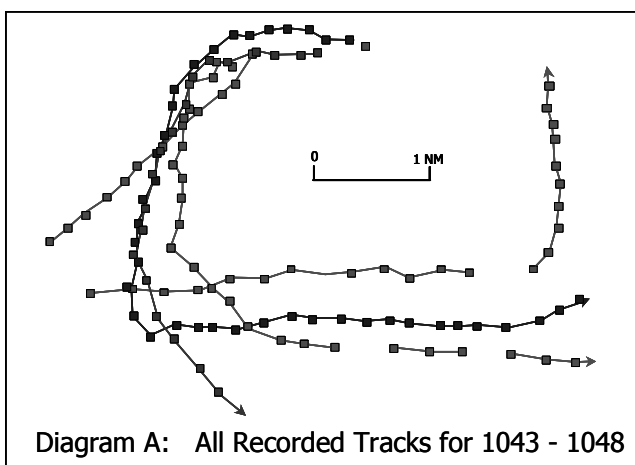
The reporting Pup ac was coloured white and yellow, with no external lighting. A transponder was fitted, squawking 7000, but Mode C was not fitted, nor was TCAS.

UKAB Note (1): The pilot stressed that the other ac turned *right* and supplied a diagram depicting the other ac executing a tight right turn to roll out on a closely spaced downwind leg. This would place it well inside the downwind spacing stipulated in the UK AIP AD-2 and commercial flight guides, which should be about 2 NM, outside of two villages to the south of the airfield.

THE DR221 DAUPHIN PILOT reports that he joined the Shobdon circuit on the deadside [north of the RW] descending to 1500 ft in conditions that were "bright but not sunny". His ac was coloured orange and white, was squawking 7000 and Mode C, though fitted, was switched off. TCAS was not fitted. He observed the Pup take off and then made a position call on the A/G frequency. After descending deadside, he crossed the RW with the Pup still on its initial upwind heading of about 270°. The pilot had with him a copy of the Shobdon circuit procedure and was aware that it was a larger than average circuit with specific noise abatement procedures. He was aware of the ground feature [a white house] where the turn to downwind was to be made, and the track required to reach it. He was

conscious of the Pup, believing it to be to his right and behind, and did not descend below 1400 ft until he was "absolutely certain" that it was clear behind. He saw the Pup (though he thought it was a PA28 "given the distance it was away") through his rear right window [he was occupying the LHS]. It was "at least 600 ft below and 400 yd away". Up to this point he had been steering 225° to intercept the crosswind track and he now turned left on to 210° to maintain it. He was quite certain that at no stage did he turn onto a northwesterly heading.

He believed that his speed and height advantage, together with the observed position and performance of the Pup would maintain proper separation between the ac, though he reported that he was more used to the "tight" 800 ft circuit at his home base. He reports identifying the white house, turning left onto the downwind heading and making the appropriate R/T call. The pilot's impression was that the Pup pilot would have seen his own ac in the 10 o'clock position after turning crosswind. He estimated that the Pup was just over half way along the crosswind leg when he made a radio call that indicated that he had just noticed his ac. The gist of this radio call was more to do with querying the procedural nature of the join rather than any safety aspect. The circuit was completed, and though the ac was landed and refuelled, the pilot was not contacted further about the event. The pilot assessed that minimum separation with the Pup was 400 yd and 400 ft, and believed that there was "nil" risk. No avoiding action had been necessary.



UKAB Note (1): Analysis of the Clee Hill radar recording shows four returns in the Shobdon area between the times of 1042:30 and 1047:50, all of which are squawking 7000 and are shown in diagram A. It is not possible to determine which, if any, of these returns are the Airprox ac but one shows intermittent Mode C and so can be discounted. Of the other three tracks, two show some similarities to the Dauphin pilot's report, and these are shown in Diagram B. In this case separation between these ac is around 1 NM in the general crosswind area, reducing to 0.6 NM as the leading ac establishes downwind. None of the tracks record less separation crosswind, nor do any reflect the Pup pilot's report of an ac turning right to downwind. All tracks comply with the Shobdon noise abatement procedures and achieve at least the minimum spacing downwind. It must be stressed that this limited analysis assumes an accurate reported time of the Airprox of 1045z.

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.

