



Defence  
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Authority

## **Service Inquiry**

1 Rifles Parachuting  
Accident

29 Sep 15

Defence Safety Authority

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**PART 1.1 – COVERING NOTE**

**1 RIFLES PARACHUTING ACCIDENT**

02 Feb 17

DG DSA

**SERVICE INQUIRY INVESTIGATION INTO THE DEATH OF LCPL ALI JOHN WOODFORD ON 29 SEP 15**

1. The Service Inquiry Panel assembled at MOD Main Building, on the 12 Oct 15 by order of the DG DSA for the purpose of investigating the death in-Service of LCpl Ali Woodford on 29 Sep 15 and to make recommendations in order to prevent recurrence. The Panel has concluded its inquiries and submits the provisional report for the Convening Authority's consideration.

[REDACTED]  
Lt Col  
President  
1 Rifles Parachuting SI

**MEMBERS**

[REDACTED]  
Lt Cdr  
Member  
1 Rifles Parachuting SI

[REDACTED]  
FS  
Member  
1 Rifles Parachuting SI

2. The following inquiry papers are enclosed:

Part 1 (The Report)  
Part 1.1 Covering Note  
Part 1.2 Convening Orders & TORs  
Part 1.3 Narrative of Events  
Part 1.4 Findings  
Part 1.5 Recommendations  
Part 1.6 Convening Authority Comments

Part 2 (The Record of Proceedings)  
Part 2.1 Diary of Events  
Part 2.2 List of Witnesses  
Part 2.3 Witnesses Statements  
Part 2.4 List of Attendees  
Part 2.5 List of Exhibits  
Part 2.6 Exhibits  
Part 2.7 List of Annexes

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Part 2.8 Annexes  
Part 2.9 Schedule of Matters Not Germane to the Inquiry  
Part 2.10 Master Schedule

1.1 - 2

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## Service Inquiry Convening Order

12 Oct 15

SI President

Hd Defence AIB

SI Members

DSA Legad

Copy to:

PS/PUS  
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MA/VCDS  
NA/CNS  
MA/CGS  
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MA/GOC RTD  
MA/GOC 1(UK) DIV  
CO 1 RIFLES  
DSA DLSR TL

### **DSA DG/SI/04/15 – CONVENING ORDER FOR THE SERVICE INQUIRY INTO A PARACHUTING ACCIDENT AT BAD LIPPSPRINGE ON 29 SEPTEMBER 2015, RESULTING IN THE DEATH OF A SOLDIER FROM 1 RIFLES.**

1. A Service Inquiry (SI) is to be held under Section 343 of Armed Forces Act 2006 and in accordance with JSP 832 – Guide to Service Inquiries (Issue 1.0 Oct 08).
2. The purpose of this SI is to investigate the circumstances surrounding the subject land occurrence and to make recommendations in order to prevent recurrence.
3. The SI Panel is to assemble at the Ministry of Defence Mon 12 Oct at 1030L.
4. The SI Panel comprises:  
  
President: [REDACTED] Lt Col [REDACTED]  
  
Members: [REDACTED] Lt Cdr [REDACTED]  
          [REDACTED] FS [REDACTED]
5. The legal advisor to the SI is Maj [REDACTED] (DSA Legad) and investigation support/assistance is to be provided by the Defence Accident Investigation Branch (Defence AIB).
6. The SI is to investigate and report on the facts relating to the matters specified in its Terms of Reference (TOR) and otherwise to comply with those TOR (at Annex). It is to record all evidence and express opinions as directed in the TOR.



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7. Attendance at the SI by advisors/observers is limited to the following:

**Head Defence AIB – Unrestricted Attendance.**

**Defence AIB investigators in their capacity as advisors to the SI Panel – Unrestricted Attendance<sup>2</sup>.**

**Mrs [REDACTED], RAFCAM HF Psychologist – Unrestricted Attendance**

8. The Panel will work initially from the Defence Accident Investigation Branch facilities at MOD Boscombe Down. Permanent working accommodation, equipment and assistance suitable for the nature and duration of the SI will be requested by the SI President in due course.

9. Reasonable costs will be borne by DG DSA under UIN D0658A.

*Original Signed*

R F Garwood  
AM  
DG DSA – Convening Authority

Annex:

A. Terms of Reference for the SI into a parachuting accident at Bad Lippspringe on 29 Sep 15 resulting in the death of a soldier from 1 Rifles.

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<sup>2</sup> On a case by case basis as authorised by Hd Defence AIB.

**TERMS OF REFERENCE FOR THE SI INTO A PARACHUTING ACCIDENT AT BAD LIPPSRINGE ON 29 SEPTEMBER 2015, RESULTING IN THE DEATH OF A SOLDIER FROM 1 RIFLES.**

1. As the nominated Inquiry Panel for the subject SI, you are to:
  - a. Investigate and, if possible, determine the cause of the occurrence, together with any contributory, aggravating and other factors and observations.
  - b. Ascertain whether the personnel involved were acting in the course of their duties.
  - c. Examine what policies, orders and instructions were applicable and whether they were complied with.
  - d. Review the levels of authority and supervision covering the task during which the incident occurred.
  - e. Establish the level of training, relevant competencies, qualifications and currency of the individuals involved in the activity.
  - f. Identify if the levels of planning and preparation were commensurate with the activities' objectives.
  - g. Investigate and comment on relevant fatigue implications of individuals' activities prior to the matter under investigation.
  - h. Determine the state of serviceability of any relevant equipment.
  - i. Determine any relevant equipment deficiencies.
  - j. Assess any Health and Safety at Work and Environmental Protection implications in line with JSP 375.
  - k. Confirm that post incident management procedures were adequate and complied with.
  - l. Determine and comment on any broader organizational and/or resource factors including the Duty Holding construct for AT and Sport parachuting in the military.
  - m. Determine if the Regulation and guidance for AT activity was followed.
  - n. Report and make appropriate recommendations to DG DSA.
  
2. During the course of your investigations, should you identify a potential conflict of interest between the CA and the Inquiry, you are to pause work and take advice from your DSA Legal Advisor, Hd Defence AIB and DG DSA. Following that advice it may be necessary to reconvene reporting directly to MOD PUS.



**OFFICIAL-SENSITIVE****PART 1.2 - GLOSSARY**

<b>Acronym/ Abbreviation</b>	<b>Explanation</b>
A/C	Aircraft
AAD	Automatic Activation Device
AFF	Accelerated Free Fall
AFF BI	BI Accelerated Freefall Basic Instructor
AFFI	Accelerated Freefall Instructor
AGAI	Army General Administration Instructions
Agl	Above ground level
ALARP	As Low As Reasonably Practicable
Alti	Mechanical device used for measuring altitude
AMSL	Above Mean Sea Level
APA	Army Parachute Association
AT	Adventurous Training
ATC	Air Traffic Control
ATG(A)	Adventurous Training Group (Army)
BFG	British Forces Germany
BPA	British Parachute Association
CAA	Civil Aviation Authority
CCSPC	Cyprus Combined Services Parachute Club
CI	Chief Instructor
CJSATC	Cyprus Joint Services Adventurous Training Centre
Closure Loop	Piece of line to close the main or reserve container
CO	Commanding Officer
CoC	Chain of Command
Container	Parachute harness
COO	Chief Operating Officer
Crosswind	Flying a canopy across the wind line
CSBI	Category System Basic Instructor
CSI	Category System Instructor
Cutaway	Jettison of main canopy, usually after a malfunction
CYPRES	Cybernetic Parachute Release System
DAIB	Defence Air Investigation Branch
DH	Duty Holding
DIN	Defence Instruction Notice
Downwind	Flying a canopy in the same direction as the wind
DSA	Defence Safety Authority
DZ	Drop Zone, landing area for parachutists
EASA	European Air Safety Agency
Exit	Leave the aircraft
FAA	Federal Aviation Authority
FDTC(W)	Force Development Training Centre (Weston)
Freebag	Bag the reserve canopy is packed into
Glide Ratio	Ratio of forward movement to descent rate under canopy
JDs	Job Descriptions
JSAT	Joint Service Adventurous Training
JSP	Joint Service Publication
JSPC(L)	Joint Service Parachute Centre (Lippspringe)
SPC(N)	Joint Service Parachute Centre (Netheravon)
JSPW(N)	Joint Service Parachute Wing (Netheravon)
Jumpmaster	Experienced parachutist responsible for jumpers in the aircraft
LAIT	Land Accident and Investigation Team



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<b>Acronym/ Abbreviation</b>	<b>Explanation</b>
Lift	Group of people on board the aircraft
Main	Primary Parachute
Manifest	List of jumpers on board the aircraft
MARD	Mains Activated Reserve Deployment
MET	Meteorological Forecast
MSL	Mean Sea Level
NCO	Non Commissioned Officer
NGB	National Governing Body
OC	Officer Commanding
Opening Point	The point which a canopy should open to be set up to land in the target area
PES	Parachute Expedition Supervisor
PES	Parachute Engineering Squadron
PIA	Parachute Industry Association
PJI	Parachute Jumping Instructor
PLA	Parachute Landing Area
PLF	Parachute Landing Fall
PTO	Parachute Training Organisation
RA	Risk Assessment
RAFCAM	Royal Air Force Centre for Aviation Medicine
RAPA	Rhine Army Parachute Association
Reserve	Back up parachute
Rfn	Rifleman
Rigger	Person qualified to construct, modify and repair parachutes and related equipment
RMO	Regimental Medical Officer
RSL	Reserve Static Line
RtL	Risk to Life
Run-in	Final line the aircraft takes to reach the exit point
SI	Senior Instructor
SI	Service Inquiry
SIB	Special Investigation Branch
Slider	Device to slow the opening down of the parachute
SME	Subject Matter Expert
SSW	Safe System of Work
Static-line	Line attached to the aircraft which deploys the main parachute as the jumper exits
STC	Safety and Training Committee
Toggles	Steering loops on the risers
TORs	Terms of Reference
UATO	Unit Adventurous Training Officer
UK AFSB	UK Armed Forces Sports Board
USPA	United States Parachute Association
WDI	Wind Drift Indicator

PART 1.3 – NARRATIVE OF EVENTS

All times local (GMT plus 1 hour).

Synopsis

1.3.1 EXERCISE DRAGON BUGLE FALL (EX DBF) was a Joint Service Adventurous Training (AT) Parachute Expedition planned to be conducted between 27 Sep and 12 Oct 15 at Skydive Bad Lippspringe, Germany. This site was run by the Rhine Army Parachute Association (RAPA) under the auspices of the Joint Services Publication 660 (JSP 660). The location of the accident will be referred to as 'RAPA' throughout this report. All members of EX DBF were from 1st Battalion The RIFLES (1 RIFLES) and will be referred to as 'students'. Other members of 1 RIFLES will be referred to by their role title. All personnel employed at RAPA will be identified as 'staff' or by their role. Fig 1.3.1 is a map depicting the location of RAPA, Bad Lippspringe, Germany and 1 RIFLES, Chepstow, UK.

Exhibit 1

Exhibit 2



Fig 1.3.1 – Location of RAPA.

1.3.2 At approximately 1705 hrs on Tue 29 Sep 15 whilst conducting a parachute descent, Lance Corporal (LCpl) Ali Woodford and Student A became entangled at a height below 1000 feet (ft). LCpl Woodford and Student A carried out main canopy cut away and reserve canopy deployment procedures. Student A's reserve canopy opened shortly before he landed; he did not receive any reported injuries. However, LCpl Woodford's reserve canopy did not fully open before he impacted the ground. The first two staff responders at the scene found LCpl Woodford in a prone position and non-responsive. Subsequently, LCpl Woodford was pronounced dead at the scene at 1750 hrs.

Exhibit 3  
Exhibit 23  
Exhibit 24  
Exhibit 25  
Witness 5  
Witness 8  
Witness 7  
Exhibit 4

Personalities

1.3.3 **LCpl Woodford.** LCpl Woodford joined the Army in 2011. He was a member of 1 RIFLES based at Beachley Barracks, Chepstow and worked in the Motor Transport Platoon and had served in Afghanistan as a heavy machine gun operator. He had never previously parachuted.

1.3.4 **Chief Instructor (CI).** The CI was an Ex-British Army Senior Non-Commissioned Officer (SNCO) who had been employed at RAPA on a contract since Feb 15. On leaving the Army he had worked at a parachute site in the UK as the Deputy CI before taking up the post at RAPA. He was a qualified British Parachute Association (BPA) Advanced Instructor (AI), Instructor Examiner,

Witness 1



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Tandem Instructor and Accelerated Freefall Instructor. He had completed over 5000 parachute descents. The CI had the overall responsibility, as a qualified and competent person, to deliver the parachute operation at RAPA.

1.3.5 **Senior Instructor (SI).** The SI was a serving Warrant Officer Class 2<sup>1</sup> (WO2) and had been at RAPA since Apr 15. He had been parachuting since 2007 and completed over 1560 parachute descents. As a qualified BPA Category System Instructor (CSI), Tandem Instructor and Accelerated Freefall Instructor, he was responsible for instructing students and the day to day management of the military staff. He was also the nominated Parachute Expedition Supervisor (PES) for EX DBF. Witness 3  
Exhibit 8

1.3.6 **Staff C.** Staff C was a serving Junior Non Commissioned Officer (JNCO) and a member of the assistant staff at RAPA for 3 months. He was working towards gaining his BPA Instructor rating and had completed approximately 330 parachute descents. He had been parachuting since 2013. Witness 7

1.3.7 **Staff D.** Staff D was a member of the assistant staff at RAPA since Feb 15 and working towards gaining his BPA Instructor rating. He had completed 216 parachute descents. Witness 8

1.3.8 **Chairman.** The RAPA Chairman was a serving Lieutenant Colonel in the Army. The Chairman was responsible for the implementation of policy at RAPA. He was a qualified BPA Tandem Instructor. Witness 4

1.3.9 **Student A.** Student A was a Rifleman (Private soldier) from 1 RIFLES and a volunteer for EX DBF. He joined the Army in 2011. He had never previously parachuted. Exhibit 1  
Witness 2

1.3.10 **Student B.** Student B was a JNCO and joined 1 RIFLES in Feb 13. He was the Expedition Leader (EL) for EX DBF and had previously completed 2 static line parachute descents in Oct 14 at Netheravon. Exhibit 1  
Witness 5

1.3.11 **Commanding Officer (CO).** The CO was a Lieutenant Colonel in the Army in command of 1 RIFLES. Exhibit 1

**Background**

1.3.12 EX DBF was organised by members of 1 RIFLES. The aim was for participants to achieve the BPA 'A' licence by conducting a basic freefall parachute training course. There were 14 participants on EX DBF comprising of one officer and 13 soldiers. Student B (as EL) was responsible for initiating and progressing the Joint Services Adventurous Training Form (Alpha) (JSATFA) which was the application for clearance to conduct EX DBF as an Adventurous Training (AT) expedition. Oversight of this process was conducted by the Unit Adventurous Training Officer (UATO) who had assumed the duties of UATO in Aug 15. Technical Approval for EX DBF was provided at two levels; by the Officer Commanding (OC) of the Joint Services Parachute Centre (Netheravon) (JSPC(N)) and the officer appointed to clear AT expeditions in HQ Support Command (HQ Sp Witness 29  
Exhibit 1  
Exhibit 5  
Exhibit 6  
Exhibit 1  
Exhibit 1  
Exhibit 8  
Exhibit 7

<sup>1</sup> This denotes a Senior Non-Commissioned Officer who has been promoted to the rank of Warrant Officer.

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Comd). The DDH for EX DBF was the CO of 1 RIFLES. The Officer in Charge (OIC) of EX DBF personnel whilst at RAPA was Student C.

Exhibit 9  
Witness 17

1.3.13 RAPA (Bad Lippspringe) had previously been a Joint Service Adventurous Training (JSAT) Centre<sup>2</sup> site but was disestablished in 2012 under the authority of Implementation Order PR11 – S11LL052B. This saw the removal of all established (and funded) military personnel positions. Since then it had been a military sports association. RAPA is a parachute Drop Zone (DZ) used by Type 3 Expeditions<sup>3</sup>, Unit Authorised AT (UAAT), JSAT courses, RAF Force Development (FD) courses and also provides parachuting to off-duty military personnel, dependants and civilians.

Exhibit 10  
Exhibit 2  
Exhibit 10

**Pre-accident Events – Travel to RAPA**

1.3.14 EX DBF personnel left Beachley Barracks, Chepstow at approximately 0600 hrs on Sun 27 Sep 15 in a minibus and transit van. EX DBF arrived at Normandy Barracks, Sennelager, Germany at approximately 2100 hrs and took over their accommodation where they remained for the rest of the evening.

Witness 2  
Witness 5

**Pre-accident Events – Training (Day 1)**

1.3.15 On Mon 28 Sep 15 after morning routine, including breakfast at 0700 hrs, the students arrived at RAPA at 0800 hrs. Once on site the students were met and briefed by the CI and SI. The students then completed the administration and documentation process required to gain authorisation to parachute. The students were then given a site orientation brief. Fig 1.3.2 is a map of the RAPA DZ which identifies the Parachute Landing Area (PLA) within the bounds of the blue lines. Fig 1.3.3 shows the layout of the RAPA Parachute Centre.

Witness 5  
Exhibit 13  
Witness 3



**Fig 1.3.2 – RAPA Drop Zone.**

<sup>2</sup> JSAT Centre – A facility capable of delivering Type 3 Adventurous Training expeditions.

