

SECTION 1.4.2 - SORTIE PLANNING, BRIEFING AND AUTHORISATION

1.4.2.1 The accident involved two aircraft from the same Sqn but from different formations. Together, the formations numbered four aircraft and eight crewmembers. The actions of the eight crewmembers, interwoven with the maintenance and Flypro of the four aircraft create a complex picture. Further complication was added by personnel performing multiple supervisory duties due to half of the Sqn having deployed to Cyprus on exercise. The similarity of the formation callsigns, ASTON and ABBOT, can create confusion. In order to be used as a reference, this guide to relevant personnel and callsigns will be repeated at the beginning of each section.

1.4.2.2 The crews were allocated as follows. The descriptors in the left hand column will be used to describe each crewmember throughout the report:

- a. **ASTON 1 – ZD743**
 - (1) Pilot: Student Pilot. (Deceased)
 - (2) WSO: OC B Flight (Programming), Stand in OC XV(R) Sqn, Qualified Tactics Instructor (QTI). (Deceased)

- b. **ASTON 2**
 - (1) Pilot: Student Pilot.
 - (2) WSO: Sqn WSO, QTI. Set the scenario for ASTON sortie.

- c. **ABBOT 1**
 - (1) FS Pilot: Student Pilot.
 - (2) RS Pilot: Supernumerary Sqn Ldr on XV(R) Sqn, Qualified Weapons Instructor (QWI), was 1st Duty Authoriser, gave phase brief to student pilot before going flying.

- d. **ABBOT 2 – ZD812**
 - (1) FS Pilot: Student Pilot. (Deceased)
 - (2) RS Pilot: STANEVAL(Synthetic). QWI. Led the plan for ABBOT sortie. (Survived)

Introduction

1.4.2.3 This section of the report covers the crews' preparation for flight, supervision, deconfliction and authorisation. It is divided as follows:

- a. Aircrew Background and Flying Currency
- b. Aircrew Currencies
- c. XV(R) Sqn Supervision
- d. Meteorological/Operations (Met/Ops) Brief
- e. Sortie Planning and Briefing
- f. Outbrief
- g. Authorisation

Aircrew Background and Flying Currency

1.4.2.4 **ASTON 1 Pilot.** A review of the Pilot's RAF Form 5200 and log book found that he completed the Hawk Trainer Mark 1 (Hawk T Mk 1) Tactical (Tac) Weapons Course to an "overall average" standard in Jun 11. He then continued to fly the Hawk T Mk 1 at the Joint Forward Air Controller Training and Standards Unit while he waited for his Tornado GR4 OCU course. He commenced the Tornado GR4 OCU in Oct 11 and had completed 35 of the 48 sorties of the Tornado GR4 Long Course Syllabus. He had recently completed the Air Combat Training phase of the course to an "overall more than satisfactory" standard. At the time of the accident he had accumulated a total of 615 hrs of flying experience, of which 64:50 hrs was spent on Tornado GR4. He had flown 8:50 hrs in the past 30 days and 36:15 hrs in the past three months. In addition, he had also completed five simulator sorties in the previous 30 days.

Exhibit 118
Exhibit 119
Exhibit 120
Exhibit 22
Exhibit 215

1.4.2.5 **ASTON 1 WSO.** The WSO completed the OCU on the Tornado GR1/4 in 2002 to an "overall satisfactory" standard. Following his tour on XIII Sqn he was posted to XV(R) Sqn to undertake instructional duties. He achieved A2 QTI status in 2007 and undertook the role of TGRF WSO CFS Agent as part of XV(R) Sqn Standards Flt. Following promotion in Jan 10, he undertook a four month Out Of Area (OOA) assignment then returned to XV(R) Sqn to undertake Flight Commander (Flt Cdr) duties in May 11. He completed the Intermediate Command and Staff Course (Air) course from Aug to Oct 11. His last annual assessment of ability graded him as "Above Average". At the time of the accident he had accumulated 1582 hrs of flying experience of which 1393 hrs was spent on Tornado GR1/4. He had flown 12:45 hrs in the past 30 days and 40:25 hrs in the past three months.

Exhibit 121
Exhibit 122
Exhibit 123
Exhibit 124
Exhibit 22

1.4.2.6 **ABBOT 2 FS Pilot.** A review of the Pilot's RAF Form 5200 and log book found that he completed the Hawk T Mk1 Main Fixed Wing Course at 208 Sqn, to an "overall average standard" in 2008 and was selected for instructional duties. He remained as an instructor on 208 Sqn and achieved A2 QFI status in 2010. He completed the Tac Weapons Course in May 11 and was role disposed to the Tornado GR4. Prior to starting the Tornado OCU in Jan 12, he flew the Hawk T Mk 1 at CAM and completed a refresher course at 208 Sqn in Oct 11. At the time of the accident he had accumulated a total of 988 hrs of flying experience of which 35:25 hrs was spent on Tornado GR4. He had flown 10:10 hrs in the past 30 days and 29:30 hrs in the past three months. In addition, he had also completed seven simulator sorties in the past 30 days. He had completed 19 of the 48 sorties of the Tornado Long Course Syllabus and was performing well.

Exhibit 125
Exhibit 126
Exhibit 127
Exhibit 22
Exhibit 440

1.4.2.7 **ABBOT 2 RS Pilot.** The Pilot converted to the Tornado GR1 at the Tri-National Tornado Training Establishment and Tornado Weapon Conversion Unit in 1990. Following a front-line tour with 17 (Fighter) Sqn he completed the Qualified Weapon Instructor (QWI) Cse to a "High Average" standard. He subsequently completed a QWI tour with 617 Sqn and a Flt Cdr tour with XV(R) Sqn. Following further tours with 617 Sqn and XV(R) Sqn, where he became an A2 QFI and CFS Agent, he took up the position of STANEVAL (Synthetic). In his current role he maintains flying currency and regularly conducts QFI and Aircrew Checking Officer (ACO) checks across the RAF Lossiemouth Tornado Wing (LTW) together with OCU syllabus sorties. His last annual assessment of ability graded him as "exceptional". At the time of the accident he had accumulated 3968 hrs of flying experience of which 3618 hrs was spent on the Tornado GR1/4. He had flown 14:20 hrs in the past 30 days and 39:20 hrs in the past three months.

Exhibit 128
Exhibit 129
Exhibit 130
Exhibit 131
Exhibit 22
Witness 16
Exhibit 415
Exhibit 680
Exhibit 681

1.4.2.8 **Conclusion.** The Panel concluded that the students, ASTON 1 Pilot and ABBOT 2 FS Pilot, had sufficient and appropriate flying currency and had supplemented their flying with five/seven simulator sorties in the same 30 day period. The Panel concluded that, during the previous 3 months and 30 day timeframe, both instructors had sufficient and appropriate flying currency.

1.4.2.9 The Panel concluded that flying currency was **not a factor** in the accident.

Aircrew Currencies

Introduction

1.4.2.10 This sub-section of the report examines aircrew currencies. It is divided as follows:

- a. Regulation, Policy and Orders
- b. Pre Flight Currency Check
- c. Waiver Process and History
- d. Analysis

Regulation, Policy and Orders

1.4.2.11 **MRP RA 2130 Safety and Survival Drill Currency.** Military Aviation Authority Regulatory Publication Regulatory Article (MRP RA) 2130 covers ejection and manual separation, dry liferaft and preserver drill, and liferaft and parachute dragging at sea. It states:

- a. *“On conversion to a new aircraft type all aircrew shall complete the appropriate emergency and survival drill training mandated by Aviation Duty Holders and Commanders.”*
- b. *“Qualified aircrew required to fly as crew shall be responsible for keeping themselves in date for all survival and emergency drill.”*
- c. *“Aviation Duty Holders and Commanders may grant extensions to the periodicity indicated at Annex A for operational reasons, or in exceptional circumstances. Exceptionally, after an appropriate risk assessment, Aviation Duty Holders and Commanders may exempt crews from maintaining currency in a specific drill when they consider that it is not applicable to an aircraft type and/or role.”*

1.4.2.12 **1Gp Air Staff Orders.** 1Gp ASOs 2130 states:

- a. *“Aircrew who fly in No 1 Gp aircraft are to be current in all applicable survival drills as listed at Annex A, Reference A [MRP RA2130 Annex A]. Aircrew whose currency expires are not to fly until currency is restored, or an individual extension to the currency has been granted by the Stn Cdr.”*
- b. *“The Stn Cdr is only permitted to grant extensions to the periodicity indicated at Annex A, Reference A, for operational reasons or in exceptional circumstances. If an extension is required in these circumstances, a written request is to be sent to the appropriate Stn Cdr. If an extension is granted, the approval is to (sic) kept on record within the individuals training folder...”*

1.4.2.13 **Tornado Training Syllabus (TTS).** The TTS states that *“When nominated, all students should complete the following Pre-Employment Training (PET) prior to arriving on the OCU:*

- a. *“SERE [Survival Evasion Resistance Extraction] (Conversion) Course at RAF St*

Exhibit 186

Exhibit 187

Exhibit 188

Mawgan (2 days).”

1.4.2.14 **XV(R) Sqn TORs.** XV(R) Sqn DA TOR state that the DA is to check *“the qualifications, currency and flying hours of the crews for the days flying and advise the individuals of any short falls (sic).”*

Exhibit 162

Pre Flight Currency Check

1.4.2.15 The Duty Student checked the currencies for the entire day, using the Training and Capability Tracking System (TACTS) computer (Figure 13) and printed sheets. The Duty Student brought three currency issues to the attention of the 2nd DA:

Witness 12
Exhibit 173
Exhibit 178
Exhibit 179

a. The Duty Student had been unable to check the currencies for ABBOT 2 RS Pilot. The 2nd DA confirmed with ABBOT 2 RS Pilot, who stated that he was *“current and in the green”*¹.

b. The Duty Student identified that a refresher instructor’s Aviation Medicine Training Wing (AMTW) currency had lapsed. The 2nd DA then investigated the AMTW currency and the associated waiver process, which took a *“reasonable amount of time”*, before cancelling LOSSIE 38’s sortie.

c. ASTON 1 WSO’s sea drill currency had expired. The 2nd DA questioned the WSO *“to which he replied he had a waiver. I think he gave me a date to which the waiver covered him for the period in question.”* The 2nd DA did not see a copy of the waiver.



Exhibit 91

Figure 13. Auth’s Desk TACTS Computer (Right Hand Monitor).

1.4.2.16 **ASTON 1 Pilot.** TACTS showed that ASTON 1 Pilot’s Terrain Following Radar (TFR) currency had expired. As mandated in 1Gp ASO (4)2330, this would have prevented the Pilot from using the TFR for IMC Auto Terrain Following (ATF) during the accident sortie unless a minimum of 1 leg of ATF, including an initial engagement to ATF and a disengagement and subsequent re-engagement using the Hands on Throttle and Stick, had been achieved earlier in the sortie. 1Gp ASO (4)2330 further states that IMC ATF could only have been used in the accident sortie in order to achieve VMC for the purposes of conducting VFR LL flight.

Exhibit 179
Exhibit 180

¹ When currencies are in date, they are displayed with a green background. When a drill/currency is out of date, it is displayed with a red background.

1.4.2.17 **ASTON 1 WSO.** TACTS showed that the WSO's currency for "Dinghy and Life Preserver – Sea" and "Para Drill – Sea Dragging" had expired on 4 Mar 12. The WSO had received a waiver from STANEVAL to the next sea drill on 4 May; this was subsequently cancelled for poor weather and therefore the waiver was extended until 29 Jun. The WSO withdrew himself on 28 Jun from the sea drill to allow himself time to prepare for a VTC with the Tornado Ground Reconnaissance 4 Force (TGRF) Force Commander (FC) on the afternoon of 29 Jun. The WSO instead flew a Staff Continuation Training sortie on the morning of the 29 Jun. During a medical consultation with the Consultant Psychiatrist, he admitted that he had felt relief when a possible exposure to flying related events were cancelled, such as a cancellation of a sea survival drill.

Exhibit 179
Exhibit 181
Exhibit 182
Exhibit 183
Exhibit 21
Exhibit 22
Exhibit 185
Exhibit 437

1.4.2.18 The WSO's "Dinghy and Life Preserver – Pool" currency had also expired on 4 Mar 12. He was granted a waiver by STANEVAL to extend his currency until 13 Apr with the reason given of "leave for 2 pool drills". The 13 Apr pool drill was then cancelled due to Ex Joint Warrior and therefore his waiver was extended to "mid May." The WSO completed a pool drill on 4 May 12.

Exhibit 181
Exhibit 179
Exhibit 182

1.4.2.19 **ABBOT 2 FS Pilot.** TACTS showed that ABBOT 2 FS Pilot was in date for all currencies appropriate to his level of training at the time of the accident. Of note, TACTS showed him to be strafe current despite not having completed the strafe syllabus and the requisite number of hot strafe passes in the previous 12 months as detailed in 1Gp ASO 2325.

Exhibit 179
Exhibit 184

1.4.2.20 **ABBOT 2 RS Pilot.** TACTS showed that the Pilot's currency had expired for "Ejection Seat and System" on 23 Jun 12 and "Dinghy and Life preserver – Dry" on 23 Mar 12. The Pilot was in date for all other relevant currencies pertaining to the accident sortie.

Exhibit 179

1.4.2.21 **Thrust Reverse (TR) Selection from RS.** As a result of the Unit Inquiry that investigated the runway departure on landing of Tornado GR4 ZD741 on 10 Feb 11, the TTS was updated to include "at least 1 RS landing per year is to be conducted with selection of TR by the RSC [Rear Seat Captain]." The Panel **observed** that TACTS had not been updated to allow the currency to be tracked. ABBOT 2 RS Pilot stated that he would normally complete the final landing from the rear cockpit with selection of TR on his rear seat annual check sortie. He had completed a Command Instrument Rating Examiner Test from the RS on 25 Apr 12 with selection of TR on landing.

Exhibit 22
Exhibit 406
Exhibit 407
Exhibit 408

Waiver Process and History

1.4.2.22 **RAF Marham Waiver Process.** The TGRF FC was also the Stn Cdr at RAF Marham, and therefore TGRF policy often originated from this office. A 2006 email chain, initiated by 1 Gp but via the Stn Cdr, stated that survival drill extension authority had been delegated to the RAF Marham STANEVAL and the Wing Electronic Warfare Officer (WEWO). At the time the WEWO was a qualified Combat Survival Rescue Officer, the qualification that preceded the current Survive Evade Resist Extract Officer (SEREO) qualification. The WEWO performed the role of Stn SEREO and issued waivers from 2006 to 2011 for exceptional circumstances or operational reasons, although the Panel has no examples of what such circumstances were. Following a change of Stn Cdr the WEWO would check that the new Stn Cdr was content with the process but this was not formally recorded. The WEWO retired from the RAF in 2011 and subsequently the Stn SEREO role was gapped; the waiver process then became obsolete at RAF Marham; the waiver process reverted back to the Stn Cdr approving waivers. The current RAF Marham Stn Cdr, STANEVAL, and Wg SEREO believe that the Stn Cdr has sole authority to issue Safety and Survival Drill waivers to RAF Marham based aircrew.