As the Pup pilot's report seemed to query the procedural nature of the Dauphin's join as well as the safety aspects, the Board began by looking at the joining procedure flown by the Dauphin. GA specialists stated that, as no modifying procedures are contained in the UK AIP they would have expected the Dauphin pilot to carry out a standard overhead join, crossing the upwind end of the RW at circuit height (1000ft aal) and then route to downwind, integrating with other circuit traffic. However, it was noted that at least one commercial flight guide contained instructions to descend not below 1500ft on the deadside, and to descend further to circuit height only when south of the RW. The Dauphin's flight path conformed with this height restriction, but whether this was due to the modified procedure or due to the presence of the Pup was not known. As the Dauphin was not at circuit height at this stage, some thought that there was no

compelling requirement to conform to the noise abatement route crosswind, but others took a counter view saying that flying a modified crosswind track further to the west may have been a more prudent measure that would have positively ensured adequate separation from the Pup. However, it was recognised that the Dauphin pilot, a visitor to the airfield, was trying with best intentions to conform to local practices and minimise disturbance to the local population.

Notwithstanding these views, responsibility to integrate into the circuit lay entirely with the Dauphin pilot, and some Board members felt that his choice of crosswind track did not fully meet this obligation, given that the Pup would be flying a similar track. However, another view was that his observed position in relation to the Pup and the obvious speed differential would have reasonably suggested to the Dauphin pilot that he would integrate into the circuit satisfactorily.

It had not proved possible to reconstruct the series of events as reported and described by the Pup pilot, as they were not supported by any available data. However, it was accepted that the Dauphin had flown close enough to cause concern, possibly by misjudging his flight path in relation to the Pup. It was not felt that any misjudgement on the Dauphin pilot's part would have been sufficient to cause a danger of collision.

Finally the Board observed that any variations from standard circuit joining procedures at Shobdon should be notified in the UK AIP and the Director undertook to convey this to the Safety Regulation Group of the CAA. [UKAB Note (3): Currently the only variation notified is the requirement to fly outside of the two villages on the downwind leg]

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Dauphin pilot flew close enough to the Pup to cause concern

Degree of Risk: C

AIRPROX REPORT NO 103/02

Date/Time: 27 June 1245

Position: 5144 N 00134 W (2 NM SSE Brize Norton - elev 288 ft)

Airspace: Brize Norton CTR (*Class:* D)

Reporting Aircraft Reported Aircraft

Type: C130J MD 600

Operator: HQ STC Civ Private

Alt/FL: 1500 ft 2000 ft

(QFE 1010 mb) (N/K)

Weather VMC CAVOK VMC CAVOK

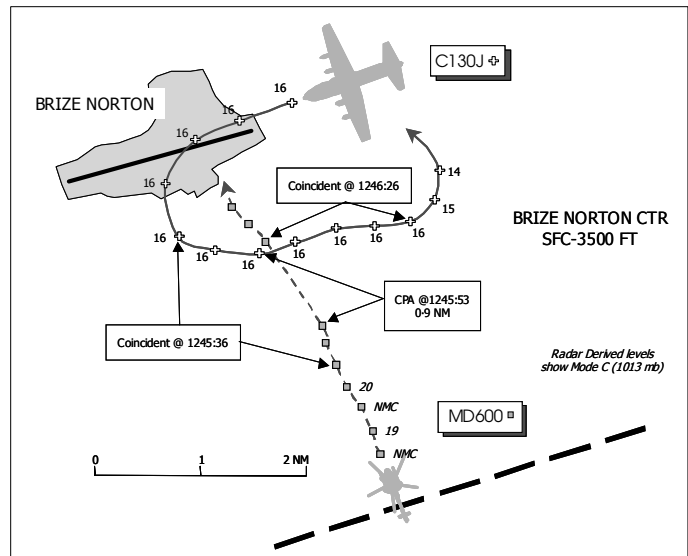
Visibility: Unlimited 10 km

Reported Separation:

Nil V, 500 ft H NK

Recorded Separation:

NR V, 0.9 NM H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE C130J (HERCULES MK5) PILOT reports that during a left-hand break into the Brize Norton RW 26 circuit at 1500 ft and 240 kt, TCAS enunciated with an RA "*Climb, climb*" against traffic passing S to N through the Brize overhead. Both pilots then saw a helicopter, a NOTAR type, 500 ft away at the same height. Because of the attitude of his ac, 60° AOB, deconfliction was achieved by tightening the turn rather than climbing. The crossing traffic had been advised by Brize Approach to be at 2000 ft QFE and was monitored on TCAS from 8 NM. However, the helicopter, which was not reported by Brize Tower, was operating on a separate frequency.