<sup>3</sup> AGAI Vol 1 Ch 11 defines Type 3 Expeditions as Adventurous Training activity conducted voluntarily in or out of theatre.





Fig 1.3.3 – RAPA Parachute Centre.

1.3.16 On completion of the orientation brief EX DBF students were issued with a parachute system, ancillaries and Personal Protection Equipment (PPE). An example of the parachute system packed in its container with its associated harness is depicted in Fig 1.3.4.

Exhibit 14  
Exhibit 15



Fig 1.3.4 – An example of a parachute system.



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1.3.17 EX DBF students then undertook theoretical and practical ground-based training. Table 1.3.5 details the ground based training syllabus, together with the RAPA staff/instructors who delivered and supervised the training and the parachute documentation that students were required to complete. The majority of the ground based training was completed by approximately 1700 hrs. The students departed for Normandy Barracks shortly afterwards. The routine that evening included a meal at approximately 1800 hrs followed by a brief on the next day's training.

Witness 5

Witness 5

Lesson	Lesson Subject	Instructor	Supervisor	Documentation
1	RAPA Brief and Introduction	CI and SI		a. BPA Form 104 – Application for Temporary Membership. b. BPA Form 114-A – Solo Student declaration of fitness. c. RAPA Student indemnity. d. JSP 950 Part 1 Lft 2-12: Fitness assessment.
2	Documentation	Staff L and G		
3	Orientation	Centre Manager	SI	
4	Introduction to equipment (after landing procedures)	Centre Manager	CI	
5	After Landing Procedures	CI		
6	Stability and Exits	Staff C and D	CI and SI	
7	Aircraft Drills and Emergencies	Staff C and D	CI and SI	
8	Parachute Landings	Staff C and D	CI and SI	
9	Canopy Control and Flight	SI		
10	Abnormal Landings	SI		
11	Malfunction Theory	Staff C	CI	
12	Canopy Control Suspended Harness Drills	SI		
13	Malfunctions Practical including Suspended Harness Drills	SI		
14	Written Confirmation Test	SI		

**Table 1.3.1 – Ground Based Training Syllabus**

**Pre-accident Events – Training (Day 2)**

1.3.18 On Tue 29 Sep 15 the students had breakfast at 0700 hrs and arrived at RAPA at 0800 hrs. EX DBF students received a revision period on the previous day's training. They were taken through the remaining training elements by the SI completing canopy control and malfunction drills in the suspended harnesses<sup>4</sup>.

Witness 5

Witness 3

1.3.19 The final phase of ground based training saw the students undertake a written examination to confirm their understanding of the parachute syllabus. Nine students answered a number of questions incorrectly. The SI went through the examination paper with all students at the same time discussing specific errors with individuals where they had occurred. EX DBF students then signed the written paper confirming that they had understood corrective instruction and had also received the requisite amount of training in order for them to parachute.

Witness 3  
Exhibit 16a  
Exhibit 16b

Exhibit 16a  
Exhibit 16b  
Witness 3

<sup>4</sup> A suspended harness is a parachute rig attached to overhead fixings in which a student receives practical parachute training; located under cover in hangars and other training facilities.

**Pre-accident Events – First Parachute Descents (Day 2)**

<p>1.3.20 On completion of the written confirmation of training, preparations were made for the first descents. These preparations included:</p>	
<p>a. The fitting of the parachute and ancillary equipment.</p>	<p>Exhibit 17</p>
<p>b. Being annotated onto the manifest.</p>	<p>Exhibit 17</p>
<p>c. Receiving a flight line check from the SI as the Parachute Expedition Supervisor (PES), including packing book check.</p>	<p>Exhibit 17</p>
<p>d. Forming a despatch order.</p>	<p>Witness 5</p>
<p>e. Receiving a brief on the parachute exit position, parachute holding area, parachute landing pattern and wind conditions.</p>	<p>Witness 1 Witness 3</p>
<p>f. A radio check by the CI with all students to confirm they could hear him for the purposes of Student Talk Down (STD)<sup>5</sup>.</p>	<p>Witness 1</p>
<p>1.3.21 All parachute jumps were conducted out of a leased Dornier Do 28, G92 aircraft registration D-IMOC. EX DBF were split into two groups and assigned to an aircraft lift order. The first aircraft lift occurred at approximately 1130 hrs. The manifest showed 8 students and 2 staff on board the aircraft and detailed the roles of the RAPA staff.</p>	<p>Witness 14 Witness 1 Witness 14 Exhibit 17</p>
<p>1.3.22 The CI performed the duties of the DZ Controller from the control tower speaking to the pilot at various stages of the parachute operation. The aircraft climbed to a height of approximately 2000ft above ground level (agl) whereupon a Wind Drift Indicator (WDI) was released to confirm the wind direction and to establish from where the student parachutists would exit the aircraft for their descents. The aircraft then climbed to approximately 3500ft agl and received clearance from the CI to initiate the first pass.</p>	<p>Exhibit 18 Witness 1 Witness 1 Witness 3  Witness 3</p>
<p>1.3.23 The SI despatched two students from the aircraft during each pass with four passes in total. Staff C performed the duties of STD, again from the control tower, supervised by the CI. After the first 2 or 3 students had exited the aircraft the CI took control of the STD duty from Staff C. Once the parachutists from the first aircraft lift had completed their descents and returned to the hangar, the CI ordered the aircraft to be shut down. The CI then briefed all 14 students about canopy control and STD instructions.</p>	<p>Witness 3 Witness 7  Witness 7  Witness 1</p>
<p>1.3.24 The second aircraft lift was authorised to proceed by the CI after the brief. He continued to perform the duties of DZ Controller and STD from the control tower. The second parachute lift consisted of 6 students and 2 staff members. It was conducted without incident and was completed at approximately 1230 hrs. EX DBF students had lunch and then repacked their parachutes in the training hangar. LCpl Woodford and Student A were supervised and checked by RAPA Staff H and J when they repacked their main parachutes. EX DBF students</p>	<p>Exhibit 17 Witness 1 Witness 2 Witness 10 Witness 11 Exhibit 19</p>

<sup>5</sup> BPA Operations Manual states STD is delivered by one-way radio to students undertaking their first 3 parachute descents.



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were also debriefed by the SI on their exit from the aircraft which was recorded on the head camera (headcam) of the despatcher. Exhibit 22  
Witness 3

### Meteorological Conditions

1.3.25 The meteorological (MET) conditions prior to the third lift were: Exhibit 21

- a. Wind direction 050 degree, strength 10 knots.
- b. Visibility approximately 27 km.
- c. Cloud cover was 2/8<sup>6</sup>.

### Accident Events – Chronology

1.3.26 Prior to the third lift all pre-descent procedures were carried out by the CI and SI, which again included exit positions, holding area, landing pattern, wind direction, equipment check and radio check. The CI positioned himself in the control tower in order to perform DZ Control and STD duties. Exhibit 17  
Witness 1

1.3.27 At 1658 hrs the third aircraft lift of the day commenced. The aircraft took off and climbed to approximately 3800ft agl. On the initial pass at 1701 hrs, three parachutists exited the aircraft. The first out was Staff D under a yellow canopy followed 12s later by Student M under a red canopy. Student M was followed 15s later by Student J, also under a red canopy. Staff D and Students M and J completed incident free descents. Witness 14  
Witness 2  
Exhibit 22

1.3.28 The second pass, approximately 3 mins later, saw two students exit the aircraft. The first out was Student A at approximately 1704 hrs at a height of 3800ft agl. His canopy was blue and he observed twists in his lines from which he kicked out of successfully. LCpl Woodford exited the aircraft 15s after Student A and was under a red canopy. Both students moved to the holding area and performed a number of turns during their descents. On leaving the holding area to initiate their parachute landing pattern, they commenced their downwind legs at approximately the same height. Student A started his downwind leg towards the golf courses and LCpl Woodford's downwind leg was towards the control tower. These respective downwind legs put them on a converging flight path. Witness 14  
Exhibit 22  
Exhibit 22  
Witness 1  
Witness 2  
Exhibit 22

1.3.29 Approximately 14s after initiating their downwind legs LCpl Woodford and Student A collided and became entangled at a height of 780ft agl. Fig 1.3.5 provides a depiction of the collision course taken by Student A and LCpl Woodford. They were entangled in the air for approximately 8s. LCpl Woodford carried out his main parachute cut away and reserve canopy deployment drills at a height of 460ft agl. LCpl Woodford was seen to be falling backwards as he cut away his main parachute. LCpl Woodford's reserve canopy started to deploy but did not fully open before he impacted the ground 359m (1180ft) from the control tower. Exhibit 22  
Exhibit 24  
Exhibit 25  
Exhibit 23  
Witness 12

<sup>6</sup> Cloud cover is measured in Okta. The measurement denotes how many eighths of the sky is covered in cloud and ranges from 0 Okta, indicating a completely clear sky, through to 8 Okta, indicating a completely overcast sky.



Fig 1.3.5 – Collision Course.

1.3.30 Student A cut away his main canopy and pulled his reserve handle at a height of 279ft agl approximately 14s after the collision. Student A's reserve canopy fully deployed just before he landed 200m (656ft) from the control tower. Fig 1.3.6 details the approximate landing positions of LCpl Woodford and Student A.

Witness 2

Exhibit 27



Fig 1.3.6 – Landing Positions.

**Post Accident Management – Immediate Actions**

1.3.31 The CI stopped all further parachuting and ordered the pilot to land the aircraft. Students K and L, who had exited the aircraft at 1707 hrs, landed without incident at approximately 1712 hrs. The pilot landed the aircraft with the 2 remaining students and the 2 RAPA staff on board at 1713 hrs.

Witness 3  
Witness 14  
Exhibit 22  
Witness 24  
Witness 25  
Witness 14



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1.3.32 At approximately 1715 hrs, the CI called Range Control to request the attendance of the emergency services. The emergency services were called at 1717 hrs by Range Control. Exhibit 28

1.3.33 Staff C, who was waiting on the flight line for the fourth lift became aware of the accident. He immediately removed his parachute equipment and made his way to the control tower where the safety vehicle was located. He, along with Staff D, who had only just landed, were instructed by the CI to assess the accident. Witness 7  
Witness 8  
Witness 1

1.3.34 Staff C and D drove onto the PLA finding Student A lying on the ground. Student A told them he was uninjured. He was told to stay where he was whilst Staff C and D went to check LCpl Woodford. The vehicle stopped about 30m short of LCpl Woodford's position. Staff D made his way towards LCpl Woodford giving a verbal challenge but did not receive a response. He found LCpl Woodford lying face down with obvious injuries. Staff D checked for a pulse at LCpl Woodford's neck and wrist and found none to be present. On this evidence he decided not to administer first aid. Staff C drove the vehicle back to the RAPA parachute centre picking up Student A on the way. Staff D informed the CI of the situation. Staff C and D were then instructed by the CI to return to LCpl Woodford in order to commence incident procedures. At the scene Staff D covered LCpl Woodford with his reserve canopy but they found the incident response camera was not working and so returned to the parachute centre to obtain a replacement camera. When they returned to the scene at approximately 1722 hrs the first emergency vehicle arrived. Further emergency services arrived from 1735 hrs. Witness 8  
Witness 8  
Witness 8  
Witness 8  
Witness 8  
Witness 8  
Exhibit 28

1.3.35 LCpl Woodford was formally pronounced dead at the scene at 1750 hrs. The German police arrived at 1800 hrs. The Royal Military Police (RMP) arrived at 1810 hrs and the Royal Military Police Special Investigation Branch (SIB) arrived at 1820 hrs. LCpl Woodford was formally identified at the scene by Student C. Exhibit 4  
Exhibit 28  
Exhibit 29

1.3.36 The CI instructed all EX DBF personnel and RAPA staff return equipment to the training hanger and to write statements. The German police and the SIB interviewed all personnel that evening with the exception of Student A. Witness 1

1.3.37 Student A was taken to hospital as a precaution where he was later interviewed. Student A was medically screened and kept in for observation until his release on Fri 2 Oct 15. Witness 2

1.3.38 LCpl Woodford's harness and parachute equipment were removed from his body by WO2 SIB under the direction of the CI and the SI. LCpl Woodford was transferred to the mortuary at the Gutersloh Klinikum on the evening of 29 Sep 15. Exhibit 30

**Post Accident Management – Follow Up Actions**

1.3.39 The Defence Accident Investigation Branch (Defence AIB) was alerted to the accident by OC 74 Section SIB, Sennelager at 1815 hrs 29 Sep 15. Four personnel deployed as a Triage Team on Wed 30 Sep 15. The BPA sent their Chief Operating Officer (COO) and the CI of the Army Parachute Association (APA) who together formed the National Governing Body (NGB) BPA Board of Inquiry (BOI). The parachute equipment used by LCpl Woodford and Student A was examined at 74 Section SIB for damage and function by members of the BPA BOI, the Triage Team and the SIB. This equipment was then secured at 74 Section. Exhibit 3  
Exhibit 31



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1.3.40	On completion of activity at 74 Section SIB the Triage Team, the BOI and the SIB moved to the RAPA parachute centre on Wed 30 Sep 15. Briefings and interviews were conducted at the scene of the accident.	Exhibit 3
1.3.41	EX DBF members were hosted by 5 RIFLES in Paderborn on Wed 30 Sep and Thu 1 Oct 15 where they were offered and subsequently received Trauma Risk Management (TRiM) <sup>7</sup> .	Witness 5 Witness 21 Witness 24
1.3.42	The CO of and the RSM of 1 RIFLES arrived in Germany on the evening of Wed 30 Sep 15 and met the members of EX DBF at Normandy Barracks.	Witness 28 Witness 30
1.3.43	EX DBF activity was discontinued after the accident. 1 RIFLES personnel left Normandy Barracks on Fri 2 Oct 15 and drove back to Beachley Barracks, Chepstow. Student A was released from hospital and flew back to the UK accompanied by the RSM of 1 RIFLES on Sat 3 Oct 15.	Witness 2 Witness 30
1.3.44	A Post Mortem (PM) was conducted on LCpl Woodford on Thu 1 Oct 15 and his body was repatriated on Mon 5 Oct 15.	Exhibit 32
1.3.45	LCpl Woodford's funeral took place with full military honours on Thu 15 Oct 15 in Taunton.	Exhibit 33

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<sup>7</sup> TRiM is a peer delivered, evidence informed psychological support strategy.

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## Methodology

### Analysis Elements

1.4.1 The Panel investigated the following areas determined by the Terms of Reference issued by DG DSA:

- a. Analysis Section 1.
  - (1) Cause of death.
  - (2) Reserve parachute deployment.
  - (3) Reserve drill.
  - (4) Collision.
- b. Analysis Section 2.
  - (1) Organisational and Resource Factors.
  - (2) Safe System of Work.
    - (a) Safe Place.
    - (b) Safe Persons.
    - (c) Safe Equipment.
    - (d) Safe Practice.

### Factor Categories

1.4.2 The analysis identifies and addresses the following categories:

- a. **Causal Factors.** Those factors which, in isolation or in combination with other factors and contextual details, led directly to the accident.
- b. **Contributory Factor.** A factor which made the accident more likely.
- c. **Aggravating Factor.** A factor that did not cause the accident but made the final outcome worse.
- d. **Other Factor.** A factor which was none of the above, but was noteworthy in that it may cause, contribute to or aggravate future accidents.
- e. **Observation.** An issue that was not relevant to the accident but worthy of consideration to promote better working practices.

1.4.3 These factors are discussed as they arise throughout this section of the report and are summarised at 1.4.277.



## Available Evidence

- 1.4.4 The Panel accessed the following sources of evidence:
- a. Defence AIB Triage Team statements conducted with students and staff.
  - b. Formal witness interviews.
  - c. Photographs from various sources.
  - d. Video footage from the Despatcher Head camera (headcam).
  - e. RAPA Charter, Constitution, Standing Operating Procedures and Terms of Reference (ToR).
  - f. Automatic Activation Device (AAD).
  - g. Parachute equipment.
  - h. Reports:
    - (1) 1710 Naval Air Squadron (Material Integrity Group) (NAS (MIG)) report.
    - (2) Human Factors report provided by Royal Air Force Centre for Aviation Medicine (RAF CAM).
    - (3) RAF CAM Landing Attitude report.
    - (4) QinetiQ report - AAD analysis.
    - (5) RAF CAM Main and Reserve Parachute Inspection report.
    - (6) Defence AIB technical report.
  - i. The British Parachute Association Operations Manual (BPA Ops Manual).
  - j. Parachute safety related material, including previous accident reports.
  - k. Rigging Innovations (container Original Equipment Manufacturer (OEM)) testing data.
  - l. Policy Documentation including:
    - (1) Joint Service Publication 419 - Adventurous Training.
    - (2) Joint Service Publication 660 - Sport.
    - (3) Army General Administration Instruction Volume 1 Chapter 5 - Sport.
    - (4) Army General Administration Instruction Volume 1 Chapter 11 - Adventurous Training.
    - (5) Joint Service Adventurous Training Form Alpha (JSATFA).

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(6) Technical Approval (TA) for Parachuting.

(7) Defence Instruction Notices (DIN).

1.4.5 Interviews conducted with personnel of interest to the Service Inquiry commenced on 20 Oct 15, two weeks after the accident. Issues considered by the Panel given this fact include:

- a. The memories of those interviewed may have faded over that period.
- b. There had been collective discussions after the accident that could have contaminated personal memories and interpretations of events.