Exhibit 189
Exhibit 190
Exhibit 191
Exhibit 192
Exhibit 193
Exhibit 194

1.4.2.23 **Delegation of Authority to Issue Waivers.** Authority to issue safety and survival drill waivers was delegated in 2006, by the RAF Lossiemouth Stn Cdr at the time, to the RAF Lossiemouth STANEVAL in an email. The email did not explicitly state the acceptable reasons for extending the currency or refer to any appropriate regulations or orders. The delegation was as a result of the process put in place by the TGRF FC/Stn Cdr Marham. Exhibit 189

1.4.2.24 **Current RAF Lossiemouth Waiver Process.** The Stn Cdr was unaware that the authority to issue waivers had been delegated to STANEVAL and believed that he held the only authority for such action. He had dealt with a direct request earlier in 2012 which reinforced this understanding. Furthermore, he was unaware that aircrew were flying outside of the currencies detailed in MRP RA 2130 with a waiver issued by STANEVAL. Exhibit 195
Exhibit 196
Witness 11

Analysis

1.4.2.25 It is normal for the Sqn programmer to check currencies before writing a Flypro to identify if an individual has a currency issue that would preclude a certain activity. Although there were 3 people programmed to fly on 3 Jul 12 who were not in date for a currency requirement, there is mitigation for 2 of them being programmed (an individual had omitted to update TACTS and ASTON 1 WSO would have indicated out of date for a sea drill but there had been a waiver in effect since Mar 12). Programming checks add a layer of supervision for currencies, and any omissions, however mitigated, place an added burden on the DA. Witness 33
Exhibit 179
Witness 85

1.4.2.26 Although the Duty Student checked the currencies, the XV(R) DA's TORs state it is the responsibility of the DA. The Duty Student was experienced in currency administration having completed a tour as an A2 Hawk QFI, however during that time he used a different computer currency tracking system. ABBOT 2 RS Pilot's currencies were available on the Auth's Desk TACTS computer but the Duty Student was unaware of the method to interrogate aircrew currencies from different sections such as Ops Wg (ABBOT 2 RS Pilot), due to the intricacies of TACTS. Exhibit 178
Exhibit 197
Exhibit 162
Exhibit 198
Exhibit 403

1.4.2.27 The Panel believes that ABBOT 2 FS Pilot inadvertently updated TACTS the day before the accident following OCU Sim 19, which contains "hot" strafe events, without understanding the significance of the strafe flag in TACTS. Exhibit 22
Exhibit 199

1.4.2.28 The Panel believes that ABBOT 2 RS Pilot had undertaken the necessary ejection seat and system refresher training on either 16 Mar 12 or 25 May 12 but had not updated TACTS. Exhibit 179
Exhibit 200
Exhibit 201
Exhibit 404

1.4.2.29 ABBOT 2 RS Pilot was outside of the six month Dry Liferaft currency detailed in MRP RA 2130. It is possible that he had completed the training and again not updated TACTS, however no evidence could be produced to support this. Since the currency had expired on TACTS, the pilot had flown a total of 26 sorties with XV(R) and 12(B) Sqn. This highlights a problem² that is not specific to the 3 Jul 12, and demonstrates that DAs place as much trust on verbal updates as TACTS. Exhibit 22
Exhibit 200
Exhibit 201
Exhibit 403
Exhibit 630

1.4.2.30 Due to a reassignment to an earlier OCU Long Cse, ASTON 1 Pilot did not attend the SERE Conversion course as regulated in MRP RA 2130 and TTS, which includes sea drill training. The Panel concluded that while waiting for the OCU Long Cse the Pilot completed a sea drill using Hawk T Mk 1 Aircrew Equipment Assembly (AEA) and TACTS had been updated to reflect this. There is no evidence that he had completed a pool drill or Exhibit 188
Exhibit 202
Exhibit 203
Exhibit 204
Exhibit 179

² The problem of not being able to access currencies from personnel outside of the Sqn is a training issue rather than an IT issue. All members of XV(R) Sqn were issued unit administrator rights to access all records.

sea drill utilising Tornado AEA. This would <u>not</u> have been apparent to the 2 nd DA (as ASTON 1 Pilot would have been recorded as in date for sea drill).	Exhibit 22 Exhibit 630
1.4.2.31 The Flypro timings for 29 Jun would have allowed ASTON 1 WSO to attend the sea drill and arrive in time for the VTC. It is possible that ASTON 1 WSO had asked STANEVAL for a waiver at the VTC; however, at the time of the accident the WSO did not have a waiver and was out of “Dinghy and Life Preserver – Sea” and “Para Drill – Sea Dragging” currency.	Exhibit 179 Exhibit 181 Exhibit 22 Exhibit 185
1.4.2.32 MRP RA 2130 states that it is the individual’s responsibility to keep themselves in date for safety and survival drills. TACTS is the vehicle for recording and tracking aircrew currencies. The Panel concluded that aircrew should ensure that TACTS currencies are correct and updated prior to flying.	Exhibit 186
1.4.2.33 The Panel believes that the 2 nd DA should have ensured that the crews’ currencies were correct and up-to-date on TACTS prior to flying, requesting visibility of any waivers, although there are no orders to mandate their physical presentation.	Exhibit 179
1.4.2.34 The Panel considered that, due to the experience and seniority of the ASTON 1 WSO and ABBOT 2 RS Pilot, the 2 nd DA would be less rigorous in his checking of currencies when he was told by them they were in date. This is not a reflection of his professionalism, more a reflection of the respect he held for their position and experience.	Exhibit 630
1.4.2.35 The Panel considered that the 2 nd DA may have viewed the waiver as an entry on a centralised matrix, rather than a specific document for an individual, which could be printed and produced on request.	Exhibit 206
1.4.2.36 The Panel considered that as the safety and survival drill waiver process had not been recorded in an appropriate manner, the waiver process had been allowed to continue for five years ³ , with both the RAF Lossiemouth Stn Cdr and RAF Marham Stn Cdr unaware.	Exhibit 189 Exhibit 196 Exhibit 181
1.4.2.37 A number of waivers granted by RAF Lossiemouth STANEVAL did not reach the operational reasons/exceptional circumstances threshold detailed in MRP RA 2130, leave being an example.	Exhibit 181
Aircrew Currencies Conclusions	
1.4.2.38 The Panel concluded that:	
a. the RAF Marham Stn Cdr and RAF Lossiemouth Stn Cdr were unaware that waivers were being issued on their behalf;	
b. STANEVAL had issued waivers not meeting the “operational reasons or in exceptional circumstances” threshold detailed in MRP RA 2130;	
c. ASTON 1 Pilot had not completed a pool or sea drill utilising Tornado AEA;	
d. ASTON 1 WSO’s sea drill currency had lapsed;	
e. ABBOT 2 RS Pilot’s dry dinghy and life preserver currency had lapsed;	
f. insufficient oversight of currencies and ASTON 1 WSO’s waiver by the 2 nd DA allowed both ASTON 1 WSO and ABBOT 2 RS Pilot to fly out of currency;	

³ Five years refers to RAF Marham, the misunderstanding continued at RAF Lossiemouth for another year.

therefore, Aircrew Safety and Survival Currency was an **other factor** due to the potential aggravating nature in a further accident.

XV(R) Sqn Supervision

Introduction

1.4.2.39 The supervision of ASTON and ABBOT's sorties was primarily the responsibility of Sqn and formation personnel. MAA, 1Gp and Stn provide additional levels of supervision through regulation, policy, orders and direct oversight of Sqn operations. This sub-section is divided as follows:

- a. Regulation, Policy and Orders
- b. Supervision of XV(R) Sqn
- c. XV(R) Sqn Internal Supervision
- d. Analysis

Regulation, Policy and Orders

1.4.2.40 **General.** Several regulations and orders have direct relevance to ASTON and ABBOT's sortie including: MRP RA, 1Gp ASOs, UK Military Low Flying Handbook (UKMLFHB), Air Command Air Weapon and Electronic Warfare Range Orders (ACAWEWROs) and the RAF Lossiemouth Flying Order Book (FOB).

Exhibit 55
Exhibit 138
Exhibit 224

1.4.2.41 **MRP RA 2305 Supervision of Flying.** MRP RA 2305 requires Aviation Duty Holders and Commanders to appoint officers to supervise the flying operations for which they are responsible and promulgate orders. The RA states:

Exhibit 139

- a. *“Commanding Officers of flying stations... **should** appoint officers to supervise the flying operations for which they are responsible under specific arrangements promulgated by Aviation Duty Holders and Commanders.”*
- b. *“Aviation Duty Holders and Commanders are responsible for the control of flying at station/unit level and **should** issue orders applicable to the particular theatre or formation. Similarly, Aviation Duty Holders and Commanders of flying units should issue local flying orders.”*

1.4.2.42 **Guidance Material.** MRP RA 2305 Guidance Material details nominated pers and Local Flying Orders:

Exhibit 139

- a. *“Aviation Duty Holders and Commanders of flying units will nominate a suitably experienced individual to be immediately contactable and available to supervise all flying conducted on the unit.”*
- b. *“Local Flying Orders...will not repeat the direction and guidance of superior level documents, but may raise any minimum qualification or safety margin to take account of local requirements or conditions. All necessary steps will be taken to bring the appropriate flying regulations and orders to the attention of the flying personnel concerned. However, it will also be the duty of aircrew to acquaint themselves with appropriate flying regulations and orders.”*

1.4.2.43 **1Gp ASOs.** 1Gp ASO 2305 Supervision requires that:

Exhibit 141

- a. Station Commanders (Stn Cdrs) appoint DCFs to supervise stn flying on their behalf; *“the DCF is directly responsible to the stn cdr for the safe supervision of day-to-day flying operations on the station.”*
- b. DCF orders are to be published in the unit FOB.
- c. the Stn Cdr is also responsible for appointing aircrew as DA. *“The Duty Authoriser is responsible for sqn-level supervision of flying operations on behalf of his Sqn Cdr.”*
- d. the Stn Cdr is to provide Local Orders which detail the *“responsibility boundaries for each appointed supervisory position.”* The orders should also specify the *“minimum level of experience required before an individual may be considered to fill a stn or sqn supervisory position.”*

1.4.2.44 **RAF Lossiemouth FOB**

Exhibit 150

- a. Sqn Cdrs. The FOB states that Sqn Cdrs are *“responsible to the Stn Cdr for the supervision and safe and efficient conduct of his/her Unit’s flying, in accordance with his/her Terms of Reference.”* Sqn Cdrs are required to issue *“Sqn Flying Orders and Instructions in respect of the operations of his/her own unit.”*
- b. The FOB states that *“Sqn Commanders are responsible to the Stn Cdr for the supervision and safe and efficient conduct of his/her Unit’s flying, in accordance with his/her Terms of Reference.”*

Exhibit 150

Supervision of XV(R) Sqn

1.4.2.45 The Stn Cdr chairs bi-weekly meetings with the Sqn Cdrs, Senior Operator and Chief Aircraft Engineer. On a monthly basis a review of Key Performance Indicators is conducted, which includes the sqns’ performances in capability and currency. On behalf of the Stn Cdr, OC Ops conducts monthly “flying execs” meetings with the Sqn Cdrs. A panoply of other meetings are conducted with a focus on Air Safety and standardisation matters, and happen on an irregular basis for various topics as required.

Witness 11
Exhibit 152

XV(R) Sqn Internal Supervision.

1.4.2.46 At the time of the accident OC XV(R) was deployed to Cyprus. A week prior to departing, OC XV(R) led an Execs meeting to discuss the way forward for the next two months. OC XV(R) decided that OC Programming Flt, ASTON 1 WSO, would take command of the Sqn at RAF Lossiemouth during the split Sqn operations. OC XV(R) would lead the Cyprus based element. ASTON 1 WSO was due to attend the Flight Supervisors Course (FSC) but this was cancelled by OC XV(R) Sqn to ensure there were sufficient supervisors present during the split ops period. OC XV(R) considered supervision to be his number one concern as the Sqn had not done split ops for a long time⁴. During the Execs meeting they discussed priorities and what the Sqn needed to achieve during the two week period. OC XV(R) wanted an Exec always on the ground during the flying period. To achieve this, ASTON 1 WSO, OC Standards Flt and a supernumerary Sqn Ldr, ABBOT 1 RS

Witness 7
Witness 33
Exhibit 18
Exhibit 422
Exhibit 631

⁴ The last time XV(R) Sqn had done similar detachments was Aug/Sep 11.

Pilot⁵, remained at RAF Lossiemouth. Programming for the RAF Lossiemouth element of XV(R) for the period of the split ops was entrusted to one of the Sqn's most experienced programmers. The flying task at RAF Lossiemouth was halved to ten sorties per day. The Flypro would normally be approved by OC B Flt (ASTON 1 WSO), including any tasking of Flt Cdrs for ground based instruction; there is no evidence to identify if this happened on 2 Jul 12.

Analysis

1.4.2.47 AOC 1Gp, TGRF FC, RAF Lossiemouth Stn Cdr and OC XV(R) Sqn had specific and defined responsibilities for the supervision and co-ordination of all mission planning and aircrew briefing conducted at XV(R) Sqn and RAF Lossiemouth. Direction was issued through the promulgation of 1Gp ASOs, TGRF Handbook, TGRF Pocketbook (discussed later in this part of the report), RAF Lossiemouth FOB and XV(R) Sqn orders. The Panel believes that there are current orders in place that are coherent and clear in their direction. Exhibit 138
Exhibit 224

1.4.2.48 The Stn Cdr had appointed DCFs and DAs to supervise the flying operations, for which he was responsible, as required by MRP RA 2305. Exhibit 153

1.4.2.49 The Panel **observed** that OC XV(R) did not have TORs although he had received direction and guidance from the TGRF FC's In Year Delivery Plan. Exhibit 144

1.4.2.50 The Panel **observed** that the Stn Cdr had not promulgated local orders defining the minimum level of experience required before an individual may be considered for selection or to fill the position of DCF as required by 1Gp ASO 2305. The Stn Cdr stated that *"the key area is the Sqn Cdr's assessment...to assure the suitability of Auths, DCFs. That said OC Ops interviews all prospective DCFs."* Exhibit 152
Exhibit 141

1.4.2.51 The Panel **observed** that the Stn Cdr had not promulgated local orders defining the minimum level of experience required before an individual may be considered for selection or to fill the position of DA as required by 1Gp ASO 2305. He was, however, content with the minimum qualifications of the Tornado Training Syllabus (TTS) Authorisation Syllabus for DA. In addition, OC XV(R) had issued training and qualification requirements for personnel to fulfil the role of DA. Exhibit 175
Exhibit 152
Exhibit 141

1.4.2.52 OC XV(R) had allocated his personnel to ensure that there were sufficient supervisors available for Sqn flying. The Stn Cdr was content with the level of supervision for the RAF Lossiemouth element of XV(R) Sqn. The Panel considered that the reduction to ten sorties per day was sensible and achievable. Witness 11
Witness 7

1.4.2.53 Conclusions regarding supervision are detailed in para 1.4.2.177.

Met/Ops Brief

1.4.2.54 This sub-section has been divided as follows:

- a. ASTON and ABBOT Activity Matrix
- b. Regulation, Policy and Orders
- c. Met/Ops Brief Attendance
- d. Met/Ops Brief Description

⁵ He had been OC Standards until Apr 12

- e. Auth's Desk Met/Ops Brief
- f. Supervision and Deconfliction
- g. Analysis

ASTON and ABBOT Activity Matrix: Arrive at Work to Walk for Aircraft

1.4.2.55 Figure 14 provides a summary of ASTON's and ABBOT's activity from arriving at work to walking to the aircraft.



Regulation, Policy and Orders

1.4.2.56 RAF Lossiemouth FOB

- a. Duty Commander Flying (DCF). The orders state that the *“first DCF of the day is to receive a face-to-face met brief from the Met Forecaster in the ATC tower prior to his/her period of duty.”*

Exhibit 144
Exhibit 151

1.4.2.57 XV(R) Sqn FOB. XV(R) Sqn FOB requires that:

- a. *“All aircrew detailed for flying duties to report to work iaw the daily flying programme.”*
- b. Crews obtain a *“Met Brief from the Sqn Authoriser to ensure that all relevant restrictions and notices are promulgated; however this is not to interfere with the scheduling of outbriefs, which take priority.”*

Exhibit 144
Exhibit 145
Exhibit 146

Met/Ops Brief Description

1.4.2.58 Met brief is a shortened term used to refer to a Meteorological Brief. This is a brief to explain the weather forecast for the flying period to come. On a flying sqn the term Met Brief is also used to refer to the daily briefing or Met/Ops brief which, along with the weather, would cover a number of additional items. The Met/Ops brief allows crews to liaise on Flypro or other matters, review an emergency procedure and for notices to be promulgated. To avoid confusion within the report, the term Met Brief will refer to a brief consisting only of weather information. The term Met/Ops brief will describe a brief consisting of more content as described below. The electronic XV(R) Sqn Met/Ops brief slide is at Figure 15. (Each tile reveals another page)

Witness 4
Exhibit 133
Exhibit 145

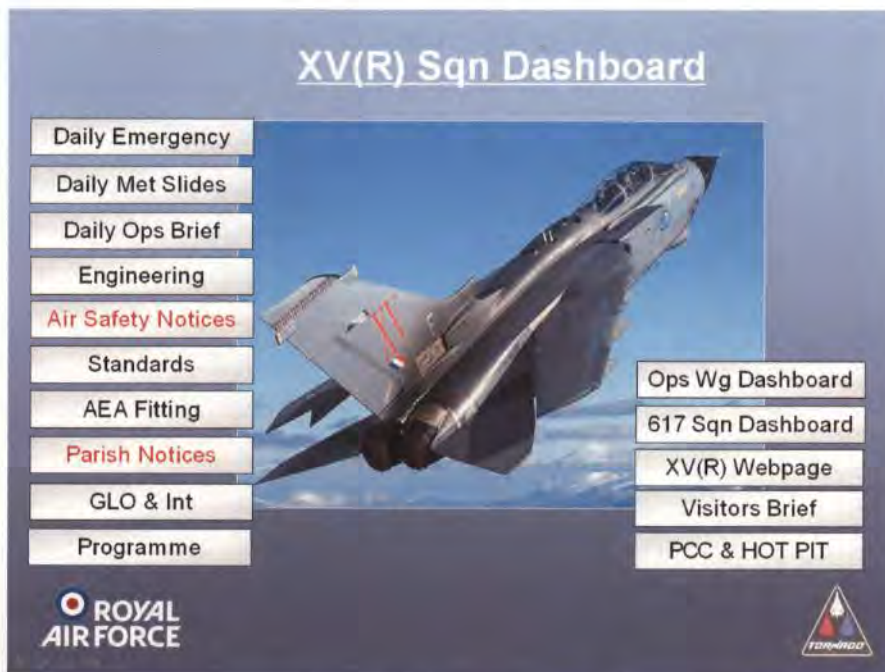


Figure 15. XV(R) Sqn Met/Ops Briefing Slide.