The C130J pilot adds that his ac was grey and that HISLs were selected on. At the time of the incident he was in contact with Brize Tower on 396.7 MHz and was in good VMC with unlimited forward visibility. He estimates that minimum separation from the helicopter was 500 ft H but nil V. He assessed that the risk of collision was medium.

THE MD 600 PILOT reports that he was en route from Seagry, near Lyneham, to a private site at Pattingham and in contact with Brize Norton Zone on 119.0 MHz. He was operating under VFR in good VMC with 10 km visibility. Approaching Brize Norton heading N at 100 kt with clearance

from ATC to pass overhead at 2000 ft, he was informed of a Hercules cleared to land, he thought, from his right. He saw the ac from about 5 NM and saw it land, continue to roll, and he thought, take off again. From that moment on he monitored the ac, as he was unaware of its intentions. He continued to monitor the situation closely and slowed down as the Hercules passed in front from L to R in the turn to a LH downwind position. He assessed that there was no risk of collision because he had good visual contact with the Hercules. However, he would have appreciated the other ac to have been on the same frequency.

He also reports that his ac was coloured green and that both red flashing beacons were selected on. He adds that SSR with Mode C was selected on.

MIL ATC OPS reports that the MD 600 contacted Brize Norton Zone (ZONE) on 119.0 MHz at 1235:07. [UKAB Note: On initial contact the MD 600 pilot reported "*1500 ft 1020*".] It was identified and, as requested, provided with a Zone transit under FIS subject to avoidance of Harwell.

At 1238:40 ZONE advised "*... to cross the Zone, we do now have traffic to affect inbound from the N, if you fly at 2000 ft, Brize QFE, 1010 and route*

S to N 1 mile E of the overhead". This was acknowledged by the MD 600 pilot who reported "... *leaving 1500 ft for 2000 ft 1020*", however this was not corrected by ZONE. [UKAB Note: The MD 600 pilot reported "... *level 2000 ft*" at 1240:02".] ZONE then passed traffic information on the MD 600 to the Aerodrome Controller (TWR). [UKAB Note: ZONE told TWR "... *transit traffic S to N 1 mile E 2000 ft QFE.*" at 1239:14.] Thereafter, ZONE gave the MD 600 pilot traffic information on the Hercules, although it was only on the third attempt "... *Hercules now 4 miles N descending inbound for a run and break RW 26*" before the MD 600 pilot acknowledged the call with "*I have visual with that traffic*".

Meanwhile the C130 was inbound for a visual join for RW 26 and in contact with Brize Approach (APP). APP called TWR at 1240:06 to obtain approval for the C130 to join right base. This was approved but qualified with instructions to join at "*circuit height*". The C130 called TWR at 1242:44 and requested "...*join for initials 1010*". TWR approved the request, confirmed the QFE, declared the circuit "*clear*" but omitted to pass information on the Zone transit traffic, the MD 600. Between 1243:00 and 1243:30 APP and TWR were engaged in discussion about an unknown contact that had entered the CTR and eventually APP requested TWR to "... *keep a lookout for us please*" as it was likely to affect the inbound C130. [UKAB Note: The Cleve Hill radar data recording shows this unrelated ac, squawking 7000 with no Mode C, tracking N at 2 o'clock range 3 NM from the MD 600.]

At 1246:04 the C130 pilot reported to TWR "...*you've got a NOTAR helicopter routeing S to N through your Zone, are you aware?*".

THE C130 PILOT'S UNIT COMMENTS this was an interesting Airprox from the Station viewpoint and led to in-depth discussions amongst training staff. The consensus of opinion was that TCAS was confused by the 60° AOB whilst the ac was manoeuvring in the circuit. Both pilots of the Hercules were visual and the conflict was avoided by the tighter turn. As the other ac was 8 miles away and 500 ft higher there would have been no requirement for Brize Norton radar to highlight the position to the crew.