### Organisations and Agencies

1.4.6 The Panel was assisted by personnel from the following organisations and agencies:

- a. Defence AIB.
- b. RAF CAM.
- c. 74 Sect Royal Military Police (RMP).
- d. 1710 NAS MIG.
- e. QinetiQ, MOD Boscombe Down.
- f. Joint Service Parachute Wing (Netheravon) (JSPW(N)).
- g. No22 (Trg) Gp, RAF.
- h. British Parachute Association (BPA).
- i. Rigging Innovations.
- j. Airtec GmbH.
- k. Cyprus Joint Service Adventurous Training Centre (CJSATC).
- l. Rhine Army Parachute Association (RAPA).
- m. Adventure Training Group (Army) (ATG(A)).
- n. Army Parachute Association (APA).
- o. Army Inspectorate (AI).
- p. Chief Environmental and Safety Officer (Army) (CESO (A)).
- q. Combined Services Sports Board (CSSB).
- r. Army Sports Control Board (ASCB).
- s. British Army (Germany) Sports Board (BA(G)SB).

## OFFICIAL SENSITIVE

- t. Force Development Training Centre (Weston) (FDTC (W)).
- u. Defence Internal Auditors (DIA).
- v. Defence Infrastructure Organisation Germany (DIO).
- w. Defence Land Safety Regulator (DLSR).

### Introduction

1.4.7 On 29 Sep 15 LCpl Woodford and Student A were conducting the second static line<sup>1</sup> parachute jump of a basic freefall parachute course at the Rhine Army Parachute Association (RAPA) Parachute Centre, Bad Lippspringe, Sennelager, Germany. They exited the aircraft 15s apart; Student A went first under a blue canopy. LCpl Woodford was under a red canopy. The initial part of the descent was uneventful. LCpl Woodford and Student A collided in mid-air shortly after starting their respective landing patterns. This resulted in their canopies becoming entangled. LCpl Woodford carried out his reserve drill but his reserve parachute did not fully open before he impacted the ground. LCpl Woodford sustained significant trauma as a result of his impact with the ground and was subsequently pronounced dead at the scene. Student A carried out the reserve drill after LCpl Woodford. Student A's reserve parachute fully deployed shortly before he landed and he did not sustain any injury.

1.4.8 The Defence Accident Investigation Branch (Defence AIB) was alerted to the accident by OC 74 Sect Special Investigation Branch (SIB), Sennelager at 1815 hrs on 29 Sep 15 and deployed a Defence AIB team of 4 personnel. The aim of the Defence AIB Triage investigation was to secure vulnerable evidence, ascertain the facts of the accident and provide the Director General (DG) Defence Safety Authority (DSA) with sufficient detail to determine the appropriate level of further investigation.

1.4.9 Subsequently, a Service Inquiry (SI) was convened by the DG DSA on 12 Oct 15.

### Analysis Process

1.4.10 The Panel has divided the analysis into two sections:

- a. **Section 1:** Examined why the outcome of the accident (which was the collision) was dramatically different for LCpl Woodford and Student A. The Panel has analysed why LCpl Woodford's reserve parachute did not fully deploy despite being activated at a greater height than Student A's; the Panel examined why LCpl Woodford and Student A conducted the reserve drill and why they collided in mid-air. All Causal, Contributing and Aggravating Factors are identified in this section along with some Observations.
- b. **Section 2:** This section discussed parachuting in the Armed Forces and the broader organisational and resource factors identified at RAPA by applying the Safe System of Work to categorise each element. Section 2 also discussed post-accident procedures. All Other Factors and most Observations are identified in this section.

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<sup>1</sup> Static line describes the method of deploying the main parachute as the student exits the aircraft – BPA Ops manual.

### Analysis Section 1

1.4.11 The Panel defined the 'accident' as the collision between LCpl Woodford and Student A. This section focuses analysis on the following:

- a. Cause of Death.
- b. Reserve Parachute Deployment.
- c. Reserve Drill.
- d. Collision.

#### Cause of Death

1.4.12 LCpl Woodford did not have a fully deployed reserve parachute when he impacted the ground at an estimated speed of 48m/s (107mph). LCpl Woodford died as a result of the multiple injuries he sustained on impact. The QinetiQ report indicated that the speed at which LCpl Woodford was travelling surpassed that where survivability was expected.

Exhibit 24  
Exhibit 32  
Exhibit 23

#### Reserve Parachute Deployment

1.4.13 LCpl Woodford impacted the ground because his reserve parachute did not fully deploy in time to arrest his rate of descent. A number of factors have been considered by the Panel in order to understand why this occurred:

Witness 5,  
18 and 19  
Witness 1  
and 7

- a. Reserve Drill Conducted at Low Height<sup>2</sup>.
- b. Body Position.
- c. Reserve Pilot Chute Spring.
- d. Bridle Line Snag.
- e. Parachutist's Wake.
- f. Pull Off Tension.
- g. Rigging Line.
- h. Canopy and Container Compatibility.
- i. Packing Process.

1.4.14 **Reserve Drill Conducted at Low Height.** To deploy a reserve parachute the parachutist locates 2 handles (see Fig 1.4.1); the cut away pad (to release the main parachute) and the reserve handle (to remove the pin securing the reserve container to release the reserve parachute). The drill was detailed in RAPA lesson 9 and taught during

Exhibit 26

<sup>2</sup> Low height is not defined in BPA parachuting literature. For the purposes of this report low height is defined as 1000feet (ft) above ground level (agl), or less. This report uses height agl in ft and not altitude, which describes above mean sea level (amsl).



ground based training. The parachutist removes the cutaway pad from its stowed position and pulls it downwards which pulls the cables and releases the three ringed mechanism holding the main parachute to the harness. This cuts away the main parachute.

Exhibit 35



Fig 1.4.1 – Cut Away Pad and Reserve Handle Locations.

1.4.15 As the main parachute is released (cut away) from the harness a Reserve Static Line (RSL) is automatically activated. The RSL is connected to the main parachute at one end and to the reserve deployment cable at the other end. Once the RSL is activated it pulls the reserve cable to open the reserve container. After the reserve container is opened the spring loaded pilot chute is ejected to initiate the deployment of the reserve parachute. As the parachutist descends, the pilot chute inflates to pull the free-bag, in which the reserve is stowed, from the container. This releases the reserve parachute for deployment. This normally happens before the parachutist has opportunity to operate the reserve parachute handle (the second phase of the reserve drill). However, parachutists are taught to always pull the reserve handle despite the operation of the RSL. Aside from speeding up the deployment of the reserve parachute, the RSL offers protection in the event a parachutist cuts-away but is unable to operate the reserve deployment handle.

Exhibit 35

1.4.16 When deploying the main parachute, if a malfunction or self-entanglement is detected, the reserve drill should be conducted as high as possible. As the first descents on EX BDF were static line descents the main parachute was deployed as the student exited the aircraft. Students on the third lift of the day were despatched at 3800ft above ground level (agl). A report by QinetiQ described that a static line main parachute deployment required on average 500ft height loss before the parachute was fully deployed. If the reserve drill was required because of a malfunction after exit from the aircraft on the third lift it would most likely have been conducted at a height of approximately 3200ft agl. RAPA Lesson 9 stated that to conduct the reserve drill at low altitude<sup>3</sup> was dangerous.

Exhibit 26

Exhibit 6

Exhibit 60

Exhibit 26

1.4.17 Parachute Industry Association (PIA) standards require a reserve parachute to open after 3s or 300ft agl. Data obtained from a QinetiQ report showed height loss for full

Exhibit 36

<sup>3</sup> A 'low altitude' figure was not defined in the RAPA documentation.



inflation of a reserve canopy can vary from as little as 273ft agl to as much as 659ft agl with associated times of between 4.8s to 8.2s. Therefore, if a malfunction occurred during the third lift of EX DBF, given the parameters described above, the parachutist should have been under a reserve parachute by approximately 2500ft agl after conducting the reserve drill. These procedures are the standard BPA training scenarios incorporated into the ground based training for static line basic freefall parachute courses at RAPA.

Exhibit 54

Exhibit 26

1.4.18 The reserve parachutes of LCpl Woodford and Student A were inspected at RAF CAM. Both canopies had no damage to the top skin, bottom skins, or ribs and all stitching was intact. In the Panel's opinion the reserve parachutes and their component parts were serviceable<sup>4</sup>.

Exhibit 19

1.4.19 Student A conducted the reserve drill because he believed that it was his own parachute wrapped around him and that he was not flying under an inflated parachute. Student A carried out the reserve drill at a height of 85m/280ft agl and his reserve parachute fully deployed at a height of approximately 9m/30ft agl. When Student A conducted his reserve drill he was at a height where it was marginal as to whether or not his reserve parachute would operate. However, Student A's parachute fully deployed exceeding the PIA expected standards. In the Panel's opinion he was incredibly fortunate to be uninjured after landing given the low height at which he conducted his reserve drill.

Witness 2

Exhibit 25

Witness 7

Witness 8

1.4.20 LCpl Woodford undertook his reserve drill at a height of approximately 140m/460ft agl. His parachute did not fully deploy. The Automatic Activation Device<sup>5</sup> (AAD) readings indicated that after LCpl Woodford cut away he fell for a period of approximately 4s before impacting the ground. Both the cut away pad and reserve handle had been operated which indicated that the entire reserve drill had been conducted by LCpl Woodford.

Exhibit 24

Exhibit 40

Witness 1

1.4.21 In summary, LCpl Woodford's reserve parachute had no reported faults. His reserve parachute only partially deployed even though in theory, because he was at a height of 140m/460ft agl and above the PIA standards of 300ft agl or 3s, there was enough height and time for it to fully deploy. However, there have been parameters described by QinetiQ that indicate that the time and height loss might vary before a reserve parachute fully deployed. Indeed, Student A's reserve parachute had fully deployed in time even though he was at a lower height than LCpl Woodford when he conducted his reserve drill. The Panel assessed that conducting the reserve drill at low height put LCpl Woodford in a perilous situation. The Panel concluded that LCpl Woodford was at a low height when he conducted his reserve drill and this was an **aggravating factor**.

1.4.22 **Body Position.** A parachutist will descend under a parachute in an upright hanging position as depicted in Fig 1.4.2. An entanglement can change a parachutists' body position in relation to the ground from an upright position because of rotation forces as depicted in Fig 1.4.3.

Exhibit 23

<sup>4</sup> Serviceable means there were no structural faults found in the reserve parachutes or the containers.

<sup>5</sup> CYPRES AAD tolerance is approximately 1 - 2m. Ref: CYPRES email dated 03/06/2016 Evidence 273: Exhibit 52.



Fig 1.4.2 – Normal Upright Position.



Fig 1.4.3 – Example of Body Position Change Due to Entanglement.

1.4.23 LCpl Woodford and Student A were at a height of 238m/780ft agl when they collided. They were entangled for approximately 8s. During this time the AAD data depicts fluctuations in air pressure immediately prior to the point at which the reserve drill was completed by LCpl Woodford. The Panel was provided with evidence that these fluctuations were likely due to erratic changes in body position as a result of the entanglement. Witnesses stated that LCpl Woodford was falling backwards when he conducted the reserve drill.

Exhibit 24  
and 25  
Exhibit 23  
Witness 18  
and 19  
Exhibit 24

1.4.24 According to the PIA standards, when LCpl Woodford conducted his reserve drill, he was at sufficient height for the reserve parachute to fully deploy. However, the Panel noted that if LCpl Woodford was falling backwards when he conducted the reserve drill, deployment of the reserve parachute could be delayed because in theory the spring loaded pilot chute would have ejected towards the ground (Fig 1.4.4). The Panel assessed that LCpl Woodford would have had to fall below his pilot chute before it could inflate to initiate the deployment of the reserve parachute.

Exhibit 37



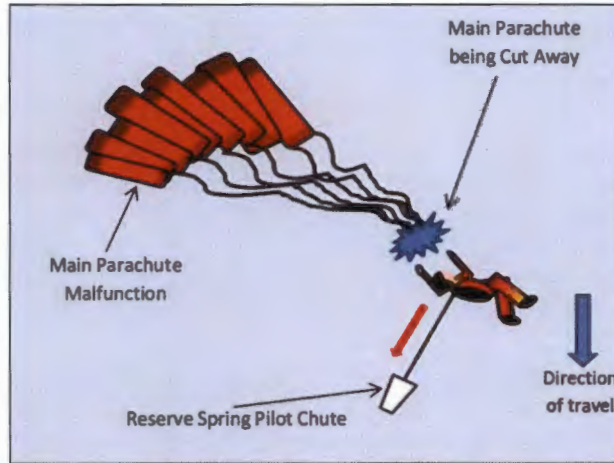


Fig 1.4.4 – Spring Loaded Pilot Chute Ejection Direction.

1.4.25 The Panel concluded that it is more likely than not that LCpl Woodford's body position caused a delay in the full deployment of the reserve parachute and his rate of descent could not be arrested within the height available. LCpl Woodford's body position was an aggravating factor.

1.4.26 **Reserve Pilot Chute Spring.** The reserve parachute system contains a spring loaded pilot chute, as depicted in Fig 1.4.5, which is compressed in the reserve parachute container and held closed with the reserve pin (Fig 1.4.8). When the reserve handle is pulled to remove the pin, the container opens and the pilot chute spring rapidly expands and launches itself into the airstream. The reserve pilot chute acts as a drag device to withdraw the reserve canopy from the container for deployment. The Panel found that once the spring is fitted into the reserve system it is then inspected as part of the repack checks for the reserve parachute. The Panel found no evidence of a defined spring compression force standard for the system used in the accident.

Exhibit 41  
Exhibit 35

Exhibit 43  
and 44

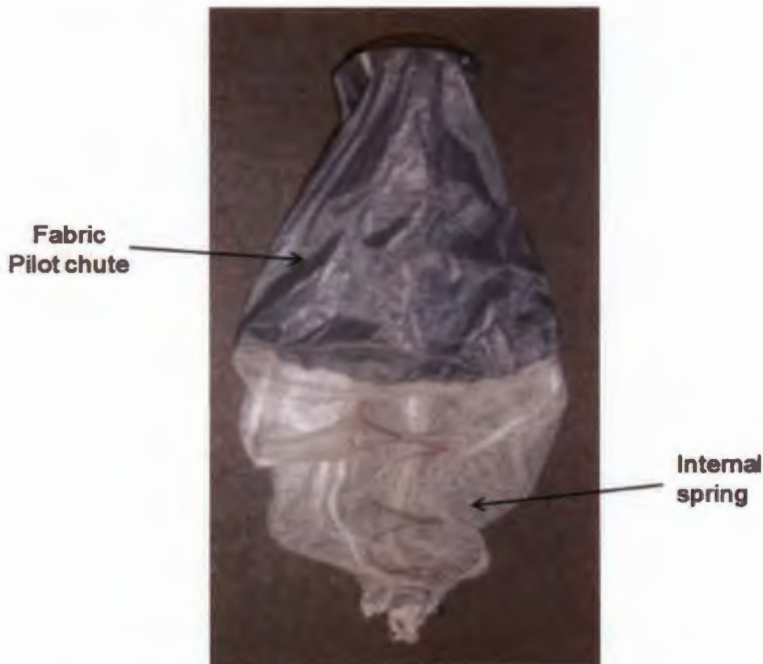


Fig 1.4.5 – Reserve pilot chute and spring.

1.4.27 Photographs taken immediately after the accident of LCpl Woodford's spring loaded pilot chute, bridle line and free bag by Staff C and D indicated that LCpl Woodford's pilot chute spring had initiated the deployment of his reserve parachute. RAF CAM examined LCpl Woodford's and Student A's pilot chute springs and found them to be intact and functional. Based on the evidence the Panel concluded that the reserve pilot chute spring was **not a factor**. However, the Panel **observed** that although there is evidence of spring tension/compression tests on other parachute systems there is no minimum spring compression force stated either in published documentation from Rigging Innovations or the spring manufacturer for the system used in the accident. In contrast, military parachute systems have standards applied to each equipment item and tests are conducted periodically once fitted.

Exhibit 40  
Exhibit 19

Exhibit 152  
Exhibit 42

1.4.28 **Bridle Line Snag.** A bridle line connects the reserve pilot chute and spring to the free bag. A bridle line can become snagged on the parachutist or the parachute system when the reserve drill is carried out. Fig 1.4.6, which was a photograph taken at the scene immediately after the accident, indicates that the bridle line of LCpl Woodford's reserve parachute system was in a position commensurate with a normal parachute deployment. There was no evidence of a bridle line snag provided by witnesses. LCpl Woodford and Student A's bridle lines and reserve deployment bags were inspected by RAF CAM and were found to be serviceable. The bridle line assemblies and deployment bags were found to be of the correct size and labelled appropriately for the containers made by Rigging Innovations and did not reveal any areas of concern as to their ability to function correctly. The Panel concluded a bridle line snag was **not a factor**.

Exhibit 145

Exhibit 19



Fig 1.4.6 – LCpl Woodfords Reserve Pilot Chute Spring, Free Bag and Bridle Line.