1.4.2.59 Met/Ops briefs have no fixed duration but typically last between 5 and 15 mins, depending upon the forecast weather picture, aircraft availability, programming changes,

notices and complexity of the daily emergency.

1.4.2.60 The Met/Ops brief is an important tool in sqn planning, organisation, and supervision. It is usually the first event of the day for sqn aircrew. Flying supervisors can see the weather, the flying and engineering programme, together with any other operational factors, in a communal setting. This facilitates supervisory input, discussion and liaison between crews and engineers.

Exhibit 18

Auth's Desk Met/Ops Brief

1.4.2.61 The DA can provide updates or brief crews at the Auth's Desk when required. This can take the form of an abbreviated Met/Ops brief which concentrates on the most pertinent information. Such briefs can take a bespoke format depending on the audience, allowing a greater variance of content and duration. Met/Ops briefs at the Auth's desk are not regarded as the norm and are not encouraged, XV(R) Sqn FOB directs aircrew to attend scheduled Met/Ops briefs.

Witness 4
Witness 12

Supervision and Deconfliction

1.4.2.62 **Deconfliction Precise.** Aircraft deconfliction can be established by lateral, vertical, or temporal contracts during sortie planning, or dynamically once airborne using radio or other means. The amount of effort and time required to establish a deconfliction plan will depend upon a number of factors including, but not limited to: weather, day or night operations, airspace, aircraft capabilities and numbers, rules and regulations, and dispersed or co-located aircrew. In a scenario of two formations from the same sqn seeking to use an AWR booking, a brief conversation between formation representatives may suffice. There is no difference in content between formations from the same or different sqns, however the proximity of planning and briefing (Met/Ops brief) assists in this brief liaison.

Witness 8
Witness 9

1.4.2.63 **Supervision.** Met/Ops briefs provide aircrew with an opportunity to liaise and discuss matters relating to the Flypro in addition to the briefing⁶. This is not its primary function, however, and liaison can take many forms. Coarse deconfliction (such as a comment that formations will be in the same AWR booking) could take the form of an acknowledgement or reminder to discuss after the briefing, however it is unlikely detailed liaison will take place as it is not the forum for it. Full deconfliction will take place in the sortie planning process. The formation supervisors did not attend the 07:00 hrs Met/Ops brief; all students attended. Although students are encouraged to consider deconfliction with other callsigns during the planning stages of a mission it is not their responsibility, and the requirement may not be immediately apparent to them.

Exhibit 18
Witness 2
Witness 4
Witness 12
Witness 14
Witness 8
Exhibit 632

Met/Ops Brief Attendance

1.4.2.64 ASTON 1 WSO did not attend the Met/Ops brief allocated on the Flypro. ASTON 1 WSO was in work at the time of the 07:00 hrs Met/Ops brief but did not attend as he was busy with other duties. He received an abridged brief from the 1st DA (ABBOT 1 RS Pilot) later during handover⁷ at the Auth's Desk and did not cover the XV(R) briefing slide to the same depth as the scheduled brief. This is the only documented occasion that a member of ASTON formation discussed sortie related information to a member of ABBOT formation, however there is no evidence that AWR/FRA or deconfliction planning was mentioned. The content of the discussion was a met brief, although an abridged one as

Witness 4
Witness 12
Exhibit 132

⁶ Although there is a tile/link to the Flypro, ABBOT 1 RS Pilot (1st DA) stated that this is not normally displayed during the Met/Ops brief. Even if this was used, it would not display any changes to the previously promulgated programme. Other TGRF sqns display an updated Flypro at the Met/Ops brief to present crews with the most up to date information and to facilitate mission planning. This is discussed in para 1.4.2.157.

⁷ The 2nd DA did not attend a Met/Ops brief.

ASTON 1 WSO was in a rush, asking the DAs “can you speed things up, can you speed things up?”. He was informed by the 1st DA, “this is not an official Met brief, this is me doing a handover for authorisor...so you either want the abbreviated one, go speak to the Met office or something, but if you want one from me it’s going to take a little bit more time.”

1.4.2.65 ASTON 2 WSO did not attend the Met/Ops brief allocated on the Flypro, which was not unusual for supervisors on XV(R) Sqn. ASTON 2 WSO had arrived for an earlier Met/Ops brief to allow himself time to set the sortie scenario. He received a Met/Ops brief from the 1st DA (ABBOT 1 RS Pilot) at the Auth’s Desk; ABBOT 1 RS Pilot choosing to brief the weather aspects rather than using the Met forecaster on speaker phone.

Witness 4
Witness 2
Exhibit 496

1.4.2.66 ABBOT 1 RS Pilot cannot remember attending the scheduled 07:00 hrs Met/Ops brief (which was his formation’s Met/Ops brief, which he was the DA for and which he would have been expected to give). The Panel cannot find any evidence to support that he attended.

Witness 4
Witness 14
Exhibit 217
Exhibit 218
Exhibit 219
Exhibit 220

1.4.2.67 ABBOT 2 RS Pilot did not attend the scheduled Met/Ops brief, as he was unaware that he was programmed to fly until he was called by XV(R) Sqn to confirm his availability. He arrived at the simulator at 08:11 hrs where he conducted a meeting and remained there until he was informed of his flying requirement and left at 09:14 hrs. Although he did not know that he had been programmed to fly and was scheduled to attend the 07:00 hrs Met/Ops brief, he stated that he would not normally have planned to attend the 07:00 hrs Met/Ops brief due to the 2.5 hr delay to start plan. He would plan to receive a “more relevant” met brief from the DA just prior to start of planning at the Auth’s Desk. He received a Met/Ops brief from the 2nd DA who went through the XV(R) Met/Ops briefing slide; the 2nd DA briefed the weather aspects.

Witness 12
Exhibit 28
Witness 15
Exhibit 633
Exhibit 634

1.4.2.68 All ASTON and ABBOT students attended the 07:00 hrs Met/Ops brief and received a Met briefing from the Met Forecaster.

Witness 14
Exhibit 8
Exhibit 29

Accuracy of 05:30 hrs Met/Ops Brief Forecast

1.4.2.69 The Panel was able to obtain a copy of the 05:30 hrs Met/Ops brief weather slides. The forecast weather slides are accompanied by a verbal description given by the Met Forecaster which is not recorded.

Exhibit 661

1.4.2.70 The 05:30 hrs Met/Ops brief was described by the 1st DA as “...noticeably shorter than usual...” and he also noted that, “It was good in that actually Lossiemouth was initially forecast to be fairly poor weather, and then it was clearly panning out to be a lot nicer, so it ended up like a day like this in the local area, and in fact, similar conditions.”

Witness 4

1.4.2.71 The crew of LOSSIE 30 who attended the 05:30 hrs Met/Ops brief, that flew in the first wave of sorties, stated, “the weather had deteriorated quite a lot, more than was forecast. So at the start -- at the time when we were at low level over the bowl to the north, it was probably maybe 2,000 ft cloud base at best, maybe 1500 ft cloud base and some low skud underneath probably 10 to 15 kts at best and maybe even a bit less than that at times.”

Witness 32

07:00 hrs Met/Ops Brief Forecast/Actual Weather

1.4.2.72 The 07:00 hrs Met/Ops brief weather slides showed the “Forecast Weather below 10000ft” slide was unchanged from the 05:30 hrs Met/Ops brief. Figure 16 shows Area A affecting Northern Scotland, which included A1 and A2. JSP 847 requires that area

Exhibit 8
Exhibit 134
Exhibit 633

boundaries should be accurate to within 60 nm. Met forecasters, however, will strive to be as accurate as possible. Aircrew will use the area boundaries as an indication of where they might expect a change in weather conditions. Much of the weather forecast for A1 and A2 was similar; however, A1 could expect areas⁸ of fog and broken stratus between 300 ft and 1500 ft in coastal areas and over the sea. In addition, A1 could expect widespread⁹ visibility of 3000 m. To a lesser extent, the fog and poor visibility could also be expected in A2. Both A1 and A2 were forecast to have cloud bases of 1500-3000 ft and cloud tops of 6000-8000 ft. Figure 17 is a satellite picture taken 40 mins after the accident.

1.4.2.73 The effect of weather on the accident is analysed in Section 1.4.4.

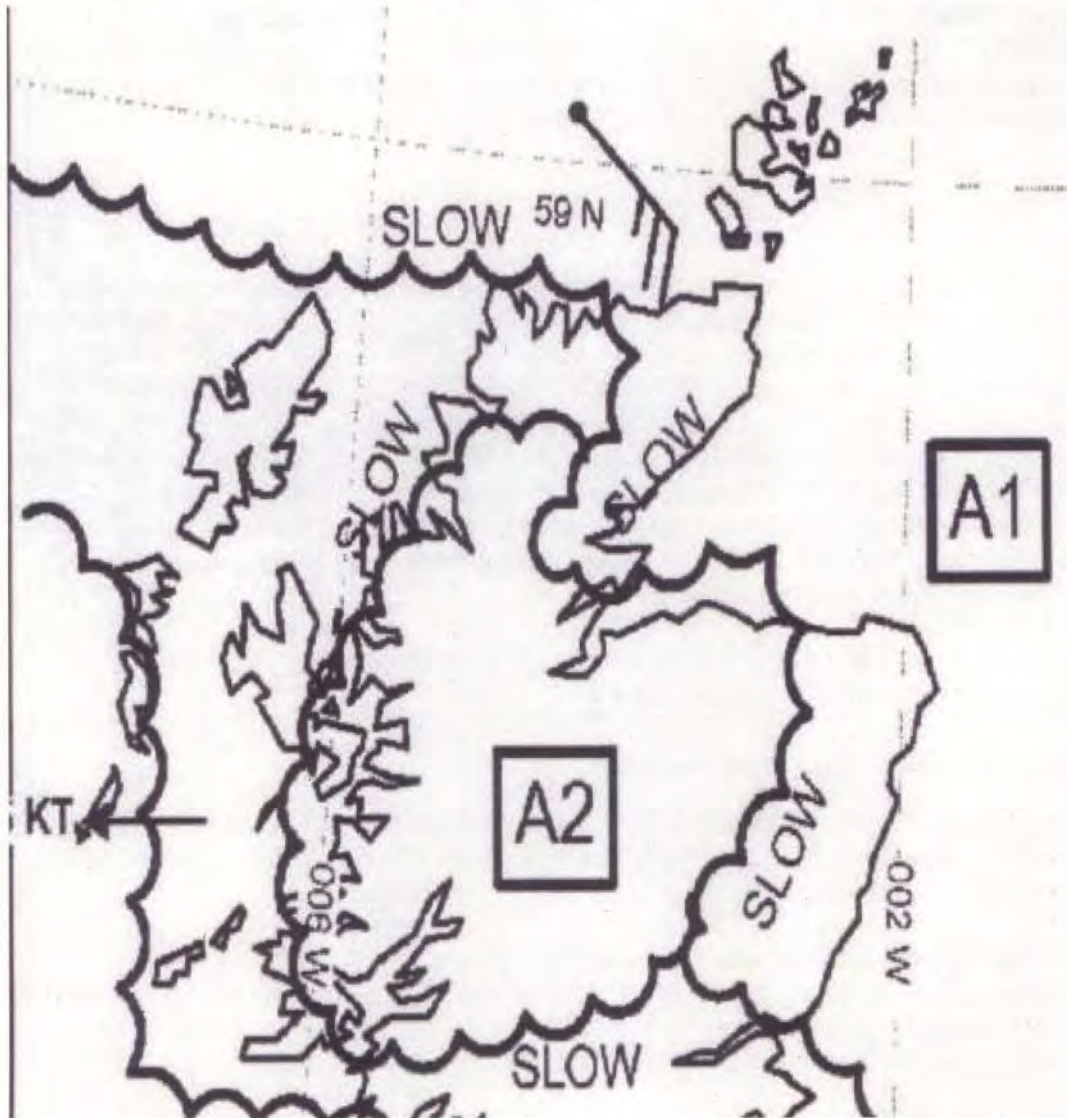


Figure 16. "Forecast Weather below 10000ft" (zones valid at 12:00 hrs).

⁸ Implies infrequent conditions clustered into areas which may be difficult to avoid. Places in between will be largely unaffected. Used to describe non-convective types only (e.g. Areas of Broken Stratus). 25-<50% of the area affected. (JSP 847).

⁹ Implies conditions affecting many places which will be difficult to avoid, > 50% of the area affected. (JSP 847).

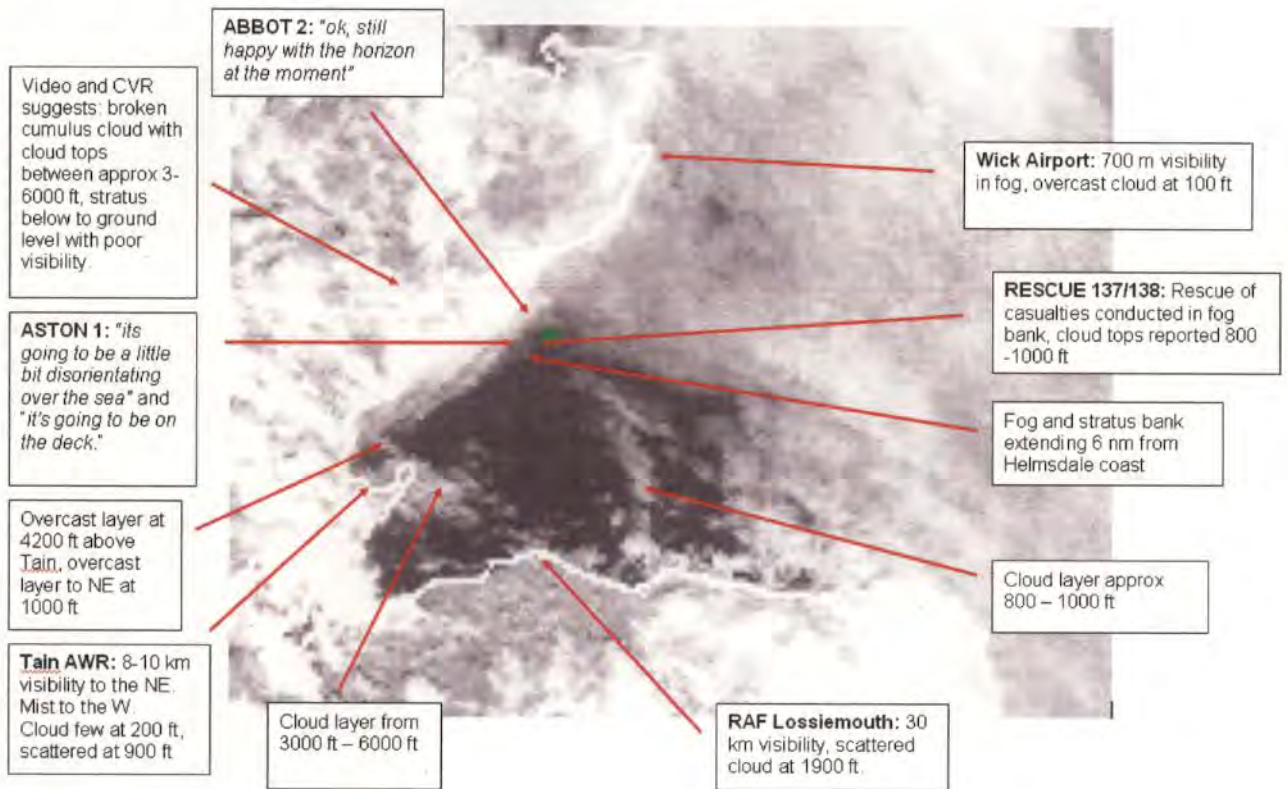


Figure 17. Pictorial Summary of Weather at 12:41 hrs (the green dot represents the approximate position of the collision).