HQ STC comments that once again the need to listen carefully, confirm and acknowledge

instructions is essential. The MD 600 pilot apparently did not hear the correct QFE and ATC did not register the incorrect QFE readback. TCAS appears to have functioned correctly and alerted the C130 crew to the potential conflict with the MD 600. The AOB of the C130 would not in itself have been registered by TCAS, however the AOB would have generated a constantly changing flight path vector, which was moved into conflict with the flight path of the MD 600 thereby triggering the RA.

UKAB Note (1): Two radar data recordings were made available to UKAB, from the Heathrow (23 cm) radar and Cleve Hill respectively. SSR code 3704 assigned to the MD 600 by Brize Zone, together with Mode C, is evident on the Heathrow radar, albeit intermittently, from before it enters the Brize Norton CTR until 1245:30, at which time Mode C displays 020. Thereafter, the MD 600 paints as a primary return only until it fades before the encounter. Analysis of the Cleve Hill data reveals the MD 600, as a primary return only, entering the Brize Norton CTR tracking NNW. Meanwhile, the C130J, squawking 3750, has entered the CTR from the N and positioned for the break on RW 26. The C130J, indicating 016 on Mode C, is shown on the break at 1245:18. Two sweeps later, at 1245:36, the C130J is shown about halfway round its turn with the MD 600 2 NM to the SE tracking NNW. The following 2 sweeps show an increased rate of turn by the C130J, consistent with the manoeuvre reported by the C130J pilot. CPA is shown at 1245:53 when the subject ac are 09 NM apart. Unfortunately no returns from the MD 600 are evident for the next 3 sweeps during which time the C130J proceeds downwind. They reappear at 1246:26, by which time the MD 600 has crossed through the track of the C130J.

UKAB Note (2): ZONE would have been using SSR data from the Brize Norton MSSR. Analysis of the Brize Norton RT transcript offers no suggestion that the MD 600 SSR transponder was not functioning throughout the incident.

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,

radar video recordings and reports from the appropriate ATC and operating authorities.

It was evident to the Board that it was ZONE's intention to accommodate the requirements of the MD 600 pilot for Zone transit by effecting 500 ft V separation against the C130J within the visual pattern. Civil ATC Board members noted the application of an inappropriate FIS within Class D airspace where a control service, either procedural or radar, should have been provided; nevertheless, this was not considered to have been a contributory factor. Furthermore, to enable the MD 600 pilot, who was operating under VFR, to maintain separation against other traffic within the CTR required traffic information that was meaningful to him. It was probable that the MD 600 pilot was not familiar with the term 'run and break' manoeuvre, which might explain his mistaken impression that the C130J had performed a roller landing prior to flying downwind.

The Board discussed the erroneous, and undetected, QFE readback by the MD 600 pilot and the possibility that the MD 600 pilot may not have set 1010 mb. One pilot member suggested that any such ambiguity could be resolved if controllers stated "*set QFE*". Military ATC members noted that the QFE was passed to the MD 600 pilot by ZONE in a long and compound transmission containing both traffic information and Zone transit clearance. Instructions and information for the MD 600 pilot, it was suggested, would have been clearer had they been passed in shorter transmissions. Had the MD 600 pilot been flying level at 2000 ft (1010 mb) when the C130J broke downwind, it is most doubtful that a TCAS RA would have enunciated. Therefore, a combination of the incorrect readback, the TCAS climb RA together with the C130J pilot's estimation of co-altitude, persuaded the Board that the MD 600 pilot had probably not set 1010 mb.

Much discussion focused upon the TCAS RA received by the C130J pilot. Experienced airline pilot members confirmed that it was extremely unlikely that the TCAS had been subject to any confusion resulting from the 60° AOB, although it was conceded that CAT captains are not permitted to operate at AOB >30°. Consequently, the RA would have been triggered by momentary

TCAS computation of flightpath conflict. Given that the C130J was level at 1500 ft (QFE), the climb RA would have been the result of either the MD 600 being below its assigned height, 2000 ft (QFE), or the C130J TCAS detected a descending vertical component from the MD 600 SSR Mode C. Hence members concluded that TCAS was working correctly. Airline pilot members went on to voice concern that the C130J pilot elected not to follow the RA but rely instead on his visual acquisition although, given the prevailing circumstances, they expressed a degree of sympathy with his decision. In a TCAS encounter it is possible that a pilot may see traffic he believes to be the cause of the RA. However, if it is not the target against which TCAS is reacting, any manoeuvre effected visually may compound, rather than resolve, the situation as regards the true target. Accordingly, BALPA recommended practice is for full compliance with an RA, visual acquisition notwithstanding. This is, apparently, SOP for most UK companies although CAA guidance still allows for visual manoeuvring at commander's discretion. However, as one pilot member advised the Board, FAA advice is that RA selection is deselected in areas of intense traffic such as, for example, when operating within the visual pattern.