1.4.29 **Parachutist's Airflow.** The airflow around a parachutist could cause a delay in the deployment of the reserve parachute by trapping the reserve pilot chute in the turbulent air immediately behind the body of the parachutist. This is more likely to be experienced when a parachutist is in freefall with a flat, stable and face to earth body position. Fig 1.4.7 shows a pilot chute trapped in turbulent air behind a free falling parachutist; the loose bridle line is also evident. LCpl Woodford had been despatched using the static line method to deploy the main parachute and the reserve was fitted with a spring loaded pilot chute. This apparatus is specifically designed to overcome airflow turbulence by breaking through the airflow when deployed. Given also that LCpl Woodford was probably not in a flat, stable and face to earth body position, the Panel concluded that the parachutist's airflow was **not a factor**.

Exhibit 145





Fig 1.4.7 – Pilot Chute Delay.

1.4.30 **Pull Off Tension.** The reserve parachute and spring extractor are held in place in the container by the pin of the reserve cable inserted through the reserve closure loop line (see Fig 1.4.8). A Pull-off tension test applied to the handle of the reserve cable is the last phase of the packing process. The reserve handle pull off tension tolerances for this container system were not to exceed 22 lbs.

Exhibit 42

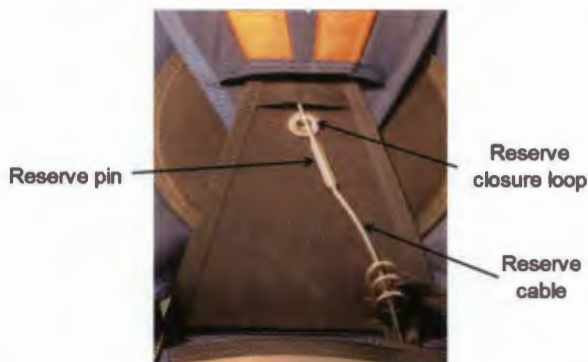


Fig 1.4.8 – Reserve Closure Loop and Pin Fitted into the Container.

1.4.31 The length of the reserve closure loop line for this system was not defined in the manufacturer’s documentation. A closure loop is measured from the base of the washer to the top of the loop. Fig 1.4.9 shows an example of a reserve closure loop set to 53 mm but they can be set to different lengths according to a number of factors discussed at para 1.4.32.

Exhibit 42



Fig 1.4.9 – Closure Loop Length Measurement.

1.4.32 The Panel found that LCpl Woodford’s reserve closure loop length was 154 mm and Student A’s was 127 mm. The reserve closure loop length is determined by canopy volume, environmental influences at the time of packing, such as temperature and humidity, the AAD cutter installation and the packing technique of the rigger. The containers and reserve parachutes utilised by both students were the same size and packed by the same rigger. The reserve parachutes were Performance Designs, PD PR

Exhibit 19

Exhibit 42  
Exhibit 43,  
44

253 (253 square feet of material). The amount of material (volume) contained in parachutes of the same size can vary by as much as 20%. The reserve parachutes were measured and found to be comparable in size; the volume of the material was not established. Testing was carried out by the Original Equipment Manufacturer (OEM) on a range of closure loop lengths. These tests demonstrated that there can be a significant difference in the length of the loop without affecting the reserve spring loaded pilot chute deployment. Irrespective of the closure loop length the pull off tension must be within the tolerances stated of 10 – 22 lbs. LCpl Woodford and Student A's parachute systems had the same pull off tension of 18 lbs annotated in their respective record of inspection sheets. Fig 1.4.10 shows an example of measuring the reserve handle pull off tension.

Exhibit 19

Exhibit 35

Exhibit 42

Exhibit 46

Exhibit 43

Exhibit 44



Fig 1.4.10 – Measuring the Reserve Handle Pull Off Tension.

1.4.33 Both LCpl Woodford and Student A pulled the cut away pad and reserve handles and their reserve parachutes were extracted. The Panel therefore concluded that the reserve closure loop of LCpl Woodford, whilst different in length to that of Student A, was **not a factor**. The Panel found that the pull off tensions recorded for both parachutes to be the same and within the specified tolerances. The Panel concluded that pull off tension was **not a factor**.

1.4.34 **Rigging Line.** Rigging lines can snag on the mouth lock stows (Fig 1.4.11) of the reserve deployment bag when the parachute is in the process of deploying. This could cause a delay in the deployment of the parachute. During the accident sequence, both reserve parachutes were extracted; one fully deployed and the other was in the process of deploying. The reserve rigging lines were not damaged. The Panel could find no evidence to suggest that the rigging lines had snagged and therefore concluded they were **not a factor**.

Exhibit 55

Exhibit 19



Fig 1.4.11 – Mouth Lock of the Reserve Deployment Bag.



1.4.35 **Canopy and Container Compatibility.** Parachute containers are produced in a range of sizes that are designed to accommodate parachutes up to a specific pack volume, referred to as canopy and container compatibility. The reserve container and reserve parachute used by LCpl Woodford in this accident were compatible according to the manufacturer's guidelines. LCpl Woodford's reserve parachute had been re-packed on 5 Aug 15 with no issues being noted. The Panel concluded that the reserve canopy and container compatibility **was not a factor**.

Exhibit 42  
Exhibit 43

1.4.36 **Reserve Steering Toggle.** The Panel reviewed photographic evidence of LCpl Woodford's equipment taken at the accident site as part of the post-accident procedures and subsequently during the equipment inspection by the SIB, BPA and Defence AIB. The Panel identified from the post-accident photographs that LCpl Woodford's right hand reserve steering toggle was not set at half brake<sup>6</sup>. Fig 1.4.12 depicts a steering toggle set correctly at half brake according to the manufacturers' guidelines.

Exhibit 3  
Exhibit 40



Fig 1.4.12 – Steering Toggle Set at Half Brake.

1.4.37 The locking loop/finger trap was not in place nor was the finger stowed into its keeper shown in Fig 1.4.13. After further investigation the Panel were unable to determine whether this anomaly had occurred when the reserve parachute was packed, on impact with the ground, or during the recovery process after the accident.

Exhibit 40



Fig 1.4.13 – LCpl Woodfords right hand Steering Toggle.

1.4.38 The Panel was advised by a Subject Matter Expert (SME) from the BPA that the steering toggle not being stowed correctly would not have impeded the deployment of LCpl Woodford's reserve parachute. The Panel concluded that the reserve steering toggle

Exhibit 47  
Exhibit 20  
Exhibit 34

<sup>6</sup> Half brake refers to the positions the steering toggles are set for both main and reserve parachutes. This setting restricts the opening forces on the deployment of the parachute and is standard practice.

anomaly was **not a factor**.

1.4.39 **Packing Process.** The Panel considered the potential of a packing error contributing to the reserve parachute not fully deploying. The Rigger at RAPA was a Suitably Qualified and Experienced Person (SQEP) having carried out 765 reserve repacks as of 5 Aug 15. The Rigger had carried out routine maintenance on both LCpl Woodford's and Student A's reserve parachutes on the following dates:

Exhibit 48  
Exhibit 72

a. LCpl Woodford: Parachute Rig No 14 – PR 253 - Ser No 51090, 5 Aug 15.

Exhibit 43

b. Student A: Parachute Rig No 73 – PR 253 - Ser No 47623, 14 Jul 15.

Exhibit 44

1.4.40 The Panel found a minor omission in the 'Record of Inspection' documentation for LCpl Woodford's reserve parachute system. The 4 tick boxes numbered 11 – 14 were annotated by 3 ticks. Subsequent inspection and analysis of the physical evidence by the BPA and at RAF CAM did not identify any issues with the functionality of the reserve system. The Record of Inspection had been signed by the Rigger on completion of the inspection process. The Panel reviewed the Record of Inspection for Student A's parachute and found it correctly completed. The Panel **observed** that a reserve 6 monthly check is conducted by the Rigger without 1<sup>st</sup> Party Assurance measures applied to the re-packing of the respective parachute. This represents a potential single point of failure as there is no independent check to minimise the risk that mistakes may go undetected. Military parachuting has a stage check system audited by another qualified person in order to assure the re-packing of a reserve parachute.

Exhibit 43  
Exhibit 49  
Exhibit 19  
Exhibit 44

Exhibit 144

1.4.41 The Record of Inspection had been signed appropriately by the Rigger. The reserve parachute was inspected by RAF CAM and no issues were identified to affect the deployment of the reserve parachute. The Panel concluded that the packing process was **not a factor**.

1.4.42 In light of the documentation oversight coupled with not being able to identify the cause of LCpl Woodford's reserve steering toggle not being set correctly in the half brake position, the Panel recommended to DG DSA that all reserve parachutes held at RAPA be inspected prior to the recommencement of parachuting activities. This recommendation had been enacted by RAPA and confirmed with DG DSA.

Exhibit 96  
Exhibit 150

1.4.43 **Recommendations:**

a. **The Chief Operating Officer of the BPA should consider the introduction of 1<sup>st</sup> Party Assurance on the re-packing element of the 6 monthly reserve parachute check.**

b. **Armed Forces Sports Board should introduce 1<sup>st</sup> Party Assurance on re-packing reserve parachutes during the 6 monthly checks for all Sport Parachute activities.**

#### Reserve Drill

1.4.44 The Panel presented evidence at paras 1.4.19 and 1.4.20 that LCpl Woodford and Student A carried out the reserve drill at 140m/460ft and 85m/280ft agl respectively. The Panel investigated the decision made by LCpl Woodford and Student A to conduct the reserve drill and the following elements were considered:

Exhibit 24,  
25

a. Student Talk Down (STD) Radio Instructions.



- b. Collision Training.
- c. Malfunction Training.
- d. Self-Entanglements.
- e. Entanglement with another Parachutist.
- f. Cut Away Height.

1.4.45 **Student Talk Down (STD) Radio Instructions.** Radio communicated STD instructions are a back-up system to aid students during their initial parachute descents. Parachutists are required to control their descents in accordance with the training they have received but may also be given instructions/guidance over the radio. The BPA Ops Manual requires the first 3 parachute descents to be accompanied by STD. Student parachutists conducting their first 5 descents at RAPA are provided STD. The first 2 student parachute descents are to be supervised by the STD from a position towards the centre of the PLA. The CI delivered STD located in the Control Tower via a radio set to one way receive. Students wore the radio on the side of their helmet (an example is at Fig 1.4.1 where the radio is fixed to the left side of the helmet).

Exhibit 6  
Exhibit 18  
Exhibit 19  
Exhibit 26  
Exhibit 22

1.4.46 The Panel found evidence that the CI provided STD instructions to LCpl Woodford and Student A whilst they were entangled. Students B, D and G were on the flight line at the base of the control tower, waiting to go up on the next lift; all were wearing their parachute systems including their helmet with the radio turned on. Staff C and Staff K were also on the flight line but were not wearing a radio. Of these personnel Staff C and K heard the CI say 'oh shit' which drew their attention to the entanglement. Staff D and Student J, who were nearing the control tower after walking from the Parachute Landing Area (PLA) on completion of their parachute landings, also heard 'shit' but did not hear anything else. A number of students heard the CI over the radio say words to the effect of steer away, kick away, cut away, and turn away. The CI said that when LCpl Woodford and Student A collided he exclaimed 'oh shit' and did not provide any other instructions. Student K did not hear anything over the radio as he exited the aircraft whilst LCpl Woodford and Student A were entangled. Students L and C, who were on the aircraft, did not hear anything over the radio.

Witness 5,  
18 and 21  
Witness 7,  
12, 8, 23, 5,  
18, 19, 21,  
and 26

Witness 1  
Witness 2  
Witness 24  
Witness 25  
Witness 17

1.4.47 The radio operators guidance states that the command 'cut away' can be given as a last resort if it is clear it reduces the risk of injury to the student parachutist or others.

Exhibit 50  
Exhibit 51

1.4.48 LCpl Woodford was entangled with Student A for approximately 8s before conducting the reserve drill. Student A was under a parachute for an estimated further 6s before he too carried out the reserve drill. Student A did not remember hearing anything whilst entangled apart from the words 'oh shit'. Student A wasn't sure it was said by the CI or LCpl Woodford. Student A carried out the reserve drill because a parachute was wrapped around his face and body which he thought was his own and not because he was instructed to do so.

Exhibit 24  
and 25  
Exhibit 23

Witness 2

1.4.49 The Panel was of the opinion that the words steer away, oh shit, cut away, and/or kick away were said by the CI. However, the Panel was unable to determine if these radio instructions had any influence on the decision to conduct the reserve drill by LCpl Woodford. Student A did not recall hearing instructions to cut away but did so because he thought his parachute was wrapped around him. The Panel was of the opinion that whilst entangled neither LCpl Woodford nor Student A would have mentally or physically attended to anything else other than the fact they were entangled. The Panel did not find evidence to substantiate this opinion. On the balance of probability the Panel concluded



that STD radio instructions were **not a factor**.

1.4.50 **Collision Training.** The current BPA Basic Freefall Parachute syllabus does not include any requirement for Parachute Training Organisations (PTO) to deliver training on actions to be carried out if a collision with another parachutist occurs. RAPA delivers the BPA syllabus. At the time of the accident RAPA did not include any specific collision training in their training syllabus/lesson plans. RAPA delivered control measures in the training syllabus to minimise the likelihood of a collision occurring. There was opinion amongst instructors that to include training on what to do if a collision and entanglement occurred with another parachutist would increase the potential to confuse the students by overburdening them with information.

Exhibit 6

Exhibit 26

Witness 34  
and 35

1.4.51 The Panel found that at the Force Development Training Centre Weston-on-the Green (FDTC (W)) (a RAF unit), collision training was included in static line parachute courses. The British Military parachute training syllabus includes collision training. BPA courses for more experienced parachutists also include collision training.

Exhibit 56

Exhibit 57

Exhibit 58

1.4.52 The risk of canopy collisions was identified in the BPA risk assessments (RA) used at RAPA dated Mar 13 but detailed the avoidance of collision and not what to do in the event of a collision. Amended RAs, dated Mar 15, did not include the risk of collisions between students undertaking static line basic freefall courses. The risk of collision was removed prior to the current CI starting work at RAPA. The risk of collision was included in the RAPA RA 17 for freefall parachuting for qualified parachutists. RAPA RA 17 did not address the potential for collisions between student parachutists and is discussed later in the report. A collision at low altitude between student parachutists was judged to be very unlikely based on a 30 year period of incident recording.

Exhibit 1

Exhibit 59

Witness 1

Exhibit 59

Exhibit 138

1.4.53 The Panel found that there was no training included in the BPA basic freefall parachute syllabus on what to do if a collision and entanglement with another parachutist occurred. RAPA delivered the BPA syllabus, which focuses on control measures by which to avoid collisions. Additionally there was the belief that students might be overloaded by including collision training in the syllabus. In the Panel's opinion this should be measured against the likelihood of a collision occurring in the first place, which the evidence indicated to be extremely low. On weighing these findings the Panel concluded that LCpl Woodford and Student A did not have any training or experience to help them deal with an entanglement after collision with another parachutist. The only recourse left open to them was to either remain entangled until they landed or carry out the reserve drill. A lack of specific RA on collision and entanglement between student parachutists was **an other factor**. The lack of specific training on procedures to be conducted when entangled was **an aggravating factor**.

1.4.54 **Recommendation:**

- a. **The Chief Operating Officer of the BPA should review and revise the BPA Basic Freefall course syllabus to include training on actions to be conducted in the event of a collision and/or entanglement with another parachutist.**
- b. **The President of RAPA should address the risk of student canopy collisions in its RA and establish appropriate measures to mitigate this risk to ALARP.**

1.4.55 **Malfunction Training.** The Basic Freefall Parachute syllabus at RAPA contains theoretical and practical training elements aimed at dealing with malfunctions. On exit from the aircraft the parachutist conducts a safety count<sup>7</sup>, check canopy<sup>8</sup> and parachute checks<sup>9</sup>. If discovering a malfunction the immediate action is to carry out the reserve drill. These drills were taught in lessons 9<sup>10</sup> and 11.

Exhibit 26

Exhibit 26

1.4.56 **Self-entanglement Training.** A self-entanglement could occur on exit from the aircraft when despatched by the static line method. In order to address this possibility the syllabus included immediate action drills and the reserve drill. These drills were taught in lessons 9<sup>11</sup> and 11.

Exhibit 26

1.4.57 **Entanglement with another Parachutist.** As a result of an entanglement with another parachutist, apart from a change in the body position described in para 1.4.22, there may also be a collapse of one or both main parachute canopies. There will also be an increase in the parachutists' rate of descent. The Panel has already highlighted that what to do when entanglement with another parachutist occurs was not taught during the RAPA basic freefall syllabus.

Exhibit 23

1.4.58 The Panel found that LCpl Woodford and Student A were descending at a rate of approximately 15ft/s before the collision. LCpl Woodford's parachute hit half way down the steering lines on the left side of Student A's canopy when they collided. The parachutes then became entangled and their rate of descent increased to approximately 40ft/s. If they had not cut-away this rate of descent, if maintained until impact with the ground, would have likely caused survivable but irreversible injuries.

Witness 1  
Witness 2

Exhibit 23

1.4.59 LCpl Woodford and Student A were inexperienced parachutists. The basic freefall parachute course was theory based followed by repeated practical drills. LCpl Woodford and Student A were entangled with an associated increased rate of descent. This would have placed LCpl Woodford and Student A in an unfamiliar situation for which they had not received any training. Students were taught the reserve drill as immediate actions on discovering a malfunction or as a result of self-entanglement. They had not been briefed on any alternative immediate action drill on collision and entanglement with another parachutist.