1.4.2.74 The 11:50 hrs RAF Lossiemouth weather was reported as scattered (SCT)¹⁰ cloud at 1900 ft, 30 km visibility with a surface wind from 130° at 16 kt. ABBOT 1 described the weather at RAF Lossiemouth to have improved from the early morning conditions to be a “relatively nice day” and by the time they launched “it was fairly wide open”. However ABBOT 1 was surprised at how far the mist and fog extended from the Helmsdale / Wick coastline. Their expectation was that with a SE'ly flow the poorer weather would be “hugging the coast.” A review of ABBOT 1 HUD tape shows the fog and stratus bank to be approximately 6 nm off the coast. The Hindcast for the Moray Firth sea area reported cloud in the SW of the area with few (FEW) stratus base 500 ft with tops of 1000 ft and cumulus base 1500 to 2000 ft with tops of 8000 ft. The surface visibility was reported as 25 km with 7 km in showers with widespread areas of 2500 m and occasional fog of 200 m.

Witness 32
Exhibit 8
Witness 4
Exhibit 10
Witness 2
Witness 14
Witness 5
Witness 6

1.4.2.75 Following the accident ABBOT 1 letdown just to the N of Wick to 750 ft but were still in cloud. Wick Airport METAR at 11:50 hrs reported 700 m in fog with overcast cloud at 100 ft. They also attempted to get visual contact with the crash site between Helmsdale and the Beatrice oil rigs at an altitude of 1000 ft. They reported layered weather, particularly to the W of the area, with stratus and fog. Outside of the layers the weather was nice with “reasonable visibility outside of the stratus.” ASTON 2 HUD tape suggested that the ML cloud structure to the S of the accident site was between scattered (SCT) and broken (BKN) cloud from 3000 ft to 6000 ft. They also stated that they could see Tain AWR through gaps in the cloud and believed that the weather was fit enough for the Op 5 First Run Attack (FRA).

¹⁰ FEW means 1-2 oktas of cloud cover, SCT 3-4 oktas, BKN 5-7 oktas and overcast (OVC) 8 oktas. An okta is a unit of measurement used to describe the amount of cloud cover; conditions are estimated in terms of how many eighths (oktas) of the sky are covered in cloud.

1.4.2.76 Rescue 137 (R137), the first RAF Lossiemouth SAR helicopter on task, stated that the weather consisted of a fog bank up to about 1000 ft with 7 oktas cover. To the S they reported visibility of 30 km with no significant weather. Rescue 138 (R138), the second RAF Lossiemouth SAR helicopter on task, stated that the weather in the vicinity of the accident site was patchy fog with cloud tops of about 800 ft and “Blue above”. Slant visibility “wasn’t brilliant” but through patches they could see R137 in the hover “brightly lit up in bright sunshine.”

Analysis

1.4.2.77 The first DCF of the day, ABBOT 1 RS Pilot, did not receive a face-to-face Met brief from the Met Forecaster, as required in the RAF Lossiemouth FOB DCF orders. Over time the mandatory process of receiving a face-to-face Met brief had fallen out of common practice as electronic briefing methods (computer or visualiser), coupled with the Met Forecaster on speaker telephone, achieves an acceptable quality of briefing. The Panel believes that had ABBOT 1 RS Pilot received a face-to-face Met brief he could have developed a more accurate understanding of the weather, specifically in the Moray Firth and around the Helmsdale coast. The Met Forecaster has additional products (computer based) that could be used to expand weather understanding and, when a DCF visits the Met Forecaster, he has a purely weather focus.

Witness 4
Exhibit 223
Exhibit 632

1.4.2.78 Although the 1st DA received the Met brief from the Met Forecaster at the 05:30 hrs Met/Ops brief, he remarked that it was noticeably shorter than usual and the electronic briefing slides were not available; instead it was necessary to revert to printed slides¹¹. The 1st DA recognised that the prevailing weather situation was a moist SE flow and that the W coast would be the preferable area for flying. Based on his local knowledge and previous experience he understood that RAF Lossiemouth, Tain AWR and the Moray Firth are usually afforded a good degree of protection by terrain to the S and E. He expected any fog to be hugging the SE facing coastlines. On the day of the accident, however, the dew point was relatively high and similar to the sea temperature over a wide area; when combined with a SE flow this would lead to extensive low cloud and fog¹². A lower dew point is associated with higher bases and less stratus. His perception of the weather may have been reinforced by Pilot Reports (PIREPs) and the improving weather conditions at Lossiemouth and Tain, which did enjoy a degree of protection on the day of the accident. The 1st DA’s understanding as to the extent of the fog and low cloud along the Helmsdale coast did not match the actual weather conditions in this area.

Witness 4
Exhibit 135
Exhibit 136
Witness 32
Witness 33
Witness 12

1.4.2.79 Forecast weather is a prediction, and a degree of variance is expected as it is attempting to predict something that changes, often in an unpredictable and localised manner. Weather on 3 Jul was complex in nature and the following facts could explain the 1st DA’s understanding of the weather:

- a. Met briefs are predictions and can differ from the actual weather, therefore attempting to analyse what someone’s understanding is against a prediction is difficult when presented with actual weather;
- b. weather conditions on the 3 Jul were described as both better and worse than that which was forecast at the 05:30 Met/Ops brief, indicating a variance in understanding and forecast for attendees;

¹¹ There is no difference to the content of the slides, it is just the means of displaying them that is different i.e. via visualiser rather than via computer.

¹² Low fog/stratus can form in banks from the surface to clearly defined tops. This can often be seen from a distance and aircraft can be manoeuvred above the fog/cloud banks. Providing the weather was suitable above the fog bank, the aircraft can climb to gain vertical separation and maintain safe flight. The understanding of how and when fog forms and its properties (i.e flat topped banks of fog hugging the coastline) aids planning but does not necessarily mean that the area must be avoided.

c. the shorter duration of the 05:30 Met/Ops brief could have resulted in a more “general” weather picture being briefed, such as focus on RAF Lossiemouth, Tain AWR itself and the weather on the W coast of Scotland;

1.4.2.80 The 1st DA briefed either directly or indirectly (through the 2nd DA) the weather to all ASTON and ABBOT supervisors. ASTON and ABBOT supervisors, therefore, would have gained their understanding of the weather from the 1st DA.

Witness 4
Witness 2
Witness 12

1.4.2.81 The 1st DA (ABBOT 1 RS Pilot) understood that the weather would be suitable to route in to Tain AWR from the NE, as later planned by ABBOT 2 RS Pilot.

Exhibit 135

1.4.2.82 ASTON 2 WSO planned ASTON’s FRA and considered that the weather would be suitable to join Tain AWR from the NE. He considered that joining from the NE was a better option than joining overland from the W, which would have better suited ASTON’s sortie flow. His FRA planning was simplified as he had already planned the FRA for the previous day’s sortie, but the FRA had not taken place. It is not unusual to plan parts of a route into areas of weather that could be forecast to be marginal, as weather can change and the forecast can also be incorrect (both better or worse than forecast). Such planning is acceptable if there is a plan to avoid the weather if unsuitable and also if the event planned (such as an FRA in an AWR) is a desirable sortie objective and it is accepted that it may not be achieved.

Witness 2
Exhibit 629

1.4.2.83 ASTON 1 WSO had received an abridged Met brief, and is likely to have gained the same weather picture as the 1st DA. The Met brief he received was during DA handover; evidence would suggest that ASTON 1 WSO was in a hurry at the time, possibly due to the need to return to the sortie plan.

Witness 4
Witness 12

1.4.2.84 The XV(R) Sqn FOB requires aircrew to report to work iaw the Flypro. The Panel **observed** that where possible external aircrew should adhere to the regulations of the sqn with which they are flying, including attending scheduled Met/Ops briefs. ABBOT 2 RS Pilot stated he would not have attended the 07:00 hrs Met/Ops brief due to the length of time between the brief and the start of planning (2.5 hrs) as it would not have been a “relevant” weather brief at that time and its timing was “inconvenient” that day.

Exhibit 145
Witness 12
Exhibit 28
Exhibit 633

1.4.2.85 ABBOT 2 RS Pilot did not know that he featured on the XV(R) Sqn Flypro until approx 30 mins before the start of planning. This gave him a short window to get to XV(R) Sqn and to prepare for the sortie. The Flypro was promulgated the day before the accident. It is usual for the Sqn programmer to contact external aircrew to confirm availability. ABBOT 2 RS Pilot stated that he would usually check the promulgated Flypro. The Panel believes, however, that this would be the case if he had already been contacted by the Sqn programmer. The Panel has no evidence of any confirmation taking place prior to programming. The Panel has evidence that ABBOT 2 RS Pilot was unaware he was programmed to fly on the day of the accident. In this instance the Panel has insufficient evidence to identify the exact breakdown in the normal practice of programming external aircrew.

Exhibit 634
Witness 16

1.4.2.86 ABBOT 2 RS Pilot had no longer than 9 mins from arriving at XV(R) Sqn to obtain a Met/Ops brief and prepare for the sortie prior to the start of planning (which would usually involve checking the student’s Training Folder). This is a short period of time to prepare for a sortie, however he was unaware that he had been placed on the Flypro and was informed that he was flying by a telephone call, which reduced the time available to him.

Witness 16
Exhibit 28
Exhibit 18
Exhibit 634

RESTRICTED – SERVICE INQUIRY

1.4.2.87	The 1 st DA, ABBOT 1 RS Pilot, did not attend the 07:00 hrs Met/Ops brief. The XV(R) Sqn FOB states that outbriefs take priority over Met/Ops briefs. He was DA and DCF at the time and, on the balance of evidence, it is likely that he was outbriefing or preparing to outbrief the first sortie of the day.	Witness 4 Exhibit 18 Exhibit 19 Exhibit 221
1.4.2.88	Although not all ASTON and ABBOT instructors attended the scheduled Met/Ops brief, they all received a Met briefing. ASTON 1 WSO's Met brief at DA handover and ABBOT 2 RS Pilot's Met/Ops brief from the 2 nd DA are understood to have been abridged.	Witness 4 Witness 12
1.4.2.89	ASTON 2 Pilot, a student pilot, attended the 07:00 hrs Met/Ops brief and he recalls that his <i>"strongest recollections are that the weather we expected sort of North of the Moray bowl and around the high ground there was going to be marginal at best" and "I thought if we were going to the West coast and coming back across at low level that the issue we were going to find was going to be overland between the West coast and sort of the Tain area but I can't remember thinking it's going to be too much of a problem in Tain itself"</i> . This is an accurate understanding of the weather.	Witness 14
1.4.2.90	It is likely that ABBOT 2 RS Pilot's perception of the weather was further influenced by a Pilot Report (PIREP). ABBOT 2 RS Pilot received a PIREP from LOSSIE 30 just prior to outbrief; describing the conditions as better than the conditions at the time of the accident along the Helmsdale coastline. Due to the nature of the sortie, LOSSIE 30 did not operate in the area of the Helmsdale coast and the conditions reported by LOSSIE 30 were from an area due N of RAF Lossiemouth.	Witness 22 Witness 33
1.4.2.91	From CVR evidence and ABBOT 1's HUD tape, ABBOT 2 avoided a layer of stratus soon after take off and continued with the planned route. From ABBOT 1's testimony, the area of poor weather along the Helmsdale coast would have been visible at this time. ABBOT 1 RS Pilot perceived that the weather to the NW was unsuitable and elected to take a different route. ABBOT 2 would not have continued along their planned track into unsuitable weather, therefore remaining on track indicates a belief the weather might be suitable for VFR flight to the NW rather than an understanding it would be unsuitable. This demonstrates the judgement of different crews when presented with the same weather conditions.	Exhibit 10 Exhibit 7 Witness 4
1.4.2.92	ABBOT 1 RS Pilot stated in interview that he was surprised, once airborne, at the extent to which the fog and cloud extended from the Helmsdale coast. He decided to avoid the weather, planning to join on the 253° LOA. This decision may have been influenced by the fact that he had been delayed and could join Tain AWR in a more expeditious manner on his preferred LOA and was predisposed to make an early judgement on weather further along track. Having departed RAF Lossiemouth 14 mins behind ABBOT 2, ABBOT 1 crew may also have attempted to make up lost time, however this would not have had a significant effect on the delay.	Witness 4 Exhibit 10
1.4.2.93	As the supervisors of ASTON and ABBOT had not attended the scheduled Met/Ops brief they had missed an opportunity to liaise and then discuss the use of the AWR booking.	Witness 2 Witness 4 Witness 12
1.4.2.94	ASTON and ABBOT students would not be expected to liaise on the AWR booking during a Met/Ops brief. An FRA is a desirable objective for P SAP 2, rather than an essential objective. At the Met/Ops brief the ASTON students would be unaware of the sortie flow (an FRA could take place at the start or at the end of a route) or of the specifics of the sortie plan, but would know the essential and desirable objectives of the sortie. It would be reasonable to expect to attempt the desirable objectives and so the students could be expecting to complete an FRA.	Exhibit 33

Met/Ops Brief Conclusion

1.4.2.95 The Panel has concluded that the 07:00 hrs Met forecast was accurate for the weather on the day, but ASTON and ABBOT supervisors gained a different understanding of the weather in the Moray Firth.

Sortie Planning and Briefing

Introduction

1.4.2.96 This sub-section has been divided as follows:

- a. Regulation, Policy and Orders
- b. ASTON and ABBOT: Formation Supervision and Deconfliction
- c. Warnout Process and Policy
- d. Analysis

Regulation, Policy and Orders

1.4.2.97 **MRP RA 2305 Supervision of Flying.** MRP RA 2305 requires Aviation Duty Holders and Commanders to define specific responsibilities for the supervision and co-ordination of all mission planning and aircrew briefing conducted at units under their command. Guidance Material requires that the briefing of aircrew before flight is essential and should be conducted in a thorough and professional manner. The RA goes on to list 13 separate bullet points from crew composition to emergency/survival procedures which must be included during sortie briefs.

Exhibit 139

1.4.2.98 **MRP RA 2305 Supervision of Flying and MRP RA 2306 Authorization of Flights.** MRP RA 2305 requires Duty Holders to define specific responsibilities for the supervision and co-ordination of all mission planning and aircrew briefing conducted at units under their command. MRP RA 2306 requires authorising officers to ensure that the Aircraft Commander or Formation Leader has thoroughly planned his mission, alternate mission or duty.

Exhibit 139
Exhibit 140

1.4.2.99 **UK Military Low Flying Handbook (UKMLFHB).** The UKMLFHB details flow and height restrictions for UK Day Low Flying. These were not relevant in the accident scenario. The UKMLFHB also requires that users book in to specific Low Flying Areas; both ASTON and ABBOT booked in to Low Flying Area (LFA) 14 and flew their sorties within the booking tolerances.

Exhibit 55
Exhibit 12
Exhibit 3
Exhibit 6

1.4.2.100 **Air Command Air Weapon and Electronic Warfare Range Orders (ACAWEWROs).** Deconfliction measures relating to AWR Radio Telephony (RT) joining calls, traffic information, and aircrew and Air Weapon Range Controller (AWRC) responsibilities are analysed in Section 1.4.3, 1.4.4 and 1.4.6. ACAWEWROs govern the use of AWR and require that:

Exhibit 142

- a. *“An FRA is to be specifically authorised and booked. It consists of a single pass on to a nominated tgt or tgts with the intention of releasing a practice or live weapon without a previous dry run.”*
- b. *“The TOT of an FRA is to be the time of impact or ‘over the tgt’ in the case of a dry pass.”*

c. FRA are to be booked as below:

Exhibit 142

(1) During another user's slot: *"one FRA may be booked in each 15-min slot (unless the users who have booked the slot are content for additional FRAs to occur)...FRAs are not permitted during the first 3 or last 2 mins of each 15-min slot."*

(2) *"In order to maximise range utilisation aircrew may 'freecall' AIR CMD AWRs in advance to bootleg¹³ un-booked or un-used range slots or to book FRAs"*.

(3) *"Bootleg FRAs may be accepted at the discretion of the AWRC following consultation with the lead crew of any booked traffic on the range."*

(4) *"Although FRAs previously booked will have priority, in-flight bootleggers will be accommodated when possible."*

d. ACAWEWROs require crews to join Tain AWR either using FRA procedures avoiding restricted and sensitive areas, TFR corridors or:

(1) *"VFR via the hold, where appropriate crews should contact Lossiemouth Approach for transit service."*

1.4.2.101 **1Gp ASOs.** 1Gp ASOs reflect and amplify MRP RA 2305 and 2306 in 1Gp ASO 2305 Supervision and 1Gp ASO 2306 Authorisation. 1Gp ASO 2305 Supervision requires that the authorising officer ensures that the sortie has been briefed iaw MRP RA 2305(5) Supervision of Flying Operations – Aircrew Briefing and the Force SOPs.