The Board then turned to the reaction of the C130J pilot who, from his report, was aware of the presence of TCAS traffic from 8 NM and had been advised by APP of transit traffic at 2000 ft (QFE). The Board's conclusion was that, having been told that the circuit was clear, he would have not expected to see traffic at a similar altitude as he broke downwind. Consequently, this sudden visual acquisition, together with the simultaneous RA, probably gave the C130J pilot a mistaken impression of the proximity of the MD 600, which radar had confirmed to be 0.9 NM. Therefore, the Board considered that no risk of collision had existed.

PART C: ASSESSMENT OF CAUSE AND RISK

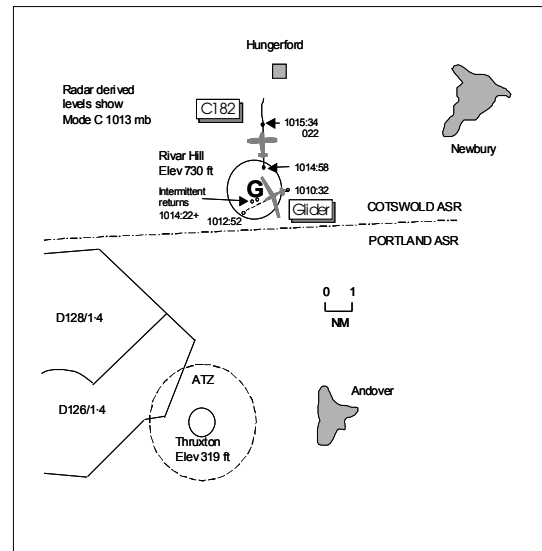
Cause: Following an undetected readback error, the MD 600 pilot entered the Brize Norton CTR on the wrong altimeter setting.

Degree of Risk: C

Contributory Factors: Brize TWR did not pass traffic information on the MD 600.

AIRPROX REPORT NO 109/02

Date/Time: 30 Jun 1014 (Sunday)
Position: 5120 N 0133 W (0.5 NM SSW of Rivar Hill - elev 730 ft)
Airspace: FIR (Class: G)
Reporting Aircraft Reported Aircraft
Type: Puchacz Glider C182
Operator: Civ Trg Civ Pte
Alt/FL: 1500 ft 1500 ft+
 (agl) (RPS NK mb)
Weather VMC CBL C VMC CBL C
Visibility: >10 NM >20 NM
Reported Separation:
 200 ft V not seen
Recorded Separation:
 not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE PUCHACZ GLIDER PILOT reports thermalling at 50 kt during a dual local training sortie from Rivar Hill. The visibility was >10 NM 1000 ft below cloud in VMC, his ac was coloured white and was not fitted with a radio. About 0.5 NM SSW of the glider site and whilst circling to the R at 1500 ft agl (Rivar Hill QFE), he suddenly noticed a high wing single engined ac, coloured white, converging at 100 kt+ and heading directly towards him about 200 ft below. The conflicting ac passed directly beneath him without taking any avoiding action and apparently without seeing him. He had seen the other ac too late to take any avoiding action and he assessed the risk of collision as very high, particularly as the other ac had flown close to the active airfield. Subsequently, the glider site ground party saw the other ac fly directly along the RW C/L maintaining approx 1200 ft agl and they had expressed concern as the airfield was active with winch launching operations.

THE C182 PILOT reports flying solo from Thrupton to Enstone heading 360° at 125 kt and cruising above 1500 ft RPS. He was receiving an

A/G service from Thrupton on 130.45 MHz followed by a FIS from Brize Norton on 134.3 MHz squawking 3701 with Mode C. The visibility was >20 NM below a scattered cloud base, the ac was coloured white/blue and his nav and strobe lights were switched on. He had transited the Rivar Hill area en route but had not seen any gliders.