1.4.60 In summary the Panel identified that there was no specific training on actions to be taken if entangled with another parachutist. The Panel **observed** that when LCpl Woodford and Student A were entangled and whilst they could have remained in that state until they landed, their training conditioned them to conduct the reserve drill as an immediate action. This was as a result of a lack of collision/entanglement training already defined as an **aggravating factor** discussed in para 1.4.53.

1.4.61 **Cut Away Height (Reserve Drill).** Static-line students are despatched at or above 3500ft agl. Given the average height loss after exit from the aircraft to canopy deployment is approximately 500ft agl it is expected a parachutist will be under a fully deployed main parachute by 3000ft agl. If a malfunction or self-entanglement was identified, the reserve drill would be carried out at a height of around 3000ft agl. Given these circumstances a parachutist would have a fully deployed reserve parachute by approximately 2500ft to 2000ft agl.

Exhibit 60

Exhibit 6

<sup>7</sup> Safety Count – verbalisation of a count to four which equates to the time for the main parachute to deploy.

<sup>8</sup> Check canopy – is the parachute big, rectangular and can I land it.

<sup>9</sup> Parachute checks – turn the parachute 90 degrees left and right and conduct two practice parachute landings.

<sup>10</sup> The Reserve Drill is: look, locate, cut away reserve, arch.

<sup>11</sup> If control is not achieved by the parachutist the reserve drill should be conducted.



1.4.62 The lesson content at RAPA included information about conducting the reserve drill as high as possible and stated it was dangerous to do the drill at low altitude. Neither the 'high as possible' nor the 'dangerous at low altitude' heights were defined to members of EX DBF. In the Panel's opinion the lack of a defined and briefed minimum cut away height may have limited LCpl Woodford and Student A's ability to properly assess whether or not they were at an appropriate height at which to conduct the reserve drill. Nevertheless, they did carry out this drill as described in paras 1.4.19 and 1.4.20. The Panel concluded the lack of a defined minimum cut away height was **an aggravating factor**.

Exhibit 26

1.4.63 **Recommendations:**

- a. **The Chief Operating Officer of the BPA should define the minimum height below which conducting the reserve drill becomes dangerous during student parachute descents.**
- b. **AOC 22 (Trg) Gp RAF should consider implementing a defined minimum height below which conducting the reserve drill becomes dangerous for JSAT courses and expeditions.**

**Collision**

1.4.64 In this section the Panel has reviewed the available evidence in order to examine what caused LCpl Woodford and Student A to collide.

**Collision Sequence**

1.4.65 LCpl Woodford and Student A attained similar heights, with LCpl Woodford the last to perform a significant turn manoeuvre, which concluded approximately 12s before the collision. Both students initiated their Landing Pattern (LP) downwind legs on a convergent path. Fig 1.4.14 through to Fig 1.4.16 depict the respective flight paths of LCpl Woodford (circled red) and Student A (circled blue) with an elapsed time in seconds in the top right hand corner.

Exhibit 24,  
25  
Exhibit 23  
Exhibit 22



Exhibit 22

**Fig 1.4.14 – LCpl Woodford and Student A approximately 180m apart.**





Fig 1.4.15 – LCpl Woodford and Student A approximately 110m apart.

Exhibit 22



Fig 1.4.16 – LCpl Woodford and Student A approximately 20m apart.

Exhibit 22

1.4.66 The collision occurred at approximately 1705 hrs at an altitude of 238m/780ft agl between second 13 and 14 of the headcam footage.

Exhibit 24,  
25 and 22

1.4.67 The Panel has estimated that the forward speed related to the ground of both parachutists was approximately 37 mph<sup>12</sup> and they had a closing speed of approximately 29 mph<sup>13</sup>. The Panel was provided with evidence indicating that in striking each other the top right quarter of the red canopy, flown by LCpl Woodford, contacted the blue canopy,

<sup>12</sup> Parachute forward speed taken to be is 20 mph. Wind speed at 1000ft was 17 mph. Time taken from headcam footage. Distances estimated from headcam footage and Google Earth.

<sup>13</sup> Separation distance at 5s was 110m, 7s later separated by 20m. Distance/Time = 12.86m/s = 29 mph

flown by Student A, on the left side mid-way down the blue canopy's left steering lines. Fig 1.4.17 provides a pictorial representation of the relative direction of travel and angles of the main parachutes at the moment of collision. The 1710 NAS report described damage to the right quarter of the red canopy and that red residue, most likely from the red parachute, was on the rear left steering lines of the blue canopy.

Exhibit 19  
Exhibit 38

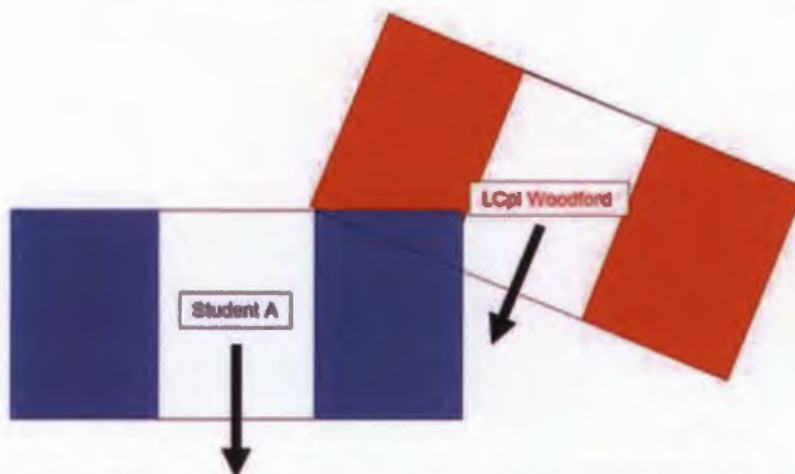


Fig 1.4.17 – Direction and Angles of the Main Parachutes at Collision.

#### Cause of the Collision

1.4.68 The Panel has reviewed the following factors and their relationship to the cause of the collision:

- a. Meteorological Conditions (MET).
- b. Position of the sun.
- c. Landing Pattern (LP).

1.4.69 **MET Conditions.** The conditions at the time of the accident were within the parameters set for student parachuting activities according to the BPA (surface wind speed 15 knots (kts) or less). The surface wind speed at RAPA was 10kts and there was clear visibility on the day of the accident. The Panel concluded that the general MET conditions were **not factors** in this accident.

Exhibit 6  
Exhibit 21  
Exhibit 22  
Witness 1

1.4.70 **Position of the Sun.** Given the general MET conditions on the day and the evidence of the headcam footage, the Panel identified that the sun was not obscured at the time of the accident. The position of the sun was in the west at 240 degrees. The time of day would have placed the sun at an elevation of 18 degrees. The sun would have been in the eye-lines of Student A and LCpl Woodford when looking ahead as their general flight paths were towards the west (see Fig 1.4.18). However, it would not have impeded their ability to see each other as they would have had to look left (Student A) or right (LCpl Woodford) to locate the other parachutist. All round observation conducted by LCpl Woodford and Student A should have enabled detection of one another. The sun had not affected Student A. The Panel was unable to determine if the sun had affected LCpl Woodford's vision but considered it unlikely. Accordingly, the Panel concluded that the position of the sun was probably **not a factor** in the accident.

Exhibit 21  
Exhibit 61

Witness 2





Fig 1.4.18 – Orientation of the Sun at the Time of the Accident.

Exhibit 22

1.4.71 **Landing Pattern (LP).** A LP is a defined directional procedure which all parachutists adhere to when landing their parachute. A LP will consist of a downwind leg from the holding area, a crosswind leg and an into wind leg to land. The direction of the LP at a given DZ is determined by the MET conditions at the time of the planned parachute lift.

1.4.72 The LP at RAPA was described as flight drill number 5 of the canopy control lesson (Lesson 7); EX DBF were taught this lesson. At RAPA the LP was always a left handed pattern. The LP used at RAPA at the time of the accident is at Fig 1.4.19. The downwind leg at RAPA was initiated from the holding area at a height of 1000ft, the crosswind leg at 500ft and the into wind leg at 250ft. Just prior to commencing the downwind leg the parachutists are instructed to check their altimeter and also check for other canopies that could interfere with the planned route; adjustments are made as necessary to maintain separation. This sequence of checks should continue until the parachutist has landed.

Exhibit 26  
Witness 1



Fig 1.4.19 – Landing Pattern used at RAPA.

Exhibit 26

1.4.73 When LCpl Woodford and Student A are first viewed on the headcam footage, (see Fig 1.4.14) their lateral separation was estimated to be 180m. By this time they had

Exhibit 22



started their respective downwind legs. During the period of 13s prior to collision, Student A was on a flight path towards the golf course commensurate with the MET and the brief given by the SI. At the same time, LCpl Woodford can be seen heading towards the control tower. Gradually, because of the convergent flight path they closed their lateral separation. The Panel has considered factors related to the convergent LP:

Exhibit 21  
Witness 1

- a. Detection of Parachutists.
- b. Conflicting LP.
- c. Supervision.
- d. Loss of Vertical Separation.
- e. Racing.
- f. Fatigue/Alcohol.
- g. Health Status.

1.4.74 **Detection of Parachutist.** The principle means by which parachutists maintain safe separation from each other and avoid collision is 'see and avoid'. The left hand column in Fig 1.4.20 outlines the stages of see and avoid, and the right hand column outlines key errors which may prevent that stage from being effective. Human Factors (HF) theories describe that each stage in the left hand column needs to occur successfully in order to reduce the potential for collision. The first element is 'search visual field and detect target'. Successful detection of a target then requires the parachutist to recognise the nature of the target and then assess the collision risk. A parachutist can then select avoiding action whereby the parachute controls are operated to change the flight path of the parachute in order to avoid a collision.

Exhibit 62

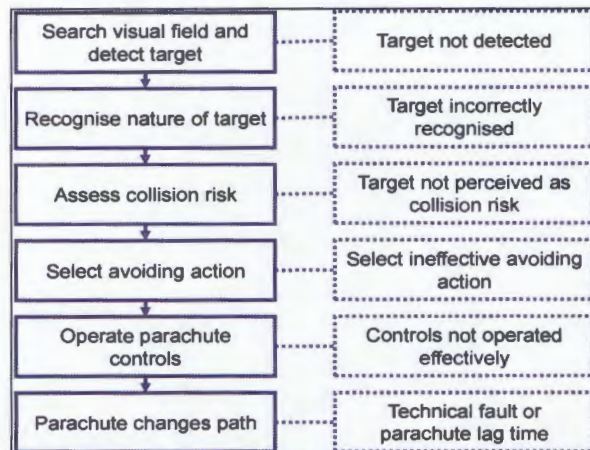


Fig 1.4.20 – Basic Model for See and Avoid in Parachuting.

1.4.75 The Panel found that Student A was aware of LCpl Woodford during the descent prior to the commencement of the landing pattern. Given that LCpl Woodford was despatched after Student A and they both moved to the defined holding area, the Panel was satisfied that LCpl Woodford and Student A were most likely aware of each other prior to the commencement of their respective downwind legs.

Witness 1  
Exhibit 22

1.4.76 During the downwind legs the ease of detection could have been reduced due to visual contrast, background complexity and glare<sup>14</sup>. In the Panel's opinion the colour of the respective parachutes and the orange jump suits contrasted with the surroundings so was probably not of importance in respect of visual contrast and background complexity. The Panel has already discussed the influence of the sun and its glare as probably **not a factor**.

Exhibit 62  
Exhibit 22

1.4.77 Student A was focused on his downwind leg and only saw LCpl Woodford in the last moments before they collided. He shouted 'Woody' as they became very close before he tried to turn away. There was no other evidence that they saw each other in the 12s before they collided or that they tried to take avoiding action. Student A may have experienced visual narrowing<sup>15</sup> and diffusion of responsibility<sup>16</sup> related to STD instructions, resulting in limited attention to peripheral areas of his visual field. The Panel is unable to report LCpl Woodford's experience. Therefore, focused attention may not have been directed towards the other parachutist and this may have reduced the likelihood of detection.

Witness 2  
Exhibit 22  
Exhibit 62

1.4.78 Of the potential limiting factors in the 'see and avoid' strategy used by LCpl Woodford and Student A (to maintain all round observation) during their parachute descents, only one can be corroborated by witness evidence. Student A described that once he had started his downwind leg he was focussed on his LP sequence. This may have caused a visual narrowing of attention during the downwind leg. Given the lack of evidence of any attempt at avoiding action, the Panel concluded that LCpl Woodford and Student A did not detect each other until the very last moments before they collided. This would have reduced the time in which to conduct the 'see and avoid' strategy. The Panel considered that visual narrowing, because of the requirement to focus on their respective LPs, on the balance of probability, inhibited LCpl Woodford's and Student A's detection of each other. The Panel concluded that they continued on a converging flight path because of a lack of visual detection and this was **the causal factor**.

1.4.79 **Conflicting LP.** Prior to embarking the aircraft the SI briefed students on the specific direction of the LP to be used. This was in accordance with the MET conditions at the time. The CI briefed the LP for that lift differently. Fig 1.4.21 illustrates the LPs briefed by the CI and SI and describes the wind direction at 3 separate heights in accordance with the MET. The CI acknowledged during interview that the SI instructed the LP with a downwind leg towards the golf courses. However, when the students were descending they were informed to head towards the control tower for their downwind leg. The CI gave these instructions because the wind had changed and was now in the direction of the control tower (Fig 1.4.22). Instructions were given to the first two student parachutists on the lift as they descended and to LCpl Woodford and Student A. The description of Student A going towards the control tower for his downwind leg was incorrect as the headcam footage shows he conducted his downwind leg towards the golf courses. A number of other students reported that the downwind leg was towards the golf courses.

Witness 3  
Exhibit 21  
Witness 1  
Witness 1  
Witness 1  
Witness 1  
Exhibit 22  
Exhibit 3  
Witness 2  
Witness 5,  
18, 21, 25  
and 26

<sup>14</sup> Visual contrast is light intensity between two areas. Background complexity is the visual contrast between the parachutist and the background. Glare is the result of strong or dazzling sunlight.

<sup>15</sup> Attention resources are limited and so if a parachutist's attention is targeted at one particular area this is likely to be at the expense of other areas. The concept of attention limitations is detailed in Harris, D. 2011.

<sup>16</sup> Diffusion of responsibility is the process by which individuals may fail to act in a situation requiring intervention as a result of the presence of other people. The perception is that this implies that the responsibility is shared which reduces the pressure on each separate individual to act (Stratton, P and Hayes, N. (1999)).





Fig 1.4.21 – Landing Patterns briefed by the CI and SI.

1.4.80 The Panel assessed that the SI briefed a LP commensurate with the MET. Student A was on a downwind leg as briefed by the SI. LCpl Woodford's downwind leg was orientated towards the control tower as instructed by the CI. This indicated that LCpl Woodford followed the instructions given by the CI to conduct a downwind leg towards the control tower although there is no other evidence to substantiate this possibility.

1.4.81 The instructions provided by the CI whilst the students descended conflicted with the brief given by the SI. LCpl Woodford and Student A assumed converging LPs which increased the potential of a collision. On the balance of evidence the Panel concluded that LCpl Woodford and Student A undertook converging downwind legs and that conflicting instructions regarding the LP may have influenced this convergence. In the Panel's opinion this was a **contributory factor**.

1.4.82 **Supervision – Position of DZ Controller/STD.** All parachutists are responsible for the conduct of their own parachute descent. However, student parachutists are supervised throughout their first 5 descents by an instructor assigned to deliver STD. STD has already been discussed para 1.4.45.

Exhibit 6  
Exhibit 18

1.4.83 The SOPs for DZ Controller required the duty to be conducted from the control tower at all times. The CI conducted the duties of DZ Controller and STD from the control tower (Fig 1.4.22) for the first 2 parachute descents by members of EX DBF. The CI felt his view from the control tower was better than if he was stood in the middle of the PLA when conducting STD duties.

Exhibit 18  
Witness 1

1.4.84 STD instructions are detailed in the Civil Aviation Authority (CAA) Parachutists Aeronautical Radio Station Operator Guide. At RAPA the duties of the STD are contained within the DZ<sup>17</sup> Controller RAPA SOP Order 1. The SOP states that during the first 2 descents by a student the STD was to be located close to the centre of the Parachute Landing Area (PLA). RAPA SOPs stated that both DZ Controller and STD could be undertaken by the same instructor after the first 2 parachute descents were completed by students. JSAT PTOs do not have the STD carried out by the same person undertaking DZ Controller duties for initial student parachute descents; these roles are separated and it is detailed in their respective SOPs that the STD is to be positioned in the middle of the

Exhibit 50  
Exhibit 6  
Exhibit 18

<sup>17</sup> A DZ is a notified portion of airspace within which parachute descents are made. The normal radius is 1.5 nautical miles (nm) and up to the altitude notified.



PLA.

1.4.85 In summary, the RAPA SOP required the STD to be positioned towards the centre of the PLA during the first 2 descents made by EX DBF students. The CI positioned himself in the control tower. In the SOPs of JSAT parachute sites the STD is required to be in the middle of the PLA and this was practiced at WOTG and JSPW(N). The Panel assessed that being positioned towards the centre of the PLA improved the STD's perspective of parachutists because they would likely to be on a flight path directly towards the position of the STD. The Panel concluded that STD delivered from the control tower to be **an other factor**.