Exhibit 141

1.4.2.102 **TGRF Sortie Briefing.**

a. **TGRF Handbook.** The TGRF Handbook aims to capture best practice and provides units with common procedures to enhance interoperability. The TGRF Handbook requires that formation leaders use the *"Force Standard briefing sheet from the TGRF Pocketbook for all routine sorties wherever possible although certain sorties...may require supplementary information."*

Exhibit 167

b. **TGRF Pocketbook.** The TGRF Pocketbook contains a sortie briefing aide memoire. The standard sortie briefing aide memoir does not have a specific heading for deconfliction, however many of the headings within the Navigation and Domestic sections encompass deconfliction.

Exhibit 168

1.4.2.103 **RAF Lossiemouth FOB.** The RAF Lossiemouth FOB contains an order which details the flow pattern between RAF Lossiemouth, Tain AWR and Helmsdale. It states:

Exhibit 143

Exhibit 144

Exhibit 148

"there is a danger of confliction between aircraft in transit between Lossiemouth, Tain AWR and LFA 14 North of Helmsdale. Aircraft transiting over the Moray Firth heading Northwards between Lossiemouth and the Helmsdale area (including ac leaving Tain AWR to the North) should fly at heights not above 500 ft MSD [Minimum Separation Distance]. Aircraft flying from North to South over the Moray Firth (including ac recovering from Tain AWR to Lossiemouth and ac joining Tain AWR from the North) should fly at heights not below 1000 ft MSD."

¹³ ACAWEWROs definition: Bootleg is the use of a range without prior booking. Aircraft merely call the range on an opportunity basis. These aircraft are known as bootleggers.

1.4.2.104 The FOB also requires crews to complete a Record of Flight and submit mission materials prior to outbrief.

1.4.2.105 **XV(R) Sqn FOB.** The FOB contains an SOP formation departure from Tain AWR but does not detail a formation join SOP, to allow flexibility for individual sortie requirements.

Exhibit 145
Exhibit 146

ASTON and ABBOT: Formation Supervision and Deconfliction

1.4.2.106 **General.** The direct supervision of ASTON and ABBOT's sorties was primarily the responsibility of the formation authorisers, the instructors within the formations and the Sqn DA.

1.4.2.107 **ASTON Formation Supervision.** Within ASTON formation supervision was the responsibility of ASTON 1 WSO, the formation authoriser, and ASTON 2 WSO. ASTON 1 WSO was a four's leader and A2¹⁴ Qualified Tactics Instructor (QTI) and ASTON 2 WSO a B1¹⁵ QTI and pair's leader. The formation was constituted correctly iaw with 1Gp ASOs and the XV(R) Sqn Sortie Profile Guide which require a minimum of a pair's leader and both instructors to be a QTI. Both supervisors were available and present for the sortie plan, although ASTON 1 WSO was known to have left the plan to use his computer for emails for a short period. There is no evidence that ASTON 1 WSO or ASTON 2 WSO liaised with ABBOT formation on the use of the 12:00 – 14:00 hrs Tain AWR booking. The local understanding on XV(R) Sqn is that although not allocated on the Flypro, ownership of the booking would fall to the dedicated AWR sortie, P Dive 1 (ABBOT) and, if not pre-arranged with the prime user (ABBOT), that FRAs would be approved or declined on a "bootleg" basis.

Exhibit 153
Witness 7
Exhibit 121
Exhibit 154
Exhibit 155
Exhibit 33
Exhibit 157
Witness 2
Witness 14
Exhibit 24
Exhibit 211
Exhibit 444
Exhibit 443

1.4.2.108 **ABBOT Formation Supervision.** Within ABBOT formation supervision was the responsibility of ABBOT 1 RS Pilot and ABBOT 2 RS Pilot. Both ABBOT 1 RS Pilot and ABBOT 2 RS Pilot were four's leaders and QWIs. The formation was constituted correctly iaw with 1Gp ASOs and the XV(R) Sqn Sortie Profile Guide which require a minimum of a pair's leader and both instructors to be a QWI or A2 Qualified Flying Instructor (QFI). ABBOT 1 RS Pilot was not present for the plan. The Flypro scheduled him to handover the role of DA at 08:30 hrs. At 08:30 hrs he was also scheduled to deliver a weapon brief to a Fast Jet Cross Over (FJXO) student, which requires between 1:45 and 2 hrs for the full brief¹⁶, before starting plan at 09:30 hrs. He did not complete DA handover until 08:45 hrs, answered emails relating to OJARs and did not achieve the 08:30 hrs timing schedule for the weapon brief. On commencing the brief ABBOT 1 RS Pilot realised that the FJXO student did not require it at that time. The student had been programmed for the corresponding weapon simulator when he had not yet completed the pre-requisite simulator sortie. ABBOT 2 RS Pilot informed ABBOT 1 RS Pilot that he would lead the plan and that ABBOT 1 RS Pilot should continue with the brief. ABBOT 1 RS Pilot considered that because there was only "a handful of QWIs around, you know, if I didn't do it [the weapon brief] then, I'd be doing it some other time."

Exhibit 153
Exhibit 156
Exhibit 130
Exhibit 19
Exhibit 18
Witness 4
Exhibit 158
Exhibit 159
Exhibit 160

1.4.2.109 **Sortie Planning.**

a. The XV(R) Sqn Flypro does not allocate specific AWR bookings to callsigns.

Witness 2
Witness 33
Witness 4

¹⁴ This is awarded from recategorisation from B1. This is an Above Average Aircrew Instructor. Employed as a Qualified Instructor for at least 15 months, flown 200 hrs instruction of which ten must have been at night and passed an examination from a CFS Agent.

¹⁵ This is awarded from recategorisation from B2. This is a Capable Instructor. Employed as an Instructor for at least six months, flown 75 hrs instruction of which five must have been at night and passed an examination from a CFS Agent.

¹⁶ In this instance the student was an experienced FJ crossover student (QWI) therefore it is likely that the full briefing time would not be required.

The local understanding is that the dedicated AWR sortie will have primacy and that other users should liaise if they require use of the AWR. ASTON 2 WSO presented the pre-planned FRA as a fait accompli to the formation and it was not discussed further during the planning stages. ASTON 2 WSO understood that ABBOT would be using Tain AWR sometime after ASTON had completed their FRA. ASTON were in the final time constrained part of their planning phase, sticking together map booklets at 09:34 hrs prior to sortie brief. ASTON and ABBOT overlapped in the planning room for a very short period between 09:30 hrs and 09:35 hrs. ABBOT had just gathered to start plan. ABBOT would not have planned their route yet on Tornado Advanced Mission Planning Aid (TAMPA), although ABBOT 2 RS Pilot may have had an idea of how he was intending to join Tain AWR. This situation might not have enabled accurate sortie timing deconfliction to take place, but coarse deconfliction could have been possible. If, however, a safety issue is highlighted, crews would be expected to delay the sortie brief to resolve the confliction.

Witness 14
Exhibit 18
Exhibit 31

b. There are no formally laid down standard routes from RAF Lossiemouth to Tain AWR for aircraft to fly. Questioning a wide range of RAF Lossiemouth crews found it was normal for them to join Tain AWR on a 253° LOA abeam Tarbat Ness. ABBOT 2 RS Pilot decided to plan a slightly longer ground track to allow the students more time to complete checks and to position downwind in the 04RH pattern. This ground track meant that they would also join abeam Tarbat Ness but on an LOA of 215°. This ground track was very similar to how ASTON intended to join for the FRA, albeit timings meant they should have been separated by 8 mins 30 secs. This occurred through circumstance, rather than planned deconfliction.

Exhibit 12
Exhibit 3
Witness 16
Witness 26
Witness 9
Witness 3
Witness 34
Witness 35
Witness 36
Witness 37
Witness 8

1.4.2.110 **Sortie Briefing.**

a. XV(R) Sqn Long Cse sortie briefs are normally delivered using Tornado Interactive Briefing and Training Aid (TIBTA) or a combination of the TGRF Pocketbook briefing aide memoire and TIBTA. TIBTA is an electronic briefing aide which is designed to assist the briefing of syllabus sorties. ASTON's sortie was briefed by the lead crew using TIBTA. ASTON discussed the specifics of the FRA profile in the sortie brief but there is no evidence that ABBOT was mentioned in the sortie brief or that the AWR might be active at the time of the FRA. ASTON 2 WSO could not remember if ASTON had discussed that Tain AWR was booked until 12:00 hrs. ASTON 2 Pilot does not remember any discussion relating to deconfliction with aircraft external to the formation during the brief.

Witness 2
Witness 14
Exhibit 155
Exhibit 171
Exhibit 170

b. The sortie was briefed by ABBOT 2 RS Pilot using TIBTA. As ABBOT 1 RS Pilot had not been in any part of the planning process he was unaware of what detail had been discussed during planning and the pre-brief. He therefore asked a number of questions of the students and ABBOT 2 RS Pilot to satisfy himself that the sortie had been comprehensively planned and briefed. Although not encouraged, this situation is not unique and crews can be fully prepared for a sortie from receiving the brief when they have been absent from the planning process. ABBOT 1 RS Pilot was also content that the instructors would be "*controlling the sortie and the flow.*" ABBOT were unaware that ASTON would be conducting an FRA during their AWR slot and therefore did not discuss ASTON in the sortie brief. ABBOT did not discuss in their sortie brief that Tain AWR was booked until 12:00 hrs. ABBOT 2 RS Pilot stated, "*It is not normal to be informed of the details of the preceding range booking (timings, user etc), only to be aware of the timings of the assigned range booking.*"

Exhibit 163
Exhibit 135
Witness 4
Exhibit 633

Warnout Process and Policy

1.4.2.111 **General.** Aircrew are required to complete a warnout folder prior to outbrief. The warnout folder contains a Record of Flight, a copy of the sortie domestics, a route map (if the sortie includes LL flight) and a P90 datasheet which includes detailed routing, fuel and timing information.

1.4.2.112 **Record of Flight.** One crewmember is normally tasked to complete the Record of Flight and submit it to a Sqn Ops assistant. The Record of Flight has an A5 size map for the nominated crewmember to draw a summary of the LL route. There can be a large variation on how accurately the route summary is represented. The LL route map is used to highlight potential conflicts to other sqns, which may prompt further actions to ensure safe deconfliction. AWR information is recorded in a small matrix on the Record of Flight. The Sqn Ops assistant would extract the following information for action:

Exhibit 144
Exhibit 148
Exhibit 147
Witness 3
Exhibit 55

a. **LL Flight.** If the sortie was planning to include LL flight the Sqn Ops assistant would telephone through timings and Low Flying Areas (LFAs) to the Low Flying Booking Cell (LFBC). In return the LFBC may pass information back on other booked traffic together with late warnings including Civil Aviation Notification Procedure and Notice to Airmen (NOTAMs). Although the LFBC does provide warnings and caps the number of users in LFA 12 it does not attempt to deconflict users.

b. **AWR.** The Ops assistant would telephone the AWR and pass the event, strike time (TOT), target, LOA and AWR departure details. AWR controllers rely on the Record of Flight information passed over the telephone to build a picture of the planned arrival and departure of AWR users. They do not receive a copy of the Record of Flight and therefore do not receive a pictorial summary of the planned route.

1.4.2.113 The Record of Flight is then faxed to other sqns and other RAF Lossiemouth based sqns to aid deconfliction. The Record of Flight would then be placed in the warnout folder together with the other mission materials. The warnout folder is then passed on to the DA to check prior to the sortie outbrief. XV(R) Sqn OC Standards has stated that it *“doesn’t always work that robustly as...quite often the maps don’t appear until just prior to outbrief, so it doesn’t give the authoriser very long to do that process, if at all.”* Records of Flight received from other sqns are placed on a board for crews to check for conflict at outbrief. If a conflict was identified several courses of action are available, including trying to liaise once airborne via radio, or by telephone while on the ground to formulate a deconfliction plan. The fact that other aircraft are planning to operate in the same airspace can provide a timely reminder for crews to be more vigilant in their lookout.

Witness 8
Exhibit 147

1.4.2.114 **ASTON Warnout.**

a. ASTON submitted a Record of Flight with a copy of their LL route map. A comparison of ASTON’s LL route on the Record of Flight (Figure 18) and their planned LL route map (Figure 19) shows the Record of Flight to be reasonably accurate; however it does not cater for the differing ground tracks of ASTON 1 and 2 during the two split SAPs. The accuracy of Records of Flight varies with crews, scenarios and sortie content. The Northern part of ASTON’s route on the Record of Flight is in error and differs from their planned routing by greater than 10 nm. The Record of Flight route map also contains four timing references at various points on the route. Three of the timings are accurate to within 2 mins of their actual planned timings; the fourth timing reference is 5 mins different from their actual planned timing. Following the programme change from a pair to singletons with 39 mins difference between them, there is no evidence to suggest that the Record of Flight was updated or redistributed. This would not be done as a matter of routine.

Exhibit 3
Exhibit 495

b. ASTON completed the following information in the AWR section of the Record of Flight: Tain, Target 1, 12:20 hrs, 253° LOA, 5° Brora Op, Cross VFR. ASTON had actually planned to achieve a TOT of 12:19 hrs for ASTON 1 and 1219:30 hrs for ASTON 2. The final LOA of 253° was planned to be achieved from an Op 5 profile joining abeam the village of Brora, a well known reporting point for RAF Lossiemouth crews and Tain AWRCs. The departure was planned to be via "The Cross". "The Cross" is not a physical point on the ground but a map symbol used to delineate different sections of the British National Grid System; it is not recorded formally in ACAWEWROs as a reporting point.

Exhibit 3
Exhibit 149
Exhibit 38

Exhibit 3

LT RECORD OF FLIGHT - DAY - NORTH ANNEX A TO
FOB - SUP
SUP-3

DATE: 3 Jul	SON: XV	CALLSIGN: ASTON	NO OF AC: 2	ETD: 1115	RET: 1:30	RECOV SLOT TIME: (IF RECD)	
VFR: TAIN: Y/N	NARVA GAP (South)		FORMATION SPACING: PAIR: Y/N STREAM (Separation): 20sec		DUTY DETAILS REQ'D IN AUTH SHEETS: SAP 2 LFA 14		
Non-Std: HDG:	ALT:		POST IFR DEP: H'OVER TO: INTENTIONS: (e.g. GH/LL/FLT PLN)				
IFR: SID REQD:	FL/ALT:		LL ENTRY PT AND TIME: NARVA GAP 1120		LL EXIT PT AND TIME: TAIN 1220		
STUD 4 1/2 REQD: Y/N	SE Hvy Wt: Y/N	CHAT FREQ:	BOUNCE: Y/N	OLE: Y/N	AIRFIELD ATTACK DETAILS: AF: NO OF AC: HT: SPEED: PROFILE: LOA: TOT: TOT BRACKET:		
						A/F AND ATTACKING AC COORDINATION COMPLETED BY:	
						CREWS ARE TO BE GIVEN DETAILS OF A/F WCRW IN USE AND SCHEDULED TRAFFIC +/- 15 MINS OF TOT	
						HRA - BLOCK(S) REQ'D: (IN 30 MIN BLOCKS AFTER 1500L) VFR / IFR?	
						EVIASION (TICK A/F)	
						EVIASION IN HOUSE?	
						AFFIL?	
						COMAO?	
						PARTICIPATING UNITS:	
						TOTAL NO OF AC?	
						SPADEADAM / SPACES	
TIME: IP:							
SCENARIO:							
SQUAWKS:							
PRACTICE DIVERSION							
AIRFIELD:							
TIME:							
APPROACH:							
	FRA 1	FRA 2	FRA 3				
RGE	TAIN						
TGT	1						
TIME	1220						
LOA	253						
EVENT	5° Brora Op						
DEP	+ VFR						
CLR NOS: D46	INIT: JB						
LW: HJD	C						
W/O:	FAX:	MAP:	P90:				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				

Figure 18. ASTON Record of Flight.



Figure 19. ASTON Planned Route.