UKAB Note (1): During a subsequent telephone conversation with the C182 pilot, he said that he was fully aware of the location of the glider site and had visually located Rivar Hill from a distance of about 5 NM. He had not seen any activity on the ground and had proceeded through the glider site O/H without seeing any other traffic. The UKAB secretariat apprised the pilot of the topographical chart information which shows the site as a circle 1 NM radius with an appended altitude of 3800 ft, the max altitude attainable by a glider during a winch launch. He was also informed of the Rivar Hill published hours from the UK AIP and of the recommendation to avoid transiting through any glider site during their notified hours.

MIL ATC OPS comments that the RT tape transcript from Brize reveals that the C182 called on frequency at 1014:48 (although an exact timing cannot be confirmed) and reported *"...Thrupton to Enstone this time twenty two hundred 1016 coming up to Hungerford....."*. This would indicate that the ac is N of the Airprox position on his initial contact call and therefore there is no apparent Mil ATC involvement in this incident.

UKAB Note (2): The UK AIP at ENR 5-5-1-4, promulgates Rivar Hill as a Glider Launching Site centred 512038N 0013235W for winch launches where cables maybe encountered to 3000 ft agl, during daylight hours; site elevation 730 ft amsl.

UKAB Note (3): Met Office archive data shows the actual QNH for the Rivar Hill area as 1016 mb. The Cotswold RPS 1000-1100 was 1012 mb and the Portland RPS 1000-1100 was 1014 mb.

UKAB Note (4): Analysis of the Pease Pottage radar recording was rather inconclusive. At 1010:32 a slow moving primary only return, believed to be the Puchacz glider, is seen just over 1 NM E of Rivar Hill tracking 250° which continues on this track until fading from radar at 1012:52 1 NM SSW of the glider site. Two further radar returns appear at 1014:22 and 1014:28 about 0.3 NM S of the glider site now tracking NE before fading again. It is only after a further 30 sec, at 1014:58, a primary only return appears, the C182, 0.85 NM NNE of Rivar Hill tracking 360° which 36 sec later commences squawking 3701 indicating FL 022 (2300 ft QNH 1016 mb). The Airprox, as reported by the Puchacz pilot, is not observed but is believed to have occurred shortly before 1014:20, just before the gliders last two radar returns show.

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.

Members were dismayed that this Airprox had been caused by the C182 pilot flying through an active notified glider site. Although gliders can be encountered anywhere within an FIR, it was more likely to occur within the airspace close to the launch site. As he approached the glider site, the C182 pilot had erroneously assumed that since he could not see any activity on the ground it was safe to transit through it. Members thought that the Cessna pilot's 'familiarity' with the site may have led him to believe that his judgement and actions were sound whereas previous similar Airprox incidents had shown to the contrary - wide avoidance of the O/H was the safest option. Turning to route around was particularly important to avoid any launching glider and, just as important, the attached cable. However, for whatever reason, the Cessna pilot had not seen the Puchacz glider that was already airborne and soaring immediately to the S of the airfield. This was immediately before the pilot contacted Brize Norton for a service so he may have been 'heads in' changing radio frequency to the detriment of his lookout. Also, a white glider is known to be a difficult ac to see orbiting against a white cloud backdrop.

Turning to risk, the Puchacz pilot had been surprised at seeing the Cessna late and close by, 200 ft below. Nevertheless, he had quickly realised that the subject ac were not going to collide and had continued with his orbit and watched the C182 pass beneath. Members agreed that the ac had passed in such close proximity, before the glider pilot's lookout had revealed the potential confliction, to the extent that safety of both ac had been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Degree of Risk: B

Cause: The C182 pilot flew through an active notified glider site into conflict with the Puchacz glider, which he did not see.