Exhibit 73

1.4.86 **Supervision – Telemeters/Binoculars.** A PTO should be equipped with telemeters or suitable high powered mounted binoculars to assist with supervising/observing students although their use is not mandated. RAPA had a set of mounted binoculars in the Control Tower. During visits to JSAT parachute sites telemeters were used by the DZ Controller. The Panel was informed by the CI of RAPA that he did not use binoculars because he was long sighted. At RAPA students could be up to 1.5 nautical miles (nm) away from the control tower when despatched from the aircraft. The Panel **observed** that the CI did not use binoculars when conducting STD and DZ Controller duties.

Exhibit 6

Exhibit 73

Witness 1

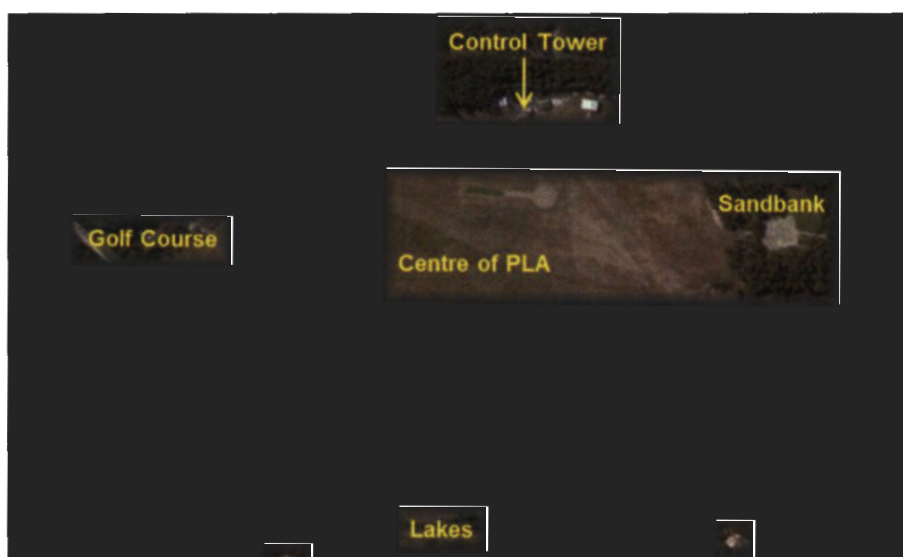


Fig 1.4.22 – Drop Zone Layout.

1.4.87 **Supervision – Division of Attention.** The third lift of the day occurred at 1658 hrs. The first pass was conducted at 1701 hrs, the second pass at 1704 hrs (LCpl Woodford and Student A) and the third pass at 1707 hrs. The CI watched the exits of Students K and L on the third pass. The headcam footage showed that as Student K sat in the doorway of the aircraft, LCpl Woodford and Student A were approximately 20m apart (Fig 1.4.23) at 12s elapsed time of the headcam footage.

Witness 14

Witness 1

Exhibit 22



Fig 1.4.23 – Student K Exiting the Aircraft - LCpl Woodford and Student A Circled.

1.4.88 LCpl Woodford and Student A collided as Student K exited the aircraft between second 13 and 14 of the headcam footage. The actual collision was not visible on the headcam footage as they were obscured by Student K. LCpl Woodford and Student A became visible again during second 14 by which time they were entangled.

1.4.89 The DZ Controller is required to watch the airspace for other airborne traffic and maintain open communications with the RAPA aircraft via a separate radio to that used for STD. STD required the student parachutist to be monitored after exit from the aircraft until the parachutist has landed in a safe area.

1.4.90 The HF report described that there may have been issues related to the CI's ability to deliver both STD and DZ Controller duties simultaneously. These included allocation of attention and diffusing responsibility of collision avoidance to the students. Attention issues might have arisen because of the differing responsibilities required of the DZ Controller and STD.

1.4.91 This may have been caused as a result of the requirement to watch the exits of parachutists from the aircraft whilst other parachutists were in the latter stages of their descents. The diffusion of responsibility issues were linked to the briefing that STD was purely a back-up mechanism to the student controlling their own descent. Therefore there may have been an expectation that students would have controlled their parachute descent and avoided collision.

1.4.92 During the downwind legs of LCpl Woodford and Student A the CI observed that Student A and LCpl Woodford were getting close to one another. He instructed them for the first time to 'steer away, steer away' from each other. Student A heard steer away but thought it was directed at LCpl Woodford. The CI instructed both students to steer away for a second time at which point he saw the blue canopy turn left towards the red canopy and continue for approximately 7s on a converging course until the collision. In that period he did not provide further instructions.

1.4.93 Students heard the words of command 'steer away, steer away' once by the CI prior to the collision. Witnesses did not hear any other instructions given by the CI before the collision. Some witnesses heard the exclamation of 'oh shit' from the CI, which drew their attention to LCpl Woodford's and Student A's entanglement.

1.4.94 The Panel found evidence that a left turn was not taken by the blue canopy flown by Student A which, according to the headcam footage illustrated at Fig 1.4.24, continued

Exhibit 22

Exhibit 22

Exhibit 18

Exhibit 62  
Exhibit 22

Exhibit 22  
Exhibit 62

Exhibit 22  
Witness 1

Witness 2

Witness 1

Witness 5  
Witness 21  
Witness 23  
Witness 7,  
8 and 12

Exhibit 24



on a straight flight path towards the golf courses. The red canopy can be seen to be heading towards the control tower with a slight deviation to the left at approximately second 5 of the headcam footage.

Exhibit 25  
Exhibit 22



Fig 1.4.24 – Converging Down Wind Legs.

1.4.95 The CI conducted both DZ Controller and STD duties but JSAT PTOs split these duties between 2 personnel. The Panel considered that because of the range of responsibilities required of the DZ Controller and STD (and the HF RAF CAM report's theory on the potential for distraction given the range of duties required of both roles) there may have been attention issues. The CI was most likely not able to focus on the simultaneous aircraft exit of Student K and the converging flight paths of LCpl Woodford and Student A even though he felt he was not distracted. The evidence provided by EX DBF students described limited instructions provided by the CI in the period of time prior to the collision.

Exhibit 62

Exhibit 22  
Witness 26  
Witness 5

1.4.96 Because of the HF report and the evidence of the STD interventions made during the descents the Panel assessed it was unlikely the CI was able to supervise the downwind legs of LCpl Woodford and Student A because of the requirement to deliver DZ Controller duties. Therefore, combining the duties of STD and DZ Controller was a **contributory factor**.

1.4.97 **Recommendations:**

- a. **The Chief Operating Officer of the BPA should mandate the separation of the DZ Controller and STD duties when despatching 2 student parachutists per pass.**
- b. **The AOC 22 (Trg) Gp, RAF should mandate the separation of the DZ Controller and STD duties when despatching 2 student parachutists per pass in JSAT parachuting.**
- c. **The President of RAPA should ensure the SOPs are separated and clarified for the DZ Controller and STD responsibilities including where these duties are delivered from at RAPA.**



<p>1.4.98 <b>Loss of Vertical Separation.</b> On the second pass of lift 3, Student A was despatched first, followed 15s later by LCpl Woodford. This, theoretically, would have created approximately 500m lateral and 75m vertical separation between LCpl Woodford and Student A.</p>	<p>Exhibit 22 Exhibit 148</p>
<p>1.4.99 During the descents of LCpl Woodford and Student A, the CI instructed them to complete 3 x 360 degree turns. The effect of 360 degree turns is to increase the rate of descent with corresponding height loss. The Panel was unable to find evidence as to when these instructions were given during the descents of LCpl Woodford and Student A. The vertical separation created by the 15s despatch interval was eliminated in the latter stages of the descent because LCpl Woodford conducted a turn which lasted 7s with an associated height loss of 75m/247ft. LCpl Woodford then levelled off and headed towards the control tower on his downwind leg. Meanwhile, Student A was already on his downwind leg towards the golf courses.</p>	<p>Witness 1 Witness 2  Exhibit 24  Exhibit 22</p>
<p>1.4.100 The last turn by LCpl Woodford put him at a slightly lower height than Student A at approximately 290m (950ft agl). Student A had been on his downwind leg for at least 2.5s according to his AAD when LCpl Woodford started his downwind leg. Their rate of descent in this early phase of their downwind legs were similar at 14ft/s and 16ft/s for LCpl Woodford and Student A respectively. They assumed a similar height at approximately 272m (900ft agl) and continued to descend maintaining similar height loss until they collided.</p>	<p>Exhibit 24 Exhibit 25 Exhibit 23</p>
<p>1.4.101 From the available evidence, LCpl Woodford completed the last discernable turn which removed the vertical separation between himself and Student A. This placed LCpl Woodford at approximately the same height as Student A. They then commenced their LP and maintained a similar rate of descent on a convergent flight path. The Panel concluded that the loss of vertical separation between LCpl Woodford and Student A <b>was a contributory factor</b>.</p>	<p>Exhibit 23</p>
<p>1.4.102 <b>Racing:</b> The Panel did not find any evidence to indicate that LCpl Woodford or Student A were racing or in any other way disregarding their training. The Panel concluded that racing was <b>not a factor</b>.</p>	
<p>1.4.103 <b>Fatigue/Alcohol:</b> The Panel reviewed the travel plan conducted by EX DBF and their routine once deployed to RAPA. Witnesses had received meals, alcohol had not been consumed and they had quiet nights on 27/28 Sep 15. The Post Mortem (PM) reported that there was no evidence of LCpl Woodford consuming alcohol prior to the accident. The Panel was satisfied that EX DBF members were rested after travelling on Sun 27 Sep 15 to Germany and that the routine provided adequate rest and recovery. The Panel concluded fatigue and alcohol were <b>not factors</b>.</p>	<p>Witness 5 Witness 5 Exhibit 32 Witness 17</p>
<p>1.4.104 <b>Health Status.</b> Both LCpl Woodford and Student A were fit to attend EX DBF. Their health status was recorded on Annex A to JSP 950, Stage One Assessment – Self Certificate of Health. This document was required to be re-signed to confirm their fitness status on arrival at RAPA. The Panel <b>observed</b> that this was not completed by members of EX DBF. The Panel consider this as an administrative oversight. LCpl Woodford's PM did not report any reasons for incapacitation. LCpl Woodford and Student A had controlled their parachutes prior to commencing the LP and once entangled they conducted the reserve drill; they both therefore conducted the physical skills required of parachuting. According to the Regimental Medical Officer (RMO) of 1 RIFLES no medical or sight restrictions precluded either LCpl Woodford or Student A taking part in EX DBF. The Panel concluded that the health status of LCpl Woodford and Student A were <b>not factors</b>.</p>	<p>Exhibit 142 Exhibit 22 Exhibit 32    Exhibit 149</p>

ANALYSIS SECTION 2

Parachuting Activity in the Armed Forces

1.4.105 Parachuting in the Armed Forces is described in two categories:

a. **Military Parachuting** – parachuting as a means by which Military personnel are deployed into an operational environment in order to conduct specific Military outputs. In this sense Military personnel are employed by the MOD in order to deliver parachute training and conduct parachute activity. It is governed according to Military policy and is conducted in accordance with Military regulations using Military equipment, training and operational standards. Military Parachuting was out of scope for this SI.

Exhibit 63

b. **Sport Parachuting** – this activity is conducted in the Armed Forces in accordance with the British Parachute Association (BPA) regulations. The BPA is the recognised National Governing Body (NGB), which sets the standards for British Sport Parachute training, parachute qualifications, and parachute operations. Sport Parachuting in the Armed Forces is accessed by the following routes:

Exhibit 6

(1) As a competitive sport activity in accordance with JSP 660. Competitive sport parachuting includes training for, and competing in, sport parachute competitions. Military personnel are defined as 'on duty' when conducting this activity. Competitive Sport Parachuting was out of scope for this SI.

Exhibit 2

Exhibit 2

(2) As an Adventurous Training (AT) activity under the governance of JSP 419. Military personnel are defined as 'on duty' when conducting AT. There are three Joint Service Adventurous Training (JSAT) parachute course delivery sites; Force Development Training Centre Weston on the Green (FDTC (W)), Joint Service Parachute Wing Netheravon (JSPW (N)) and Cyprus Joint Service Adventurous Training Centre (CJSATC). In addition, units may undertake parachuting AT expeditions to other approved sites around the world. This SI investigated the accident that occurred during EX DBF, where the Military personnel involved were engaged in a formal AT expedition. The RAF is the Lead Service for AT Sport Parachuting.

Exhibit 64

(3) As a Military Association/Club activity delivered in accordance with JSP 660. Military personnel are 'not on duty' when active with such clubs. RAPA is a sport association and also a location where AT Type 3<sup>18</sup> Expeditions and RAF Force Development (FD) are delivered. There are 5 known separate Military parachute Associations/Clubs:

Exhibit 2

(a) RNRM Sport Parachute Association (RNRMSPA) – operating out of Netheravon.

(b) Army Parachute Association (APA) – operating out of Netheravon.

<sup>18</sup> Detailed in JSP 419 – Type 3 refers to Expeditions defined as being a single activity conducted away from the unit for more than 48 hours with a specific objective.

- (c) Rhine Army Parachute Association (RAPA) – operating out of Bad Lippspringe, Germany<sup>19</sup>.
- (d) RAF Sport Parachute Association (RAFSPA) – no defined site.
- (e) Cyprus Combined Service Parachute Club (CCSPC) – operating out of Dhekalia, Cyprus.

(4) As a Display Team (DT) activity. Military personnel are 'on duty' when engaged in official events on behalf of the Services. This type of activity is directed toward military engagement with the public. All three Services have Sport Parachute DTs. Military Sport Parachuting DT was out of scope for this SI.

1.4.106 The Panel noted that Sport Parachuting activity is fundamentally the same activity regardless of how it is accessed albeit DT is a distinct and more technical aspect of the sport. The Panel noted that Military personnel can currently undertake Sport Parachuting through AT, sport, club/association or DT activity. The Panel noted that although all Sport Parachuting is governed by the BPA as the NGB, AT Sport Parachuting is governed by the RAF as Lead Service. Sport competitions are governed by UK Armed Forces Sport Boards and club/association activity is governed through committees with Military personnel acting as officers therein. The Panel **observed** that Sport Parachuting in the Armed Forces is not co-ordinated by a single MOD organisation.

Exhibit 64  
Exhibit 2

**1.4.107 Recommendation: The UK Armed Forces Sports Board should define how Sport Parachuting in the Armed Forces is governed and assured. This provision should be resourced in order to deliver the intended regulating<sup>20</sup> effect.**

#### Organisational and Resource Factors

1.4.108 The Panel considered the wider organisational and resource matters associated with activity at RAPA.

1.4.109 **RAPA Status.** RAPA as a Military sport association had been in existence for over 50 years and operated out of Bad Lippspringe (BL). BL was also the site of the Joint Service Parachute Centre (Lippspringe) (JSPC(L)) delivering AT courses. In effect RAPA co-existed with JSPC(L). In 2011 an Implementation Order<sup>21</sup> was issued which detailed the drawdown of JSPC(L), the procedure for its subsequent closure and re-subordination of the residual Military manpower for completion by 31 Mar 12. It also stated that Sport Parachuting at BL would continue under the auspices of RAPA.

Exhibit 2  
Exhibit 10  
Exhibit 10

1.4.110 The intent was that RAPA, without support of public funds, would deliver Sport Parachuting, Type 3 AT Sport Parachuting and some JSAT Sport Parachuting courses. The drawdown of JSPC (L) saw the removal of the funded Military positions. The last of the funded Military personnel at the site left in Mar 14. The Panel noted that RAPA continued as a Military sport club/association in accordance with the definition detailed in JSP 660 after the closure of the site as a JSAT centre. RAPA remained an affiliated BPA Parachute Training Organisation (PTO).

Exhibit 10  
Exhibit 10  
Exhibit 2  
Exhibit 132  
Exhibit 67

<sup>19</sup> RAPA 'association' activity refers to parachuting with off duty military personnel, dependants and civilians.

<sup>20</sup> To bring about conformity with rule, principle or usage.

<sup>21</sup> De-scope PSC ATG(A) element, draw down of the JSPC Bad Lippspringe dated 30 Sep 11.



1.4.111 **Incremental Staff.** RAPA employed Military personnel as incremental staff<sup>22</sup>. The incremental staff at RAPA worked with JSAT Expeditions, RAF FD, training for and competing in competitions, and RAPA sport association activities. In accordance with the RAPA Incremental Staff Administrative Instruction Feb – Dec 15, Military personnel were placed 'on duty' during all parachuting activities conducted at RAPA, including activity at weekends. Incremental staff did not receive any payment for working at RAPA, however free parachute training and jumps were provided in order to progress parachuting skills towards attainment of BPA licences and qualifications.

Exhibit 112  
Exhibit 71  
Exhibit 112

Witness 4

1.4.112 Incremental staff in ATG(A) JSAT sites to support Military training activity are sought from Regular and Reserve Army units through the publication of 2014DIN07-162<sup>23</sup> Incremental Staff Requirements for ATG(A). JSPW(N) employed such Military personnel to support their JSAT Sport Parachute course programme; these Military personnel were 'on duty' when delivering support to military training courses.

Exhibit 113

1.4.113 The APA and the CCSPC (Military sports associations) are co-located with JSAT centres. These sports associations employ volunteer Military personnel to support their activities. These Military personnel are not on duty when delivering support at their respective association and may receive financial remuneration from the association. Military personnel working at associations/clubs were insured by the BPA for duties required of them in support of the association/club activities.