Exhibit 38

1.4.2.115 **ABBOT Warnout.** ABBOT submitted a Record of Flight with a copy of their route map. The short route to the AWR was drawn relatively accurately on the Record of Flight to within 5 nm of the planned route. The route showed them joining Tain AWR from the NE, from the vicinity of Helmsdale. No timings were placed on the Record of Flight route map, which would not be required for a short route to the AWR; the Record of Flight stated an Estimated Time of Departure of 12:00 hrs and a TOT of 12:10 hrs at Tain AWR. ABBOT completed the following information in the AWR section of the Record of Flight: Tain, Target 3, 12:10 hrs, 035° LOA, Recce to remain. ABBOT 1 had planned to achieve 12:10 hrs and ABBOT 2 12:10:30 hrs overhead Target 3.

Exhibit 12

1.4.2.116 **Record of Flight Display.** The Panel **observed** that only Records of Flight from other flying sqns are displayed at the Auth's Desk.

Exhibit 147

Analysis

1.4.2.117 There were sufficient suitably qualified and experienced supervisors on the Sqn and within ASTON and ABBOT.

Witness 11
Witness 7

1.4.2.118 ASTON formation consisted of suitably qualified and experienced personnel (SQEP) for the sortie profile.

1.4.2.119 ABBOT formation consisted of SQEP for the sortie profile.

1.4.2.120 ABBOT 1 RS Pilot did not have sufficient time to complete all the tasks that he had been programmed to undertake on the Flypro. He made a judgement on the priority of his tasks at the expense of planning the sortie with ABBOT 2 RS Pilot. Although the

Witness 4
Exhibit 18
Exhibit 160

RESTRICTED—SERVICE INQUIRY

workload was heavy and ABBOT 1 RS Pilot did not regard the demands as out of the ordinary, the Panel believes it degraded his supervision of the sortie planning.

1.4.2.121 ASTON's sortie was planned in accordance with relevant orders and was sufficient to achieve the aims and objectives of the sortie, with the exception of liaising with ABBOT for the FRA.

Witness 2
Exhibit 3

1.4.2.122 As ASTON 2 WSO had planned the FRA prior to beginning the planning phase it is possible that the other members of the formation assumed that any necessary coordination would have already taken place.

Witness 2

1.4.2.123 There was approx 5 mins overlap of ASTON and ABBOT formations in the planning room. One of the ASTON students had left to prepare the briefing room and the remaining student was "*frantically sticking maps together*", reducing numbers of ASTON in the planning room able to liaise. Routinely the callsigns going into a booked formation's AWR slot should deconflict. No deconfliction or liaison took place. The onus would have been on ASTON to have initiated the discussion with ABBOT. ABBOT should have been aware of ASTON's intentions and would have had no reason to initiate discussion with ASTON. The fact they did not discuss this indicates the possibility that:

Witness 2
Witness 14
Exhibit 12
Exhibit 3

a. ASTON 2 WSO stated in interview a misunderstanding of ABBOT's sortie timings, mistakenly believing that ABBOT would not be using the AWR booking until after ASTON's FRA. He believed that the P Dive 1 sorties of ABBOT would take place well after ASTON's timings; ABBOT actually planned to join Tain AWR 9 mins before ASTON planned to join. ASTON 2 WSO did not believe there was a necessity to liaise due to the timing of the ABBOT sortie;

b. a belief that FRA processes offer sufficient deconfliction which would not require explicit discussion, making crews less inclined to do so.

1.4.2.124 ABBOT's sortie was thoroughly planned, given the supervisors understanding of the weather, in accordance with all relevant orders and was sufficient to achieve the aims and objectives of the sortie.

Exhibit 12
Witness 4

1.4.2.125 ABBOT 2 RS Pilot has no memory of the day of the accident but has stated that he would not knowingly plan to route into an area of marginal or unsuitable weather, which is entirely reasonable. There was no particular driver to force ABBOT to enter Tain AWR from the NE and other routes were available to them which would also allow students extra time for checks if necessary. Given that they had choice, it is concluded that the route was planned with a flawed understanding of the weather, rather than deliberately planned into poor weather.

Witness 16
Exhibit 137

1.4.2.126 ABBOT 1 RS Pilot had stated that he thought the route to join Tain AWR was "*unusual*". Joining via Brora (which is where the route planned to take ABBOT) is a common method to enter the AWR for a FRA, as in fact ASTON were planning to enter the AWR via Brora. ABBOT 1 RS Pilot regarded the route to be "*unusual*" to join Tain AWR via Brora for an academic AWR sortie involving a range recce, which would more routinely be done via a 253° LOA. The Panel considers, from a survey of RAF Lossiemouth aircrew, that the majority of crews would utilise an academic LOA to join the AWR, such as the 253° LOA.

Witness 33
Witness 4
Witness 9
Witness 34
Witness 36
Witness 37
Witness 8
Witness 31
Witness 35
Witness 32

1.4.2.127 On seven previous sorties ABBOT 2 FS Pilot had not completed his After Take-Off/Departure Checks correctly. If ABBOT 2 RS Pilot was aware of this, it may have

Exhibit 7
Exhibit 127

RESTRICTED—SERVICE INQUIRY

influenced his decision to plan a longer ground track. During the accident sortie ABBOT 2 FS Pilot did not complete the checks correctly, which led to ABBOT 2 RS Pilot initiating the checks again.

1.4.2.128 ABBOT did not plan to join Tain AWR via the hold as required by ACAWEWROs. This order is not routinely complied with, partially as a result of the proximity of the hold to Inverness airport, which has seen a significant increase in traffic over the past few years. Section 1.4.4 covers AWR Usage and Section 1.4.6 covers AWR Governance, both sections comment on the position of the hold.

Exhibit 12
Exhibit 241
Witness 1
Witness 26
Witness 4

1.4.2.129 ASTON did not liaise with ABBOT during the sortie plan. At the end of their sortie plan, ABBOT were unaware that ASTON were intending to conduct an FRA which, although is a known procedure for external aircraft is not expected from within the same Sqn. ASTON and ABBOT TOTs were separated by 8 mins 30 secs, however this separation had not been engineered by the crews.

Witness 2
Witness 14
Exhibit 222
Exhibit 3
Exhibit 12
Witness 4
Exhibit 163

1.4.2.130 ASTON and ABBOT planned the deconfliction element of their sorties in accordance with UKMLFHB, 1Gp ASOs, ACAWEWROs, RAF Lossiemouth FOB and XV(R) Sqn FOB.

Exhibit 12
Exhibit 3
Exhibit 138
Exhibit 224
Exhibit 3

1.4.2.131 The format of the Record of Flight and the accuracy with which it was completed by ASTON (greater than 10 nm inaccuracy and 5 mins) did not provide a sufficiently robust conflict alert. In general, the format of the Record of Flight and the reliance on the hand drawn route map can be insufficient to highlight conflicts. Electronic Planning (Deconfliction) Aids to assist in sortie deconfliction planning are covered in Section 1.4.6.

1.4.2.132 The perceived inaccuracy of the Record of Flight is not specific to ASTON and could be representative of many crews. The Delivery Duty Holder (DDH) regarded the freedom the coarse route allows as also representing a strength as it can "heighten" crews dynamic deconfliction, as formations rarely fly the exact route and means crews do not plan on a definitive route, rather they expect the unexpected. There are times when a coarse route is appropriate, however the Panel is of the view the Record of Flight could be more accurate, striking a balance between relevance and the benefits of a coarse deconfliction tool.

Witness 11

1.4.2.133 The Panel considered that if an electronic planning (deconfliction) aid was available to ABBOT it could have highlighted ASTON's planned routing and FRA; ABBOT could then have taken action to liaise with ASTON. Figure 20 is the merged routes of ABBOT and ASTON. Using Centralised Aviation Data Service (CADS) as an example of an electronic planning (deconfliction) aid, CADS would display routes that are airborne at the same time, and a conflict alert function highlights potential conflicts between routes that have a user defined timing/distance parameters. In the case of ABBOT/ASTON, just having visibility of the planned route (not the conflict alert function) could have highlighted the requirement for deconfliction.

Exhibit 501

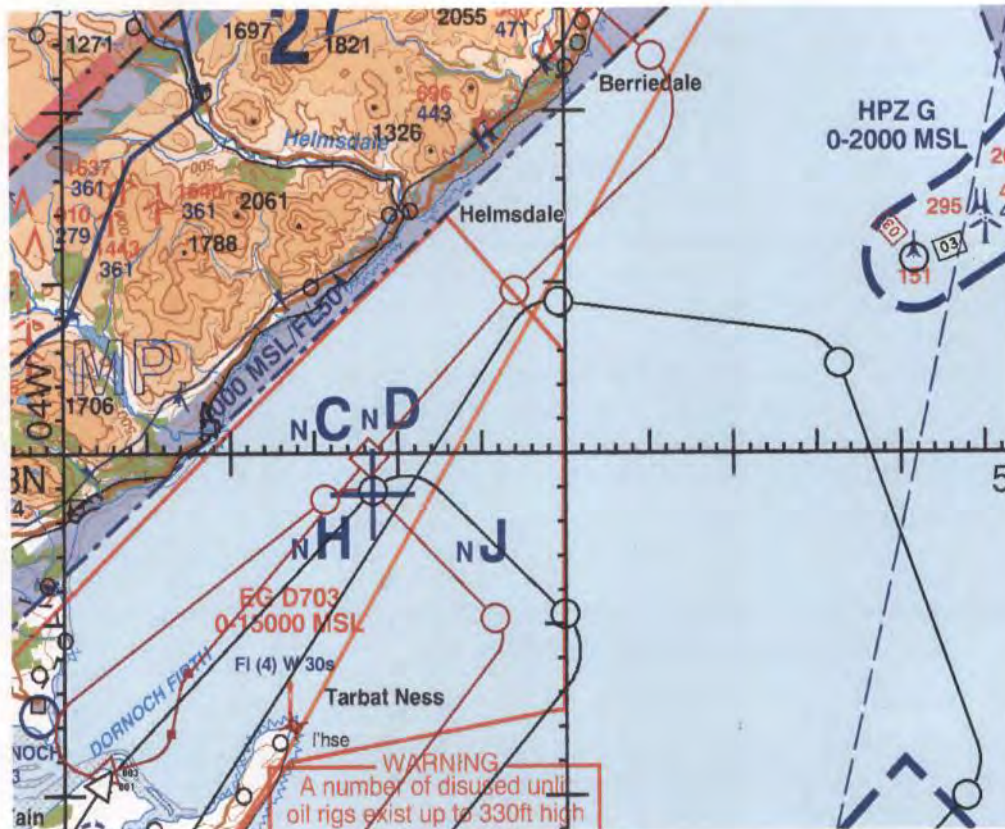


Figure 20. ASTON (red route) and ABBOT (black route) Merged Routes.

Exhibit 38

1.4.2.134 The TOT for Tain AWR on ASTON's Record of Flight differed by one minute from their actual planned TOT. This has no bearing in the accident, given that ASTON 1 flew the route earlier than planned.

Exhibit 3
Exhibit 149

1.4.2.135 The AWRCs had the correct planned time over target for ABBOT, but the 035° LOA on their Record of Flight created the opportunity for confusion over how ABBOT were intending to join, as they were planning a 215° LOA join at the AWR boundary. The AWRC do not receive a pictorial summary of any aircraft's planned routing/join. ABBOT's Record of Flight could have affected the AWRCs' SA of how they planned to join Tain AWR but the inclusion of the 035° LOA has no bearing in the accident.

Witness 3
Exhibit 12
Exhibit 147

1.4.2.136 The current process of telephoning Record of Flight information through to an AWRC does not provide the AWRC with sufficient SA. This could create a situation where AWRCs miss AWR join and/or departure conflicts; and could be compounded if Record of Flight timing information is incorrect.

Exhibit 147
Witness 3

1.4.2.137 The USAF booking of Tain AWR was not mentioned throughout the ASTON planning cycle. The planned arrival time of 12:19 and 12:19:30 hrs was enough of a time separation to expect not to be concerned with the previous booked agency. It is good airmanship, however, to check whether the AWR is busy before and after a booked slot to identify if there might be any departing traffic to affect and to have awareness if sortie timings change, or what effect this may have on adjacent slots. ABBOT 2 RS Pilot did not regard this to be a normal procedure.

Witness 14
Exhibit 155
Exhibit 633

1.4.2.138 MRP RA 2305 Guidance Material details 13 bullet points which must be covered during sortie briefs. These bullet points are encompassed, with the exception of Survival Procedures, in the TGRF sortie briefing material defined in the TGRF Handbook, TGRF Pocketbook and TIBTA. Survival briefing is discussed in Section 1.4.6 of the report.

Exhibit 139
Exhibit 167
Exhibit 168
Exhibit 91

Deconfliction Conclusions

1.4.2.139 ASTON and ABBOT did not deconflict at anytime during their planning cycles.

1.4.2.140 The Record of Flight format, policy and process was insufficient to highlight conflicts.

1.4.2.141 The Panel therefore concluded that ineffective intra-Squadron deconfliction was a **contributory factor**.

1.4.2.142 As stated in 1.4.1 and 1.4.6, Defence's electronic planning (deconfliction) aid requirement has not been satisfied since its identification in the 1980s, since when it was accepted as a proportional solution.

1.4.2.143 An electronic planning (deconfliction) aid could have highlighted ASTON's planned route and FRA to ABBOT, prompting further action by ABBOT.

1.4.2.144 The Panel therefore concluded that as described in sub-section 1.4.6.137, the absence of an electronic planning (deconfliction) aid is a **contributory factor**.

Outbrief

1.4.2.145 This sub-section is divided as follows:

- a. Regulation, Policy and Orders
- b. Supervision of ASTON and ABBOT: Oversight and Outbrief
- c. SA, Auth's Desk and Ops Desk Ergonomics
- d. Analysis

Regulation, Policy and Orders

1.4.2.146 **1Gp ASOs.** 1Gp ASO 2305 Supervision requires that DAs are responsible for sqn level supervision of flying operations iaw 1Gp ASO 2306 Authorisation of Flights and MRP RA 2306 Authorization of Flights.

Exhibit 141

1.4.2.147 **RAF Lossiemouth FOB.**

Exhibit 148
Exhibit 144

- a. The RAF Lossiemouth FOB allows *"responsibility for the day-to-day flying activities to be delegated to the Squadron Duty Authorising Officer."*
- b. The FOB contains orders for the DA. The DA is *"responsible for the supervision and safe and efficient conduct of his/her Units flying."* Specific responsibilities include:
 - (1) *"The supervision and execution of the unit's flying programme."*
 - (2) *"Ensuring that Sqn daily and sortie briefing requirements are fulfilled."*
 - (3) *"Ensuring that crews submit a Record of Flight"* and that it is distributed to other sqns iaw FOB.

1.4.2.148 **XV(R) Sqn FOB and TORs.** XV(R) Sqn FOB and TOR for the DA reflects and amplifies the Stn FOB, 1Gp ASOs and MRP RA 2305 and 2306. They state that the DA is *"responsible for the supervision and the safe and efficient conduct of his Unit's flying."*

Exhibit 162
Exhibit 169

Specific responsibilities include:

- a. *"The supervision and execution of the Unit's flying programme."*
- b. *"Ensuring that low level maps have all relevant information marked."*
- c. *"Ensuring that crews submit a Record of Flight and, if the sortie involves overland low-level, a photocopy of their route, for every sortie [flight]. A copy of the Record of Flight must be faxed to the Ops desk of every other LTW Sqn that has flying planned for the same period."*
- d. TOR for the DA state that the *"Sqn Duty Auth is responsible for the supervision and the safe and efficient conduct of his Unit's flying...including the daily briefing of all Sqn crews."*
- e. DAs are to be a minimum of a B1 Qualified Tactics Instructor and to have completed the DA training syllabus as dictated by OC Standards Fit. The syllabus requires DA to complete three duties under training before qualification.

1.4.2.149 **TGRF Handbook/Pocketbook.** The TGRF Handbook requires that all crews receive an outbrief from the DA. The outbrief should be an *"independent check of all flight restrictions and currencies."* The TGRF standard Outbrief is contained in the TGRF Pocket Book. The TGRF Pocketbook Outbrief prompts : *"Deconfliction"* (covered by DA), *"Range"* (covered by DA) and *"Range:bootleg?"* covered by the sortie authorisor (for example ASTON 1 WSO/ABBOT 1 RS Pilot) within a long list of prompts.

Exhibit 174
Exhibit 34

1.4.2.150 **XV(R) Sqn Outbrief Proforma.** XV(R) Sqn use a bespoke outbrief proforma together with OCU syllabi specific prompts. It has a prompt from the DA to cover *"deconfliction"* and for the sortie authorisor under the title *"weaponry": "range slot/FRA deconfliction"*.