INDEX TO AIRPROX REPORT SUMMARIES

Serial No	Date	Types	Position	Risk	Page
139/01	12 Aug	F15/F50	3 NM S of Scarborough	B	19
2/02	09 Jan	B737-200 /Pegasus Quantum	17 NM E of Edinburgh	C	22
3/02	11 Jan	Grob Tutor/Tucano T1	Church Fenton	C	25
4/02	16 Jan	Harrier/Squirrel	3.5 NM WSW of Bridgnorth	B	30
5/02	18 Jan	C152/Tornado GR	6 NM SSW of Linton on Ouse	C	32
6/02	21 Jan	Falcon 50/Chinook	4 NM ESE of Odiham	C	34
8/02	07 Feb	B757/C525	4 NM NW London City	C	39
9/02	08 Feb	Sea King/Tornado GR	6 NM NE of Alnwick	B	42
10/02	17 Feb	CRJ2/FK70	2 NM NNE WELIN	C	43
11/02	14 Feb	Beagle Pup/Falcon 20	2 NM SW of Sandtoft	B	46
12/02	21 Feb	C130J/Andover	3 NM W of Boscombe Down	C	48
14/02	27 Feb	Tornado GR4A/C152	2.6 NM ENE Leicester A/D	C	51
15/02	26 Feb	Sea King/Harrier GR7	5 NM ESE of Carlisle Aerodrome	C	53
16/02	07 Mar	A340/Sea Harrier	7NM NE of GIBSO	C	58
17/02	07 Mar	Tornado GR/TB10	4 NM ESE of Sleaford	B	61
18/02	07 Mar	Puma HC1/Grob Tutor	Benson	B	64
19/02	12 Mar	BN2T Defender/Lynx HAS Mk 3	1 NM W of NAB Tower	A	67
20/02	14 Mar	Andover/Twin Squirrel	3 NM NNE of Tewkesbury	B	70
21/02	18 Mar	Lynx/Chinook	0.5 NM SSW of Wattisham	C	72
22/02	20 Mar	DR253(Regent)/Bulldog	2 NM N Bourn	C	76
23/02	22 Mar	Tucano T Mk1/Tucano T Mk1	2 NM SE of Topcliffe	A	78
24/02	25 Mar	B737 (A)/B737 (B)	4 NM SW DET	C	81
25/02	26 Mar	Hawk T Mk1/Cessna C172	1¼ NM NW Valley aerodrome	C	84
26/02	24 Mar	A320/B737-200	3 NM E of WOD	C	89
27/02	27 Mar	Jetstream JS20/PA28	5 NM E of Liverpool	C	91
28/02	27 Mar	Agusta 109/PA28	7½ NM WNW Oxford/Kidlington	B	95
29/02	28 Mar	HS25/BE90	15 NM SE GOODWOOD	C	98
30/02	01 Apr	A320/PA34	BKY VOR	C	101
31/02	04 Apr	C130 Mk 4/Beech 23	2½ NM NW of Lyneham	C	105
32/02	04 Apr	VC10 K formation/Tornado GR4 pr	AARA 6	C	110
33/02	03 Apr	Harrier Formation/Hawk	10 NM SW of Leeming	C	114
34/02	05 Apr	Viking Glider/C501 Citation	1 NM N of Kenley	C	118
35/02	05 Apr	Hawk/F15E	2 NM SW of Dolgellau	C	122
36/02	08 Apr	BAe ATP/Grob Tutor	2.95 NM Finals RW09 at Liverpool	C	124
37/02	03 Apr	BE76/DC6	8 NM NW Filton	B	128
38/02	14 Apr	Extra E230/C207	Threshold RW 26 Popham	B	131
39/02	14 Apr	Gazelle/Untraced	4 NM S of Hebden Bridge	B	134
40/02	15 Apr	Jetstream 32/Tornado F3	12 NM W of Flamborough Head	C	136
41/02	26 Mar	KC 135R/Grob Tutor	2 NM NE of Wyton	C	140
43/02	16 Apr	JS31/PA28	10 NM NW Filton	B	144
44/02	14 Apr	Rollason Condor/PA28R Arrow	3 NM SE Salisbury	C	147
45/02	19 Apr	EC135/GA7	4 NM SSW Cranfield	B	149
47/02	22 Apr	DHC8/SHAR FA2	119° ST ABBS 47nm	C	151
48/02	18 Apr	Pilatus B4 Glider/Hunter T7	3.25 NM WSW Kemble	B	157
49/02	03 May	Grob Tutor/Robinson R22	Cumbernauld Aerodrome	B	159
50/02	08 May	ASK8 Glider/R44	1.5 NM ESE Halton	B	161
51/02	09 May	Jetstream 41/Hawk	7 NM NE of TILNI	C	163
53/02	11 May	Bolkow105/ASW24 Glider	O/H Brighton Airfield	B	169
55/02	11 May	BO105/C152	4 NM W of Colchester	B	171
57/02	12 May	CP301/C550	1 NM E of Gamston	B	173
58/02	16 May	B737-300/Lynx AH Mk7	Belfast Aldergrove	C	175
59/02	17 May	Hawk/Harrier T10	5 NM N of Hereford	A	178
60/02	19 May	SF25C M Glider /Hughes 500C	3 NM NE of Marlborough	C	181