Witness 33

1.4.114 The 2007DIN02-193 Service Charities/Non-Public Funds – Welfare Activities and Service Personnel Duty Status provides justification for the use of Military personnel in support of welfare activities<sup>24</sup>. The 2007DIN02-193 identifies Presidents and other officers of respective sport committees delivering the required support for recognised sports. These Military personnel are considered on duty when active with the association/club.

Exhibit 114

1.4.115 AGAI Vol 3 Annex Q to Chapter 90 states that Military personnel are not on duty when involved in sport and recreational activities when organised by a club/association.

Exhibit 65

1.4.116 The Panel consider that in accordance with AGAI Vol 3 Annex Q to Chapter 90 RAPA incremental staff should have been deemed:

Exhibit 65

- a. On duty for AT, FD and sports competitions and training.
- b. Off duty when working with off duty Military personnel, dependants and civilians undertaking club/association activity.

1.4.117 The Panel **observed** that incremental staff at RAPA were placed on duty for all aspects of RAPA activity including RAPA 'sports association' parachuting. This implied the Department was liable for the actions of incremental staff that were actually 'off duty' delivering RAPA 'association' parachute activity. The Panel concluded that the practice of having personnel on duty for all parachute activity could place the individual, RAPA and the Department at risk. The Panel **observed** that RAPA was a non-publically funded sports association employing publically funded incremental staff.

1.4.118 The Panel **observed** that the request for manpower dated Jan 16 still referred to RAPA as JSPC(L) some four years after the closure of the site as a JS Parachute Centre.

Exhibit 115

<sup>22</sup> Incremental staff refers to those Military personnel detached to RAPA in accordance with an Exercise Instruction from both Germany and UK based units for an 8 month period.

<sup>23</sup> DIN – Defence Instructions and Notices.

<sup>24</sup> Welfare activities contribute to the unit welfare objectives, such as: regimental associations, sports and social clubs and station childcare facilities.

The Panel accepts that whilst this evidence was produced after the accident it remained an inaccurate description of RAPA.

1.4.119 The Panel was informed that RAPA now has 3<sup>rd</sup> party and personal insurance for all staff. Staff are considered 'on duty' during JSAT, FD and sports competition activity. When working during RAPA sport association activity they are 'not on duty' and are at RAPA voluntarily.

Witness 4

1.4.120 The Panel **observed** that RAPA had delivered 'club' Sport Parachuting to its members and also facilitated and delivered JSAT Expeditions. In the Panel's opinion the status of RAPA and how it could operate with military personnel was not clearly understood by the RAPA committee or staff members which obscured the duty status of personnel employed at RAPA.

1.4.121 **Recommendations: The President of RAPA should ensure that all Military staff employed at RAPA are formally placed on duty whilst working with Military personnel conducting AT, FD or official sport training/competitions. This requirement should be recorded for audit purposes.**

1.4.122 **Military Governance.** The Panel identified the following organisations that are directly and/or indirectly linked to governance at RAPA:

- a. Army Sports Control Board (ASCB).
- b. 22 (Trg) Gp RAF.
- c. ATG (A).
- d. RAPA Committee.

1.4.123 **The Army Sport Control Board (ASCB).** As described in the ASCB Directive 15/16, sport is governed by National, Departmental and Service hierarchical levels with organisational responsibilities falling to the Chain of Command (CoC), Sports Boards, Formations, Brigades and Arms/Corps. International and National Governing Bodies (NGBs) and their rules, laws or regulations are the authority for the playing and governance of sport in the United Kingdom. Within Defence, Chief of Defence Personnel (CDP) is responsible for Armed Forces Physical Development Policy and is accountable to the Defence Board. Assistant Chief of the Defence Staff (Personnel Capability) (ACDS (Pers Cap)) is accountable for Defence Policy for Sport and ensuring the continued recognition of the provision of Sport as a condition of Service. The UK Armed Forces Sports Board (UK AFSB) is the regulatory body for Service Sport and is accountable to ACDS (Pers Cap) for promoting, developing and providing policy direction on the conduct of representative sport. Importantly the UK AFSB is responsible for standardising, where appropriate, sports policy across the Services. Commander Personnel and Support Command<sup>25</sup> (Comd PSC) has responsibility for Army Sport on behalf of the Army Board. He ensures that the development of Army Sport policy takes place within the wider context of the Moral Component of Operational Capability and, as the Army Member of the Service Personnel Board that it is synchronised with Defence Sport policy through the work of Army Training Branch (Army Trg), the ASCB and the Chain of Command.

Exhibit 68

Exhibit 143

1.4.124 The overarching policy for Armed Forces Sport is the responsibility of the Directorate of Training, Education, Skills, Recruiting and Resettlement (TESRR) and is

Exhibit 2

<sup>25</sup> Comd PSC now Comd Home Command.

contained in JSP 660. The policy for sport in the Army is the responsibility of Head Army Training which is contained in AGAI Volume 1 Chapter 5 'Sport'.

Exhibit 69

1.4.125 The ASCB Management Plan 2015 explains that its Mission is to support and develop sport and sport facilities in the Army to enable Land Forces to contribute to the Army's capability. The ASCB duties were detailed in Annex A of the Management Plan. One of the duties was to govern ASCB sports associations. In the Panel's opinion there is a robust but complex system of governance of sport in the Army.

Exhibit 70

1.4.126 RAPA delivers sport parachuting as club activity to off duty Military personnel. RAPA also provides training for and delivery of sports parachute competitions. These activities involve on-duty and off-duty Military personnel, dependants, and civilians. The Panel noted that governance of Sport Parachuting activity at RAPA resided with the ASCB representative in Germany (Secretary of British Army (Germany) Sports Board (BA(G)SB)) who does this on behalf of the Director ASCB in accordance with JSP 660.

Exhibit 2

1.4.127 **22 (Training) Group RAF (22 (Trg) Gp RAF)**. JSP 419 details the single Service (sS) authorities' responsibilities for AT, which includes assurance activity and assessing accident and incident frequency. The Lead Service for AT parachuting in the Services is the RAF. The RAF work closely with the Army, through ATG(A) and more specifically, OC JSPW(N) as the lead for AT Sport Parachuting in the Army, when conducting its activity within the Army space. Recognised Parachute Expedition sites are published in 2014DIN 07-094; the Guidance and Information for the Planning for a JSAT Parachute Expedition, which the Lead Service is responsible for producing. The Panel found no evidence of Service audit/governance of RAPA by the Lead Service or JSPW(N) after 2012 when it ceased to be a JSPC(L). The Panel acknowledged that assurance activity of Type 3 AT Expedition sites detailed in 2014DIN 07-094 had been established in 2016.

Exhibit 64

Exhibit 74

Exhibit 97

1.4.128 The Panel **observed** that there was no recorded audit of RAPA undertaken by the Lead Service after the site ceased to be the JSPC(L) and that the BPA was the sole deliverer of such activity and had audited RAPA on 31 Mar 14.

1.4.129 **Adventurous Training Group (Army) (ATG(A))**. ATG(A) has a responsibility for the governance of AT activity within the Army. This governance is driven by JSP 419 and AGAI Vol 1 CH 11. Expeditions in the Services require a Joint Service Adventurous Training Form Alpha (JSATFA) to be completed in order to comply with the aspects of such training. The Expedition Leader (EL) is responsible for compiling the JSATFA. Governance of parachuting expeditions in the Army was provided by the OC of the JSPW(N)<sup>26</sup> as the Subject Matter Expert (SME).

Exhibit 75

Exhibit 64

Exhibit 1

1.4.130 In applying the governance of expeditions the OC JSPW(N) was responsible for the production of the Technical Approval (TA), which authorised the parachute Expedition for delivery. The TA for EX DBF was signed on 8 Sep 15. Part of the SME process included issuing an Exercise Pack to the EL prior to the commencement of the expedition. The Exercise Pack includes a guide to Expedition Incidents and a Level 3 Parachuting Expedition brief.

Exhibit 1

Exhibit 8

Exhibit 78

Exhibit 79

1.4.131 One aspect of the approval process is to consider the location of the planned expedition. JS Parachute Expeditions must go to a site that is included in the 2014DIN 07-094 Guidance for the Planning of JSAT Parachuting Expedition. All BPA affiliated drop zones were automatically included in the 2014DIN 07-094. RAPA is an affiliated BPA drop zone and EX DBF was approved accordingly by OC JSPW(N).

Exhibit 74

Exhibit 8

Exhibit 132

<sup>26</sup> JSPW(N) is an AT centre owned by ATG(A).



**OFFICIAL SENSITIVE**

1.4.132 Whilst the completion of the JSATF(A) iterative process was undertaken by the Expedition Leader (EL) (Student B), it was overseen by the Unit Adventurous Training Officer (UATO) who was required to complete the on-line UATO course via the Defence Learning Environment. The officer appointed as the UATO was not qualified, having assumed the appointment during the last week of Jul 15 from the previous incumbent. The responsible officer at Formation had been involved in the process and he had informally approved EX DBF on 14 Sep 15. The Panel found that the last check, where the JSATFA was released/signed off by the Formation, was completed on 29 Sep 15. This occurred because the responsible officer was employed on a part time basis and was not in office to complete the JSATFA after the CO had provided his approval. There was a discrepancy in the dates that the JSATFA was signed off by the CO. The JSATFA was dated 7 Aug 15 for the CO's completion but it was apparent that the CO's authorisation for EX DBF occurred on 24/25 Sep 15. The CO was away from the unit in the last phase of the JSATFA process and was not willing to sign the document off until he had been directly briefed by the UATO and Student B. The Panel noted this as good practice by the CO.	Exhibit 1 Witness 29  Exhibit 7  Exhibit 1 Exhibit 76 Witness 29 Exhibit 1 Exhibit 77 Witness 28 Witness 29
1.4.133 The JSATFA included a requirement for specific activity Risk Assessments (RA). These RA, dated Nov 13, were provided by the Centre Manager from RAPA and reviewed by the OC JSPW(N), EL and UATO. The expiry date of these RA was 1 Mar 15. The RAs provided by RAPA to EX DBF were out of date. RAPA RAs were updated by the CI in Mar 15 and should have been provided to EX DBF.	Witness 5 Witness 6 Witness 32 Exhibit 59
1.4.134 The Panel <b>observed</b> that the TA for the Expedition location was dependent on the site being included in the 2014DIN 07-094. The Panel <b>observed</b> that the Expedition Incident and Level 3 Parachuting Expedition brief were not signed by the extant OC JSPW(N). The Panel <b>observed</b> that the UATO had not completed the on-line UATO training course when he supervised the completion of the JSATFA but noted that he researched the relevant documentation whilst conducting these duties. The Panel <b>observed</b> that the RAs provided by RAPA were out of date and that this fact was not picked up in the review/approval process.	Exhibit 78 Exhibit 79
1.4.135 <b>RAPA Committee.</b> RAPA was managed and constituted through the BA(G)SB and had a Charter and Constitution that were up to date. The structure of RAPA was commensurate with that of a military sports club with a President, Chairman, Secretary, Treasurer, Centre Manager and governance from the Secretary of the BA(G)SB. These personnel performed the executive management duties of the association. In the Panel's view the committee conformed to the requirements in JSP 660.	Exhibit 2 Exhibit 12 Exhibit 11 Exhibit 80 Exhibit 82
1.4.136 The other Military sports parachute associations are the APA and CCSPC. The APA conforms to JSP 660 and is governed by the ASCB in the UK. According to the APA Constitution/Charter it is the lead parachute association charged to deliver Army sport parachuting. CCSPC conforms to JSP 660 but the Panel could find no evidence of a relationship with a Sports Control Board.	Exhibit 83 Exhibit 2
1.4.137 The Panel <b>observed</b> that the APA are deemed the lead in Army sport parachuting but do not govern or influence RAPA.	
1.4.138 The Panel <b>observed</b> that there are differing means by which Military Sports Parachute associations/clubs are governed although all are affiliated and assured by the BPA. In the Panel's opinion this contributes to inconsistency in the governance, assurance and conduct of Sport Parachute operations.	
1.4.139 The Panel has already raised a recommendation at para 1.4.107 regarding the governance and assurance of Armed Forces Sport Parachuting.	

1.4.140 **Defence Internal Audit (DIA).** The DIA was asked, as part of its 07/08 Audit Programme to review the regularity and propriety of processes and controls for the use of public resources for non-funded activity. The DIA Review of the Public/Non-Public Interface of AT activity and Military Sports Associations - Ref 0101/07CD dated 24 Oct 08 was a management letter that set out the specific findings for a number of AT Centres of which, at the time, JSPC(L)/RAPA was one. More work followed with subsequent reports raised in Jun 09 and Feb 11. The Oct 08 report stated a 'No Assurance'<sup>27</sup> level and the 2 further reports published 'UNSATISFACTORY' assurance levels.

Exhibit 102  
Exhibit 103  
Exhibit 102  
Exhibit 104  
Exhibit 105  
Exhibit 106

1.4.141 Most issues raised in the 08 DIA report regarding the JSPC(L)/RAPA interface ceased to be of consequence when JSPC(L) closed in Mar 12 due to it no longer being a joint military/civilian sport club/association operating site. However, some legacy cost/encroachment issues remained which were detailed in a report dated Aug 15: Army: Review of the Public/Non-Public Interface of AT activity and Military Sports Associations: Follow Up Audit - Ref 3031/11/14.

Exhibit 10  
  
Exhibit 106

1.4.142 RAPA had a Defence Infrastructure Organisation (DIO) operating/encroachment licence/use agreement<sup>28</sup> for 2014 but did not secure one for 2015. The Westafalen Garrison were advised by the DIO of this fact up to and including Jun 15. DIO recommended that flying should cease until an agreement was in place as until such time the Garrison Commander was exposed to risk. The President of RAPA believed the Joint Business Agreement (JBA) negated the requirement for a DIO licence because it stated Bad Lippspringe could be used by the Garrison. It was also thought that the 2014 licence agreement was perpetual although the Use Agreement states the RAPA could use the site until Nov 14. There is nothing stated in the JBA regarding the requirement for a Use Agreement.

Exhibit 107  
Exhibit 108  
Exhibit 109  
Witness 31  
Exhibit 107  
Witness 31  
Exhibit 109

1.4.143 The Panel **observed** that the DIA 2015 report detailed that there was no agreed encroachment in place between DIO and RAPA for the year 2015. The Panel **observed** that an agreement was not in place at the time of the accident. In Mar 16 RAPA secured a licence to operate through the DIO after the issue was raised by the DSA.

Exhibit 106  
Exhibit 106  
Exhibit 110

**1.4.144 Recommendation: The Panel recommends that Commander British Forces Germany (BFG) review the DIA audit report dated Aug 15 in order to ensure each issue has been addressed in accordance with current policy.**

**Safe System of Work (SSW)**

1.4.145 Health and Safety legislation requires all activities to be conducted within a SSW. Within the Military envelope there are 3 similar but distinct SSW which are detailed in JSP 375 Part 2 Vol 1 Chapter 40.

Exhibit 66

1.4.146 **The standard Safe System of Work (SSW).** This will be used to review the relevant sections pertinent to RAPA. It entails the following elements:

- a. Safe Place.
- b. Safe Persons.
- c. Safe Equipment.

<sup>27</sup> No Assurance – The framework of governance, risk management and control do not support effective, efficient and economic achievement of the business objective (DIA Report 0101/07CD dated 24 Oct 08).

<sup>28</sup> DIO encroachment licence – a formal agreement between DIO and a site user incorporating host nation interests where required.

d. Safe Practice.

1.4.147 **SSW - Safe Place.** This is the space/area to be occupied by the military for the conduct of their activities and includes any surrounding areas together with any Military or civilian population which might be affected by those activities.

1.4.148 The Panel has considered the following areas under Safe Place:

- a. Risk Assessment.
- b. Safety Management System.
- c. Assurance.

1.4.149 **Safe Place - Risk Assessment (RA).** The SSW Safe Place should form part of the activity specific RA taking into account the proposed use of the space and controls put in place.

Exhibit 66

1.4.150 According to BPA policy RA were to be recorded on Form 244b. The Panel received a complete set of the RAPA RAs from the CI in Apr 16. The 44 RA for RAPA were dated 01 Mar 15 and were recorded in MOD Form 5010a 2008 and related to parachute operations and general site activity. All 44 were compiled and signed by the CI as the 'assessor'; 42 of the 44 were signed by the Chairman as the 'line manager'; he did not sign RA 2; Basic Parachute Course and RA 5, Suspended Harness Training.

Exhibit 39  
Exhibit 59  
Exhibit 1  
Exhibit 59

1.4.151 The most recent policy states RA are to be reviewed after an accident or incident, which is also detailed in the RAPA RA. The Panel found no evidence of formal written review of the RA after a parachute serious occurrence in May 15<sup>29</sup> or the accident involving LCpl Woodford on 29 Sep 15. RAPA RA's did not include a section on the risk of canopy collisions for student static line parachuting.

Exhibit 59  
Exhibit 136  
Exhibit 3  
Exhibit 59

1.4.152 During the visits to RAPA by the Panel between 19-23 Oct 15 and 25-27 Jan 16 it was noted that Health and Safety (H&S) notices and associated documentation were out of date or in need of review. The Centre Manager's Job Specification identified H&S at RAPA as one of his roles. He was not responsible for parachute operations; this was the domain of the CI as the Suitably Qualified and Experienced Person (SQEP) in this area.