Exhibit 174
Exhibit 34

Supervision of ASTON and ABBOT: Oversight and Outbrief

1.4.2.151 **1st Sqn DA.** The 1st DA of the morning, ABBOT 1 RS Pilot, met the criteria required by OC XV(R) to fulfil the role; indeed he had instigated the training package for DA. He considered it fairly unusual to have the DA role for only a few hours. He was surprised by the planning of the 06:00 hrs Met/Ops brief: *"because normally there's a good hour or so"* between Met/Ops briefs. The DA handover was thorough and lengthy due to the complexity of the weather and the Flypro.

Witness 4
Exhibit 156
Exhibit 172

1.4.2.152 **2nd Sqn DA.** The 2nd DA of the day met the criteria required by OC XV(R) to fulfil the role. He considered his time as DA to be very busy and encountered a number of problems relating to aircrew currency and aircraft serviceability. He reviewed ASTON and ABBOT's warnout folders and outbriefed both formations using the XV(R) Sqn outbrief proforma. During the outbrief he prompted both formations on deconfliction, AWR usage and provided weather updates.

Witness 12
Exhibit 173

1.4.2.153 **Warnout Folder Overview.** The 2nd DA was unaware what (if any) deconfliction had been discussed between ASTON and ABBOT prior to outbrief. The 2nd DA had received his Met brief from the 1st DA and was unaware of the fact that none of the supervisors from ASTON or ABBOT had attended the 07:00 hrs Met/Ops brief. The 2nd DA checked both ASTON's and ABBOT's warnout folders. He spent longer looking at ASTON's mission materials because ASTON's route was much longer than ABBOT's and he considered that ABBOT *"were doing something standard"*, referring to the fact *"they were conducting a pre-prescribed range profile."* He was aware that ASTON was intending to conduct a FRA 10

Witness 12
Witness 4
Exhibit 3
Exhibit 12
Exhibit 38
Exhibit 630

mins after ABBOT but was unaware what interaction had occurred between the formations to derive the timing split. The 2nd DA would have reviewed paper route maps for ASTON and ABBOT.

1.4.2.154 **Display of Records of Flight.** ASTON's Record of Flight was not displayed at ABBOT's outbrief. This was normal as the policy was only to display Records of Flight faxed from other sqns. OC Standards, XV(R) Sqn stated that the deconfliction prompt at outbrief is usually used as a reminder for crews to check the faxed Records of Flight from other sqns, rather than deconfliction with other XV(R) Sqn sorties.

Exhibit 147
Witness 8

1.4.2.155 **ASTON Outbrief.** ASTON formation outbriefed together using the XV(R) Sqn outbrief proforma. The bespoke XV(R) Sqn outbrief proforma encompassed the standard TGRF Pocketbook outbrief and has additional prompts specific to OCU syllabi. Under the heading "*Weaponry*" there is a prompt for "*FRA Deconfliction.*" The 2nd DA remembers asking ASTON at outbrief if they were content with "deconfliction", to which all crews replied that they were. The 2nd DA had cancelled the LOSSIE 38 sortie, removing their main concern for conflict. The crews checked the Records of Flight board for inter sqn deconfliction.

Witness 12
Witness 2
Exhibit 34
Exhibit 170
Exhibit 174

1.4.2.156 **ABBOT Outbrief.** On the way to the outbrief, ABBOT 1 RS Pilot expressed surprise at the planned route as he considered that it would protract the AWR join. He would have planned to join on the 253° LOA but did not consider that the plan to join from the NE was a "*major drama*"; he considered that the weather would be suitable to allow the planned route to be flown. The formation outbriefed separately; the formation did not discuss the latecomer plan¹⁷ as it was considered routine to join the AWR and fit in with the in use pattern. The 2nd DA stated that he asked both ABBOT 1 and ABBOT 2 at outbrief if they were content with "deconfliction", to which all crews replied they were. The 2nd DA remembers talking to ABBOT 2 RS Pilot and that he was content that "*it was their range slot they were going into and they were happy with the process and that deconfliction they had there.*" He remembers the crews checking the Records of Flight board for inter sqn deconfliction. ABBOT 1 RS Pilot believed that deconfliction with ASTON was not mentioned at outbrief.

Witness 12
Witness 4
Witness 4
Exhibit 135

1.4.2.157 **Start Up Taxi Take Off.** On completion of aircraft start, crews will normally check with the DA for late warnings just prior to taxi. Take off time would then depend on a number factors including aircraft serviceability, taxi distance to the runway in use and other traffic. ASTON 1 took off at 11:00 hrs, 14 mins earlier than planned, changing their TOT at Tain AWR to 12:05 hrs. The 2nd DA was unaware that ASTON 1 had launched earlier than planned. ABBOT 2 subsequently launched at 11:55 hrs, just over 5 mins earlier than planned, changing their TOT at Tain AWR to 12:05:30 hrs.

Witness 12
Exhibit 7
Exhibit 6
Exhibit 3
Exhibit 12

SA, Auth's Desk and Ops Desk Ergonomics

1.4.2.158 **Situational Awareness (SA).** SA refers to a person's mental picture of that environment. There are three elements that form SA: 1) perceiving the status, attributes and dynamics of relevant elements in the environment, 2) comprehending the significance of these elements, and 3) projecting current assessments to future status. Thus, an operator would obtain SA after receiving critical system-related information, understanding it and using the information to predict near-term system-state. Endsley (1995, 2000) argues that SA is based upon elements of both operators and equipment.

Exhibit 91

¹⁷ A contingency which caters for an element of a formation becoming delayed and the implications on the sortie.

¹⁸ Investigating Human Error: Incidents, Accidents, and Complex Systems, Barry Strauch, Pg 201.

1.4.2.159 **Obtaining SA.** Academic research has shown obtaining SA as:

“Mumaw, Roth, Vincente, and Burns (2000) monitored nuclear power plant controllers and observed that they obtained situational awareness from a variety of sources, not exclusively from system displays and alerts, as many had previously thought. In addition to receiving information from the displays, they actively sought out information from the operating environment... They also used control room logs and interacted with other operators, both their own team members and those outside the immediate control environment. Finally, because of the size of the operating environment, they walked through the facility to observe operations, performing their own observations to obtain situational awareness.”¹⁸

1.4.2.160 The Auth’s Desk is located in a separate room from the planning room (see Figure 21 and 22 below), which limits the DA’s visibility of sortie planning but provides a sanitised area for sortie in and out briefing. The advantages are that it provides a quiet environment; but reduces the opportunity of the DA to have any awareness of activity in the planning room, and specifically to see which crews are planning at any time. The location of the Auth’s Desk places a requirement emphasis on the DA to walk into the planning room to gain awareness of crews planning, but during busy periods this would be made difficult as inbriefs and outbriefs and DA Met/Ops briefs take place at the Auth’s Desk. Some sqns have the Auth’s Desk co-located with the planning room to improve SA and for the DA to integrate with the planning cycle and have greater visibility of crews.

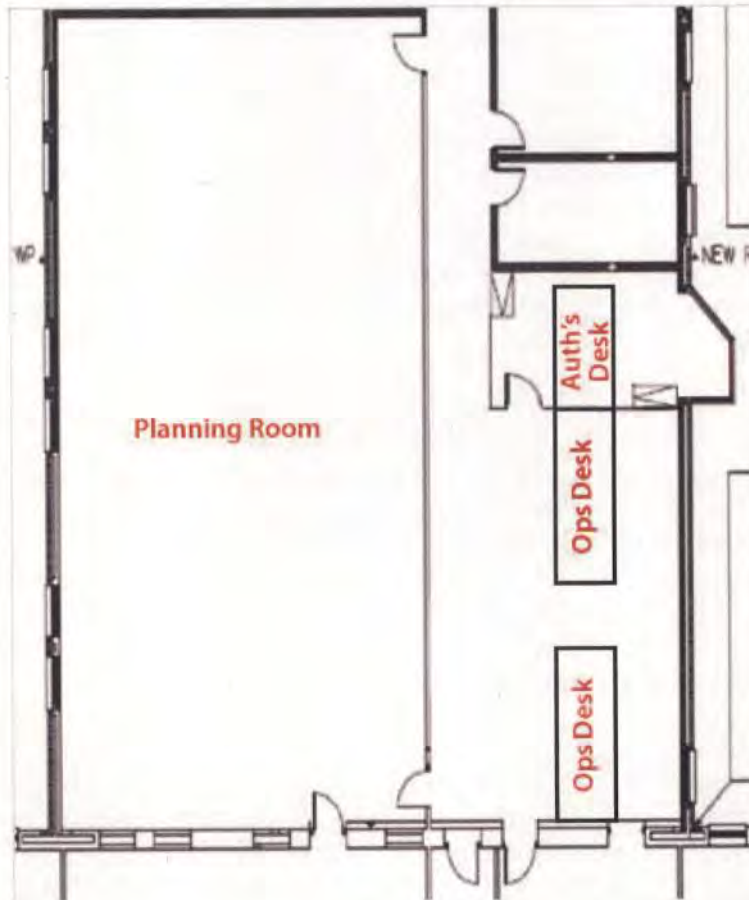


Exhibit 216

Figure 21. Plan View of Planning Room, Ops Desk and Entrance to Auth’s Desk.



Figure 22. XV(R) Sqn Planning Room.

1.4.2.161 The Flypro was normally displayed on a monitor at the Auth's Desk (Figure 23) but this was not working on the day of the accident. The monitor would display the Flypro as published; it would not be updated for changes to crews/timings/events. Both DAs were working from a printed paper copy of the Flypro which was hand amended for programme changes; this would usually be kept by the DA and not be visible to crews.

Witness 12
Exhibit 18
Exhibit 164

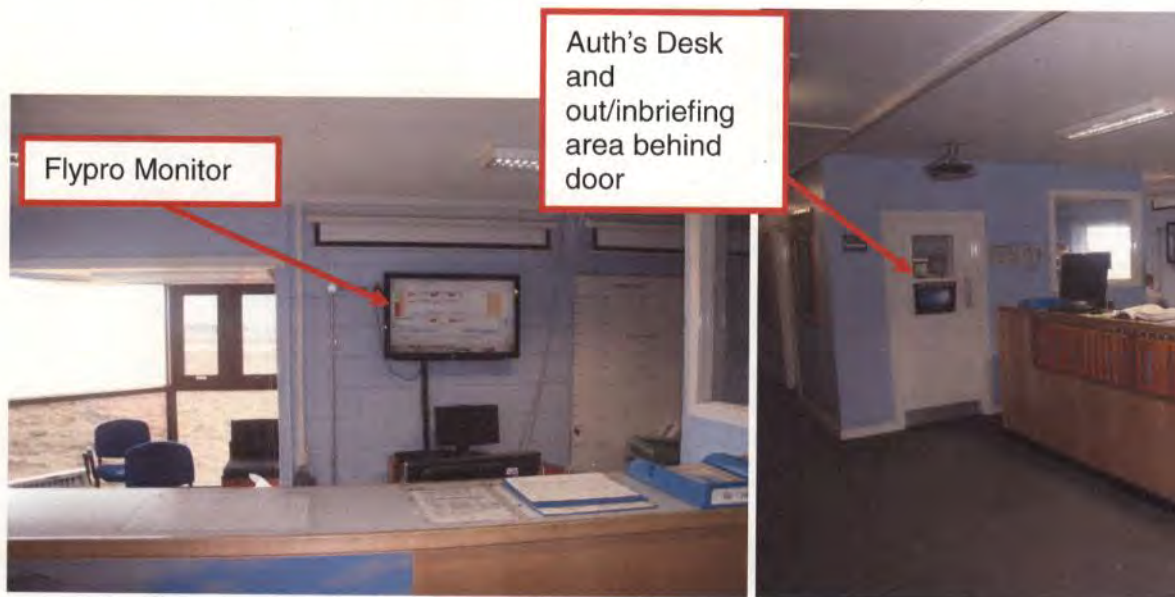


Figure 23. XV(R) Flypro Monitor and Sqn Auth's Desk.

1.4.2.162 Actual take off times, accurate to the nearest minute, are input on Squadron Training Achievement Recording System (STARS)¹⁹ by ATC staff. The take off times are available at the Ops Desk STARS terminal if needed, but not widely displayed or regularly used. The Ops Desk is situated a short distance away from the Auth's Desk (Figure 24).

Exhibit 165
Exhibit 91
Exhibit 166
Witness 21

¹⁹ STARS is a computer based system to promulgate sortie information. Sqn Ops assistants will input sortie information from the Record of Flight (Estimated Time of Departure, planned sortie duration etc) which can then be viewed by ATC. ATC will update STARS to reflect actual take off/landing times etc.



Figure 24. Ops Desk and Entrance to Auth's Desk.

1.4.2.163 The Tain AWR schedule was available at the Auth's Desk and Ops Desk computer detailing the bookings for the day, including the USAF booking. AWR scheduling is not routinely displayed in its entirety. Sqn AWR bookings are displayed on the Flypro which is produced the day before planned flying. Personnel would check the AWR schedule if, during the planning cycle, they needed to use a AWR that had not been pre-booked.

Exhibit 31

Analysis

1.4.2.164 It was necessary to have two morning DAs due to the Flypro and the availability of supervisors as a result of split Sqn ops. The Panel concluded that the handover was thorough and this did not affect the running of the Ops and Auth's Desk. The duty programmer was unable to say definitively why two Met/Ops briefs were programmed 30 mins apart but offered that it may have been to allow for a mess committee meeting or a slightly later start for childcare.

Exhibit 18
Exhibit 177
Witness 4
Witness 12

1.4.2.165 Regulation, policy and orders are not, by necessity, specific with respect to deconfliction. The Stn Cdr considers that *"you plan together, therefore you deconflict the routes, the Auth joins it all up, he tells you about what's on the same squadron."* The Panel concurs that is the responsibility of the formation supervisors and Sqn DA to ensure the safe execution of the Flypro, including deconfliction, although the information display and XV(R) Sqn layout makes this task harder.

Witness 11

1.4.2.166 XV(R) Sqn use a bespoke outbrief proforma which encompasses the standard TGRF outbrief, detailed in the TGRF Pocketbook, together with OCU syllabi specific prompts. The Panel does not believe that there are omissions in the XV(R) Sqn outbrief.

Exhibit 174
Exhibit 34

1.4.2.167 The 2nd DA was aware that ASTON would be conducting an FRA 10 mins after ABBOT was planned to begin their AWR serial.

Witness 12

1.4.2.168 The 2nd DA's questioning technique at the outbrief was insufficient to identify that ABBOT and ASTON had not deconflicted. For example, "are you happy with the deconfliction?" has a wide connotation, often referring to external aircraft, rather than "are you aware that ASTON is conducting an FRA, have you deconflicted with them?" OC Standards, XV(R) Sqn stated that the deconfliction prompt at outbrief is usually used as a reminder for crews to check the faxed Records of Flight from other sqns, rather than deconfliction with other XV(R) Sqn sorties. The Panel considered that, due to the experience and seniority of the ASTON and ABBOT supervisors, the 2nd DA of the day would have had an expectation that rigorous and complete sortie planning and deconfliction had

Witness 12

taken place. Also, the routine nature of the sortie would infer to the 2nd DA that there wasn't a requirement for detailed deconfliction, as it was a standard sortie from RAF Lossiemouth to the AWR.

1.4.2.169 The Panel identified that as a Flypro, either as published or "dynamic", was not readily visible at the Auth's Desk due to the monitor being broken, or during the Met/Ops brief, as it was not displayed, it denied ASTON a trigger to identify ABBOT's sortie timings and their programmed use of Tain AWR. Although one was available, it was behind the Auth's Desk and was only visible on request. This meant an opportunity to deconflict that was usually present without asking was not available on that day. Also, crews did not get an opportunity to see an updated Flypro during a Met/Ops brief.

Witness 12

1.4.2.170 ABBOT did not see ASTON's Record of Flight because internal XV(R) Sqn formations Records of Flight are not displayed. If ASTON's Record of Flight had been displayed at ABBOT's outbrief, ABBOT would have had an opportunity to see that ASTON had planned to conduct an FRA 10 mins after ABBOT's planned join.

Exhibit 3
Witness 12
Exhibit 147

1.4.2.171 The AWR schedule could not be seen by ASTON or ABBOT at outbrief, thus denying a final opportunity for the crews to identify other AWR bookings, such as the USAF booking. ABBOT 1 and ABBOT 2 walked without knowing that Tain AWR was booked by the USAF until 12:00 hrs.