Serial No	Date	Types	Position	Risk	Page
61/02	4 May	C182/Grob 109	1 NM S of South Cerney	B	183
62/02	21 May	Tornado GR4/AS355 F1	1 NM N of Grassington	B	185
63/02	24 May	DHC6 Twin Otter/Tornado GR4	3½ NM W of Garroch Head – Isle of Bute	C	188
64/02	24 May	Jaguar GR3A/PA28	10 NM NW of Brunton	C	191
65/02	27 May	Squirrel/Vigilant T MK1	4¼ NM WSW of Cosford	C	193
66/02	25 May	B737-300/PA46	14 NM SW POL	C	196
67/02	28 May	Embraer 145/Islander	8 NNE of Southampton Airport	C	198
68/02	17 May	KA7 Glider/HS04 Dove	O/H Kenley Gliding Site	B	202
69/02	29 May	Jaguar/EC-135	Loch Ness	A	204
70/02	30 May	F406/Harrier GR7	Bristol Channel, 45 NM NNW St Mawgan	C	206
71/02	30 May	HS74/C406	2 NM NW of Birmingham	C	209
72/02	21 May	KC 135R/Tucano	22 NM ENE of Linton-on-Ouse	C	212
73/02	21 May	KC 135-R/K-13 Glider	13 NM West of Fairford	C	214
74/02	28 May	Jetstream 41/Balloon	15 NM S of Newcastle	D	217
75/02	05 Jun	Tornado GR4/AS350 B2 Squirrel	3½ NM W of Loch Cluanie	B	218
76/02	02 Jun	A320/BA46	13 NM E WAL	C	220
77/02	08 Jun	Nimrod Mk2/Grob CS77 Glider	6 NM ENE of Feshiebridge	C	224
78/02	11 Jun	VC10/Hawk	4.5 NM ESE of Llanbedr	A	227
79/02	12 Jun	B737/B767	5 NM NW BNN	C	230
80/02	17 Jun	B777/B737	2.5 NM SSW BARLU	C	233
81/02	17 Jun	Shorts SH360/Tornado GR4	262° Glasgow Airport 24 NM	C	238
83/02	05 Jun	B737/A319	7 NM NW Southend	C	241
85/02	18 Jun	Ventus BT glider/Harrier T10	Moreton-in-the-Marsh disused aerodrome	B	244
86/02	10 Jun	KC 135/Jaguar x 2	36 NM SE of SKATE	C	247
87/02	17 Jun	A320/DC10	13 NM SW SAM	C	251
88/02	19 Jun	Squirrel/Jaguar	25 NM W of Shrewsbury	A	254
89/02	07 Jun	DHC8/BA46	10 NM SW MCT VOR	C	256
90/02	18 Jun	C550/EMB145/B757	RATUK	C	259
91/02	20 Jun	B737/C182	4 NM WSW of Teesside	C	262
92/02	23 Jun	C150/Untraced YAK	4 NM ENE WCO	B	265
93/02	20 Jun	Hawk/Hawk	6 NM NW Barnard Castle	B	267
94/02	14 Jun	Robinson R22/Harrier	Millbrook – Vehicle proving Ground	A	271
95/02	13 Jun	FK27/F15C x 3	12.5 NM NE of Dover	C	273
96/02	25 Jun	PA28R/AC12	5 NM N Oxford/ Kidlington - Elev 270 ft	C	275
97/02	22 Jun	B737/Wx Balloon	5 NM SSE of GRICE	D	277
98/02	26 Jun	Embraer 145 (A)/Embraer 145 (B)	30 NM N Manchester	C	279
100/02	30 Jun	Chipmunk/PA28	3 NM SW Husbands Bosworth glider site	B	281
101/02	29 Jun	B121 Pup/DR221 Dauphin	Shobdon Circuit	C	283
103/02	27 Jun	C130J/MD 600	2 NM SSE Brize Norton	C	286
109/02	30 Jun	Puchacz Glider/C182	0.5 NM SSW of Rivar Hill	B	289