Exhibit 31
Witness 4
Witness 2
Witness 4
Witness 2
Witness 14
Witness 14
Witness 12
Exhibit 166
Exhibit 6
Exhibit 3

1.4.2.172 ASTON 1's actual takeoff time was not displayed to or known either by ABBOT or the 2nd DA. ASTON 1's actual take off time was 11:00 hrs, which would have meant that if they followed their planned route they would have arrived at the AWR 5 mins prior to ABBOT's planned arrival.

Exhibit 6
Exhibit 165

1.4.2.173 Actual take off times were available from the Ops Desk STARS terminal. In order for the 2nd DA to have updated ABBOT on ASTON 1's timings he would have had to have known ASTON 1's take off time and reviewed their mission materials. This is not expected for day flying and occurs more often in night operations. Furthermore, an earlier than planned takeoff does not necessarily impact on a sortie's planned FRA timings. ABBOT 2 launched 5 mins early; it is unlikely that the 2nd DA would have been aware of this. It is up to the crews to inform the DA of any changes. It was not necessary for ABBOT 2 to inform the 2nd DA that they were getting airborne 5 mins early.

Exhibit 7

1.4.2.174 Once aircraft have taxied it is difficult for the DA to influence their sortie profile (timings/events etc). The DA has a radio to communicate with Sqn based aircraft, however crews will usually change from the Sqn radio frequency once taxiing or airborne. The DA does monitor the Sqn frequency but does not have a method of monitoring aircraft once airborne. The DA might gain some SA from radio messages from aircraft airborne, but this is usually limited to aircraft serviceability and recovery timings.

1.4.2.175 If an up-to-date Flypro, with FRAs and actual take off times annotated, was readily available to crews then it would provide another opportunity to highlight AWR usage and provide aircrew with the most up-to-date information. FRAs were not annotated on the DA's printed Flypro; there was no requirement to do so. The Auth's Desk Flypro monitor was unserviceable. The Panel **observed** that, irrespective of the serviceability of the monitor, the Flypro that would have been displayed would not have been an updated version.

Exhibit 18
Witness 12

1.4.2.176 ASTON's actual take off times were not displayed at ABBOT's outbrief. It is considered that a readily visible Flypro reflecting changes to crews/timings/events could

Exhibit 18
Witness 12

improve SA throughout mission planning and outbrief. For example, as ASTON had split to singletons, two separate FRAs could be expected.

Conclusions

1.4.2.177 The Panel concluded:

- a. ASTON and ABBOT supervisors did not attend the scheduled Met/Ops brief which denied an opportunity to liaise, or prompt liaison after the brief;
- b. ASTON supervisors did not liaise with ABBOT over the use of Tain AWR for their FRA;
- c. the 2nd DA's supervision of ASTON and ABBOT was insufficient to identify the lack of deconfliction that had taken place in the planning cycle;
- d. given the demand the Flypro placed upon ABBOT 1 RS Pilot, the Flypro was unachievable. ABBOT 1 RS Pilot was forced to prioritise and decided not to attend the sortie plan. His ability to affect sortie planning and his supervision of the sortie was therefore reduced.

The Panel therefore concluded that ineffective Sqn level Supervision of ASTON and ABBOT was a **contributory factor** in the accident.

1.4.2.178 The Panel also concluded that:

- a. An updated Flypro was not displayed at the Met/Ops brief, therefore crews missed an opportunity to gain pertinent information at the start of their planning cycle;
- b. the DA is located in an enclosed area away from the planning room, with an emphasis placed on walking into another room to gain awareness of Sqn planning; it did not encourage oversight of crews planning, liaison and deconfliction;
- c. the Flypro was available, but not readily visible at the Auth's Desk;
- d. the Tain AWR schedule was not readily visible by ASTON or ABBOT at outbrief;
- e. the displayed Flypro is not updated, limiting the SA of outbriefing crews;

The Panel therefore concluded that the inefficiencies of the ergonomics and information display of the Auth's Desk and Ops Desk was a **contributory factor**.

Authorisation

Introduction

1.4.2.179 The authorisation of ASTON's and ABBOT's sorties was primarily the responsibility of Sqn and formation personnel. MAA, 1Gp and Stn provide additional levels of supervision through regulation, policy and direct oversight of Sqn operations. This subsection is divided as follows:

- a. Regulation, Policy and Orders
- b. Authorisation of ASTON and ABBOT

c. Analysis

Regulation, Policy and Orders

1.4.2.180 **MRP RA 2306 Authorization of Flights.** MRP RA 2306 requires that *“All flights by UK Military Aircraft shall be authorized.”* The RA states:

Exhibit 140

- a. *“Aviation Duty Holders and Commanders **should** publish, by appointment, those officers who may delegate powers of authorization.”*
- b. *“Aviation Duty Holders and Commanders **should** promulgate lists of individuals by name or appointment and any limitations that apply.”*

1.4.2.181 MRP RA 2306 also lists the duties of the Authorizing Officer:

Exhibit 140

- a. *“Detail the Aircraft Commander, and if applicable, the Formation Leader.”*
- b. *“Ensure that the Aircraft Commander, and/or the Formation Leader or leaders understand the aims of the tasked mission or duty.”*
- c. *“Ensure that the Aircraft Commander, and if applicable, the Formation Leader is capable of carrying out his responsibilities as detailed in these regulations or other applicable directives or orders issued by a subordinate authority.”*
- d. *“Ensure that the Aircraft Commander or Formation Leader has thoroughly planned his mission, alternate mission or duty.”*
- e. *“Ensure that the crew or formation members are qualified, in current flying practice, and capable of executing the tasked mission, alternate mission or duty as planned without undue hazard.”*
- f. *“Alter the mission or crew, and ultimately veto the sortie, if deemed necessary.”*

1.4.2.182 MRP RA 2306 Guidance Material details:

Exhibit 140

- a. **“Risk.** *There are always risks associated with aviation. The key role of the Authorizing Officer is to be aware of the probability and impact of potential problems and to eliminate, reduce or control the hazards involved through risk management and implementation of suitable controls.”*
- b. **“Self-Authorization.** *Suitably qualified aircrew may be granted powers of Self Authorization by an Approving Officer with any limitations detailed on an appropriate certificate. Suitably qualified aircrew appointed as CFS or Standards Agents may be empowered to authorize all flights in aircraft on which they are qualified. Independent authorization, rather than self-authorization, is encouraged.”*
- c. **“Authorization Brevity Codes.** *Codes specifying sortie content may be used to abbreviate written authorization. Aviation Duty Holder and Commanders’ Orders will specify the codes that may be used and the relevant decode will be displayed alongside the authorization sheets.”*

1.4.2.183 **1Gp ASOs.** AOC 1Gp grants Stn Cdrs full powers of authorisation to achieve the flying task in 1Gp ASO 2306. 1Gp ASO 2306 authorises Stn Cdrs to delegate powers of authorisation and requires Stn Cdrs to promulgate a list of names, appointments and powers of authorisation of all stn authorising officers. It requires Stn Cdrs to promulgate specific

Exhibit 141

orders for their DA. 1Gp ASO 2306 also details how sorties should be recorded in the authorisation sheets and makes allowance for Training Syllabus sortie numbers to be used in the duty column.

1.4.2.184 AOC 1 Gp had published in 1Gp ASOs personnel, by appointment, who had the authority to delegate powers of authorisation iaw MRP RA 2306; this included the RAF Lossiemouth Stn Cdr.

Exhibit 141

1.4.2.185 **RAF Lossiemouth FOB and Powers of Authorisation.** The RAF Lossiemouth FOB references 1Gp ASOs for the rules authorising officers should follow when authorising sorties. The FOB also details that officers can only authorise sorties that fall within their powers of authorisation iaw the Powers of Authorisation Table, which is endorsed by the Stn Cdr on a monthly basis. The authorising officer for the sortie is to ensure that all the relevant individual codes, or any generic codes with any necessary extra information are placed in the auth sheets. The TGRF does not direct a policy of independent authorisation. If one of the crew or formation has delegated powers of authorisation that cover all the aspects of the intended sortie then he/she will typically self-authorise (the senior authoriser typically authorises the sortie) with the independent check being performed by the DA.

Exhibit 148
Exhibit 153
Exhibit 152
Exhibit 205
Exhibit 144

1.4.2.186 The Stn Cdr had promulgated a list of individuals by name or appointment to which powers of authorisation had been delegated iaw MRP RA 2306. The Power of Authorisation Table included limitations that apply to individuals.

Exhibit 153
Exhibit 209

1.4.2.187 **XV(R) Sqn Orders.** TORs for the Sqn Duty Authorising Officer require the DA to ensure that all sorties are correctly entered on the authorisation sheet and are properly authorised. XV(R) Sqn utilise XV(R) Sqn Syllabus Standard Authorization Codes in the duty column of the authorisation sheet.

Exhibit 161
Exhibit 207

Authorisation of ASTON and ABBOT

1.4.2.188 **ASTON Formation.** ASTON 1 WSO authorised ASTON formation. The Stn Cdr had delegated the authority for ASTON 1 WSO to authorise the sortie. ASTON 1 WSO had completed the Flight Authorisers Course (FLAC) in Jan 05; the FLAC is designed to prepare aircrew for duties as authorisers and junior flying supervisors. ASTON 2 WSO also held the authority to authorise the sortie and had completed the FLAC in Jun 09. The authorisation sheets were completed correctly and the duty column recorded "ASTON P SAP 2 LFA 14".

Exhibit 153
Witness 7
Exhibit 123
Exhibit 154
Exhibit 19
Exhibit 208

1.4.2.189 ASTON 1 WSO was out of date for "Dinghy and Life Preserver – Sea" and "Para Drill – Sea Dragging." There is no evidence that the WSO had been issued a waiver prior to the accident.

Exhibit 181
Exhibit 179
Exhibit 185

1.4.2.190 **ABBOT Formation.** ABBOT 1 RS Pilot authorised ABBOT formation. The Stn Cdr had delegated the authority for ABBOT 1 RS Pilot to authorise the sortie. ABBOT 1 RS Pilot had completed the FLAC in Mar 05 and the Flying Supervisors Course (FSC), which is designed to prepare unit executives for flying supervisory roles, in Feb 09. All authorisers were to have completed or applied for the FLAC as stated by TTS; there was no policy requirement for personnel to have attended the FSC. ABBOT 2 RS Pilot also held the authority to authorise the sortie. He had completed the FLAC, and the FSC in Mar 97. The authorisation sheets were completed correctly and the duty column recorded "ABBOT P Dive 1 LFA14".

Exhibit 153
Exhibit 156
Exhibit 130
Exhibit 19
Exhibit 210
Exhibit 152

1.4.2.191 ABBOT 2 RS Pilot was out of date for "Dinghy and Life preserver – Dry."

Exhibit 179

Analysis

<p>1.4.2.192 Regulatory documents, policy and orders are coherent. Roles and responsibilities of authorising officers and the DA are clearly defined. The Authorising Officer duties detailed in MRP RA 2306 are applicable to both the sortie authoriser and the DA.</p>	<p>Exhibit 138 Exhibit 140 Exhibit 224</p>
<p>1.4.2.193 ASTON 1 WSO self-authorised ASTON formation. ASTON 1 WSO had the delegated authority to authorise the sortie.</p>	<p>Exhibit 153 Exhibit 19 Witness 2</p>
<p>1.4.2.194 ABBOT 1 RS Pilot self-authorised ABBOT formation. ABBOT 1 RS Pilot had the delegated authority to authorise the sortie.</p>	<p>Exhibit 153 Exhibit 19 Witness 4</p>
<p>1.4.2.195 The authorisation sheets for ASTON and ABBOT's sorties were completed correctly.</p>	<p>Exhibit 19</p>
<p>1.4.2.196 The formation members were qualified and capable of executing the tasked mission, alternate mission or duty.</p>	<p>Exhibit 153 Exhibit 209</p>
<p>1.4.2.197 MRP RA 2306 requires that <i>"the Aircraft Commander or Formation Leader has thoroughly planned his mission, alternate mission or duty."</i> The Panel concluded that, as ASTON had not liaised with ABBOT over their <u>planned</u> use of the AWR booking, they were outwith the regulation. At the time of planning, however, and with the cultural norms surrounding AWR usage (bootlegging, standard/routine nature of an AWR sortie), the crews or Authorisers would have regarded their sorties as thoroughly planned.</p>	<p>Exhibit 140 Witness 2</p>
<p>1.4.2.198 Circumstances led to ASTON 1 WSO and the ASTON sortie supervisors being unaware of ABBOT's timings, or they assumed that deconfliction had taken place. The Panel concluded that ASTON 1 WSO (as authoriser) believed that ASTON's mission was thoroughly planned.</p>	<p>Witness 2 Witness 12</p>
<p>1.4.2.199 The Panel concluded that ASTON 1 WSO and ABBOT 2 RS Pilot survival currencies had lapsed and they were not <i>"in current flying practice"</i> and could not be authorised to carry out flying duties, nor self-authorise their own sorties. This is not a reflection of their ability to operate the aircraft, or their recent currency of flying, instead it is the contravention of 1Gp ASOs and the MRP that renders the aircrew ineligible for current flying practice.</p>	<p>Exhibit 179 Exhibit 140</p>
<p>1.4.2.200 The Panel observed that the DA did not ask for evidence of the waiver to Sea Survival drills for ASTON 1 WSO to be held by the authorisation sheets as this is not mandated in any order book.</p>	<p>Exhibit 187 Exhibit 138 Exhibit 224</p>
<p>1.4.2.201 ABBOT 1 RS Pilot, the formation authoriser, <u>would not</u> have been aware of ABBOT 2 RS Pilot's survival currency. The XV(R) Sqn outbrief relies upon the DA to have checked all currencies prior to outbrief and they are directed to <i>"don't brief if not applicable"</i>. ABBOT 2 RS Pilot had confirmed that he was in date for all currencies to the 2nd DA. There is no prompt for the sortie authoriser to check currencies of the crews he is authorising, this is assumed to be in order if it is not briefed by the DA.</p>	<p>Witness 12 Witness 7 Exhibit 34</p>
<p>1.4.2.202 Throughout this section there have been numerous references to <i>"thoroughly planned"</i>, which originated from the MRP RA 2306 requiring authorising officers to ensure that the Aircraft Commander or Formation Leader has thoroughly planned his mission, alternate mission or duty. To reach a conclusion that a sortie is thoroughly planned (or not) is subjective, as there will always be nuances upon which sortie planning is based and hindsight bias can be used to support an argument against it.</p>	<p>Exhibit 140</p>

1.4.2.203 The Panel concluded that liaison regarding the AWR FRA between ASTON and ABBOT formations could have altered the course of events, however there is a system in place that caters for un-deconflicted²⁰ users of the AWR. The Panel questioned whether this meant that, although ASTON had not specifically discussed their FRA with ABBOT, they were in effect relying on AWR procedures to provide the necessary deconfliction.

1.4.2.204 In order to make an assessment on whether the liaison should have taken place, the Panel made a judgement that where there are reasonable and effective means of deconfliction in place (sorties planned on the same Flypro, planning on the same Sqn, attending the same Met/Ops briefs, having the same DA) then formations should not rely upon ACAWEWROs FRA procedures, but instead should attempt wherever possible to deconflict with other formations. There is also an understanding both on XV(R) Sqn and on the Stn that it is a function of good airmanship to liaise and deconflict during the planning phase (if the event is known at that stage) rather than leave the deconfliction to occur airborne.

1.4.2.205 This judgement formed the basis of the assessment of the thoroughness of ASTON's planning with regard to deconfliction. The Panel believes ABBOT's sortie was thoroughly planned as described in para 1.4.2.124.

Conclusions

1.4.2.206 The Panel concluded that:

- a. a requirement to plan thoroughly is part of the authorisation process. The authorisation process did not identify a deconfliction issue within the sortie. ASTON had not liaised with ABBOT over the use of the Tain AWR booking and had not planned their mission with sufficient thoroughness;

therefore ineffective authorisation of ASTON was a **contributory factor**. Furthermore:

- b. a further requirement of authorisation is to ensure aircrew are in date for their flying currencies. ASTON 1 WSO and ABBOT 2 RS Pilot's survival currencies had lapsed and were considered not to be "*in current flying practice*";

therefore ineffective authorisation of ASTON and ABBOT was an **other factor** because of its potential to aggravate another accident.

Witness 4
Witness 11

²⁰ Un-deconflicted users of an AWR can be varied and not easily described. A crew could cut short a planned sortie (for example due to weather) and decide to use remaining time/fuel to practice weapon delivery profiles in an AWR. This would mean they call the range to see if it is possible depending on current booking/users. This procedure is described as "Bootlegging" and would usually mean airborne/dynamic deconfliction.