Exhibit 84  
Exhibit 85

1.4.153 The Panel **observed** that RA 2 and 5 were not signed off by the Line Manager. The Panel **observed** that H&S notices were out of date.

1.4.154 A review of RA was a requirement but was not conducted. Should reviews not take place when required the Panel assessed that potential for further omissions or mistakes could arise in the future. The Panel concluded that non-adherence to policy in regards to reviewing RA to be **an other factor**.

1.4.155 **Recommendations:**

- a. **The President of RAPA should ensure that RAs are reviewed by the Chairman of RAPA after accidents and incidents in accordance with JSP 375. This requirement should be formally recorded for audit purposes.**
- b. **The President of RAPA should ensure that H&S notice boards in RAPA**

<sup>29</sup> DG DSA Dated 17 May 15 refers – Parachute Serious Occurrence (Exhibit 136) land off by a student parachutist.



are updated and audited at regular intervals.

1.4.156 **Safe Place – Safety Management System (SMS).** A SMS<sup>30</sup> is recommended but not mandated by the Civil Aviation Authority (CAA). The CAA document refers to safety management being integrated into the daily activities of the organisation. RAPA has a SMS and the Chairman of RAPA signed the SMS Organisation and Arrangement Statement for Safety Health, Environmental Protection and Sustainable Development on 15 Nov 13 as Head of Establishment. Detailed in the SMS are the roles and responsibilities of the Accountable Manager. The CI is the Accountable Manager but also is the stated Safety Officer. The Panel found that the responsibility lay with the CI to deliver, manage and oversee the SMS without any recorded oversight by the RAPA committee.

Exhibit 86/90  
Exhibit 151

1.4.157 A BPA audit report letter detailed that RAPA were to complete regular sample audits of one/two per month. Whilst this recommendation was stated in the letter it was not subsequently articulated within the RAPA SMS documentation. However, the Audit, Monitoring and Reporting (AMR) process, as part of the monthly inspections of randomly chosen aspects of the parachute operation, was carried out between Mar and Sep 15 (except Apr 15) by the CI and recorded in Annex D to the RAPA SMS. The Panel noted that a land-off incident in May 15 was reviewed by the Land Accident Investigation Team (LAIT) and this was recorded in the SMS as the monthly audit. The Panel was informed that verbal dialogue between the Chairman and CI on the findings of the monthly inspection took place. A requirement for formal written records of discussions was not detailed in the SMS.

Exhibit 88  
Exhibit 86  
Exhibit 86  
Witness 4  
Exhibit 86

1.4.158 The RAPA SMS detailed that safety occurrence reports were required after an incident or accident. This was not undertaken after the incident in May 15 or the accident in Sep 15.

Exhibit 86  
Exhibit 136

1.4.159 The Panel visited RAPA in Jan 16 and found the SMS dated Nov 13 on the H&S notice board. The latest copy of the SMS dated 27 May 16 was provided when formally requested by the Panel in Jun 16. This copy indicated name changes in the safety organisation had been made in Feb 15 by the CI. The amended SMS document dated Feb 15 was not apparent when the Panel visited in Oct 15 or Jan 16.

Exhibit 86  
Exhibit 90

1.4.160 The Panel **observed** that the requirement for the audit, monitoring and reporting process was not explicit in the RAPA SMS documentation. The Panel **observed** that the CI was detailed as the Safety Officer and Accountable Manager for parachuting in the SMS. The Panel **observed** that the responsibilities associated with the delivery of the SMS by the CI were conducted without recorded oversight by the RAPA Committee or any other individual. The Panel **observed** that amendment states and document control of the RAPA SMS was not implemented. The Panel concluded not reviewing or appropriately completing sections of the SMS related to incidents and accidents could lead to safety omissions in the future; it is therefore **an other factor**.

1.4.161 The Panel concluded that there was an overall failure to apply adequate Safety Management at RAPA and consider this **an other factor**.

1.4.162 **Recommendations:**

- a. **The President of RAPA should ensure an up to date SMS is maintained at RAPA as the overarching safety document for all activity at the site.**

<sup>30</sup> SMS – a systematic and proactive approach for managing safety risks – CAA CAP 795.

- b. The President of RAPA should clarify who should hold the responsibilities of the Safety Officer and Accountable Manager. Amendments should be recorded in the SMS.
- c. The President of RAPA should provide oversight of the implementation of the SMS processes and formally record interactions in the SMS.
- d. The President of RAPA should implement a SMS document control system that facilitates appropriate maintenance of the SMS.
- e. The President of RAPA should ensure the SMS 'after incidents and accidents' sections are completed and that such action is recorded.
- f. The President of RAPA should amend the SMS documentation to include the requirement and process for monthly sample audits.

1.4.163 **Safe Place - Assurance.** The BPA was founded in 1961 and was incorporated as a not for profit company limited by guarantee in 1966 and was registered in London. The BPA was recognised as the NGB for sport parachuting by UK Sport, The Royal Aero Club of the UK and the Federation Aeronautique Internationale (FAI). From a regulatory perspective the Civil Aviation Authority (CAA) oversees the BPA's activities. The nature and extent of this regulatory relationship has varied dependent on the requirements of contemporary statutory legislation. At present the Air Navigation Order (ANO) places a responsibility on the CAA to exercise regulatory function over parachuting activity in the UK. Within the scope of this responsibility it is empowered to approve persons or organisations to carry out regulatory tasks on its behalf, subject to formal requirements. The CAA approved the BPA for these purposes on the 28 Mar 96. The BPA produced an Exposition defining their responsibilities, including control and inspection procedures in order to assure compliance with the terms of approval granted by the CAA. Under the terms of this approval, the BPA may make recommendations to the CAA for the issue of permissions to Parachute Training Organisations (PTO) and parachute DTs.

Exhibit 91

Exhibit 91

Exhibit 91

Exhibit 91

Exhibit 91

1.4.164 Section 4 Part 10 of the BPA Exposition detailed the audit inspection procedures applied to a PTO in order for it to validate its permission to operate under the auspices of the BPA. The audit reviews an organisation's facilities and parachute procedures to provide assurance of competent safety in parachuting activities and associated aircraft operations. In turn the BPA reports to the CAA to make recommendations regarding the grant or renewal of parachuting permissions for a given site. A PTO will normally be audited at intervals not exceeding three years and more frequently if appropriate or necessary. Audits and inspections are carried out in accordance with Appendices C and D of the exposition. The BPA Form 170 does not include specific instructions to review parachute operations at a PTO.

Exhibit 91

Exhibit 99

1.4.165 RAPA is a BPA affiliated PTO. The BPA carried out an audit at RAPA on 31 Mar 14. It reported that an SMS was in place in Nov 13 and that sample audits on various aspects of the parachute operation should be conducted once or twice monthly. This point was subsequently dealt with by the previous CI at RAPA.

Exhibit 132

Exhibit 92

Exhibit 94

1.4.166 The BPA published Board of Inquiry and Panel of Inquiry reports on the accident occurrence in Sep 15. In order to continue static line parachute operations RAPA was directed to implement the following permanent restrictions because the BPA stated there were not enough instructors delivering parachute operations:

Exhibit 49

**OFFICIAL SENSITIVE**

- a. Only one static line student to be despatched per pass up to and including their third jump.
- b. After the third jump and prior to the fourth jump students will receive a further lesson on canopy control and emergency procedures to include further training on entanglements, collisions and cut away heights.
- c. After completion of A and B above, a maximum of 2 static line students are to be despatched per pass.
- d. Students must continue to be equipped with radios for at least the first 6 descents.

1.4.167 The Panel raised concerns about the parachute operation at RAPA with DG DSA. Subsequently, DG DSA issued instructions on 17 Mar 16 in regard to safety issues identified in the SI. These points were:

Exhibit 96

- a. The limitations published in the minutes of the British Parachute Association (BPA) Safety Training Committee meeting on Thu 19 Nov 15 are to be adopted.
- b. All parachutists are to be weighed on calibrated scales and the correct parachute system issued in accordance with the BPA and RAPA parachute weight limitations.
- c. Training is only to be delivered by BPA qualified parachute instructors.
- d. Instructor to student training ratio of 1:12 is to be observed in accordance with the BPA Operations Manual.
- e. All reserve parachutes at RAPA are to be checked.
- f. One jump static line courses and the first 3 static line jumps of Basic Freefall Parachute training courses shall be limited to the despatch of one parachutist on each pass.
- g. The functions of Student Talk Down (STD) provided to static line parachutists and Drop Zone Controller shall not be conducted by the same individual when despatching more than one parachutist per pass.
- h. A suitable numbering system is to be adopted when despatching more than one parachutist to assist in identification during the descent.
- i. RAPA should be in possession of a Defence Infrastructure Organisation (DIO) Use Licence.

1.4.168 The Lead Service (RAF) audited RAPA between 21 – 23 Mar 16. RAPA was cleared to continue JSAT/Force Development parachute activity.

Exhibit 97

1.4.169 The Lead Service and the BPA conducted an audit at RAPA on 27 May 16. The BPA report stated parachuting could continue as long as identified issues were addressed by 24 Jun 16. The Lead Service report prohibited all military JSAT/RAF FD activity at RAPA until identified issues were resolved. RAPA as a club could continue as an affiliated BPA PTO but could not deliver JSAT activity.

Exhibit 99  
Exhibit 98



1.4.170 In the period Mar 12 to Sep 15 new personnel assumed key appointments at RAPA, which included the CI, Centre Manager and the Senior Instructor. RAPA was audited by the BPA on 31 Mar 14 and its affiliation was renewed on 1 Apr 15. The next BPA audit was not due until Apr 16. An audit could be requested by a CI on assumption of a new appointment or when the CI felt it could be beneficial. The Panel could not find evidence of internal RAPA audit on change-over of principal staff although training of all staff on procedures at RAPA took place at the start of the parachute season 2015. The Panel could not find evidence of a systematic review of procedures or practices apart from random checks conducted by the CI as part of the SMS. The RAPA committee had no process in place to confirm assurance and governance was being applied at RAPA other than the BPA audit, the annual renewal of the BPA affiliation membership and BPA instructor qualifications. The Lead Service had not assured itself that RAPA had maintained its suitability to deliver JSAT Expeditions and RAF FD in that period.

Witness 1, 2  
and 6  
Exhibit 132  
Exhibit 92  
Exhibit 99

Exhibit 86  
Exhibit 90

Exhibit 97

1.4.171 In May 15 the BA(G)SB Secretary wrote to the incumbent Director of the ASCB about issues at RAPA related to the future of the site, funding, training and safety. In the correspondence it was confirmed that RAPA conformed to BPA regulations and that the Secretary was content that parachuting at RAPA could continue into 2017 (the plan at that time was for the activity to cease in line with re-basing of Army assets from Germany).

Exhibit 100

1.4.172 The Panel **observed** that there was no mechanism of checking that standards at RAPA were being maintained in terms of training, instructor qualifications, and parachute operations since 2012 other than the biennial BPA assurance/audit visit of Mar 14. The Panel noted that the ASCB, RAF Lead Service and the RAPA committee, who had a vested interest in the governance of RAPA, used no additional means other than the BPA by which to assure that requisite standards were being maintained. The Panel noted that the BPA assurance/audit may not specifically review the delivery of parachute activity at a PTO. The Panel noted that the time between BPA audits can be up to three years. The Panel noted that a BPA audit does not automatically occur on change-over of key personnel responsible for parachuting. The Panel noted that levels of assurance were not defined in RAPA documentation. The Panel concluded that the application of assurance at RAPA was inadequate and consider it **an other factor**.

1.4.173 **Recommendations:**

- a. **For 3<sup>rd</sup> Party assurance, the Chief Operating Officer of the BPA should ensure that parachute operations for student parachutists are audited during the formal BPA audit process and that documentation should be amended accordingly.**
- b. **For 2<sup>nd</sup> Party assurance AOC 22 (Trg) Gp, RAF should audit JSAT/FD/Military Sports Association sites annually and on change-over of CIs.**
- c. **For 1<sup>st</sup> Party assurance the President of RAPA should ensure that internal audit is conducted in order to inform governance and assurance. This should cover the critical areas of parachute operations, general Health and Safety and equipment.**

1.4.174 **SSW - Safe Persons.** Defined as personnel who have been given the appropriate information, instruction, training, and supervision to enable them to carry out a specific activity as a competent person with the appropriate qualification, currency, maturity, and experience.

1.4.175 The Panel has considered the following factors under Safe Persons:

- a. Command and Control.
- b. Parachute Instruction.
- c. Health and Safety Training.
- d. SMS Training.

1.4.176 **Safe Person - Command and Control.** The Chairman of RAPA is the Head of Establishment for the association/club. The day to day functions of RAPA are delegated by the RAPA Committee through the Chairman to the CI and Centre Manager. The CI delivered parachute operations and the Centre Manager delivered the support required at RAPA to facilitate parachute operations. The Chairman reported that the CI was recruited because of his NGB BPA Advanced Instructor (AI) qualifications. The CI confirmed he was in charge of RAPA parachute operations and the Centre Manager was there to ensure the administrative support required for parachuting was delivered. The SI was a serving member of the Army and had been at RAPA since Apr 15. His main role was to conduct 'CSM<sup>31</sup>' duties for the military staff and also, as a qualified CSI, support the CI in delivering RAPA parachute operations.

Exhibit 86/90  
Witness 3  
Exhibit 12  
Witness 4  
  
Exhibit 6  
Witness 1 and 6  
Witness 4  
Witness 3

1.4.177 The Panel has described the activities that are delivered at RAPA; namely Sport Parachuting association/club activity, sport training/competitions and AT Expeditions. The CI was required to run parachute operations for sport training/competitions and association/club activities. However, when RAPA delivered AT expeditions (such as EX DBF) the CI was not strictly authorised to act as the Advanced Instructor (AI). This responsibility, according to 2014DIN07-094, should have been delivered by a Parachute Expedition Supervisor (PES).

Exhibit 10  
  
Exhibit 74

1.4.178 The DIN states that all parachute expeditions are to have an AI in charge of the parachute operation. The AI should be a serving member of HM Forces. Where military personnel cannot be obtained to act as the AI, the expedition OIC must apply to the single Service (sS) Technical Authorisers for the authorisation to use a PES in place of an AI; the CI at RAPA was not a Military AI. Therefore, a PES was required for EX DBF. However, the TA letter for EX DBF stated that the RAPA CI was the authorised BPA AI responsible for all parachuting activity during EX DBF. The TA letter also stated the SI was authorised as the PES. The Panel noted that the DIN stated that 'technical authorisation' for an expedition to go ahead was to be issued by the OC JSPW(N). However, the term 'technical approval' was used in the JSATFA and the respective letters of authorisation issued by the OC JSPW(N) and the Formation officer.

Exhibit 74  
  
Exhibit 8  
  
Exhibit 1  
Exhibit 7  
Exhibit 74

1.4.179 The SI undertook the PES examination on 23 Sep 15; this examination includes questions on safety aspects of parachute operations. The Panel could not find specific Terms of Reference (ToR) for the PES role in the DIN, JSATFA, TA letter or RAPA documentation. However, the examination asked questions that included student to instructor ratios, named instructors in the JSATFA and wing loading. The SI recognised he was the PES for EX DBF and despite a lack of explicit guidance understood the duties that were expected of him in respect of a safe parachute operation.

Exhibit 120  
  
Witness 3

1.4.180 The actual roles undertaken by the SI during EX DBF was delivery of elements of the ground based training and acting as the parachute despatcher. To deliver despatching

Witness 3

<sup>31</sup> CSM - Company Sergeant Major; the senior Non-Commissioned soldier in an Army sub-unit.

duties he was positioned in the aircraft and therefore was unable to directly supervise the parachute operation.

1.4.181 The Panel consider that in the spirit of the 2014 DIN 07-094 the PES should have been responsible for the safe conduct of parachuting on EX DBF, although this was undermined by the fact that the TA letter also stated the CI was in charge of parachuting (as the AI) for EX DBF. The Panel was informed that the CI considered himself in charge of all parachute operations at RAPA including EX DBF. The SI said that he would not overrule the CI as a BPA AI unless he identified safety issues.

Exhibit 8  
Witness 1  
Witness 3

1.4.182 In summary, the CI was in charge of parachuting activity during EX DBF. However, the SI was the nominated PES for EX DBF. The Panel **observed** that the intent was for the PES to be the responsible person to supervise the parachute operation for EX DBF. The Panel **observed** that the TA also named the CI as the authorised AI responsible for all parachuting activity on EX DBF. The Panel **observed** that there were no ToR detailed for the PES.

1.4.183 The Panel concluded that a lack of clarity in a Technical Approval letter in defining who should be in charge of a given expedition **an other factor**.

1.4.184 **Recommendation: The AOC 22 (Trg) Gp, RAF, should clarify and publish the requirement for a PES. This should entail the specific duties expected of a PES in the form of a ToR for the role.**

1.4.185 **Safe Persons - Parachute Instruction.** The aim of EX DBF was to undertake a basic freefall parachute course as detailed in the BPA Ops Manual course syllabus. The programme delivers ground based training for some 6 hrs followed by 'static line' parachute jumps. The instructor qualification levels for the delivery of parachute training to student parachutists are set out in the BPA Ops Manual; in summary the BPA require either a Category System Basic Instructor<sup>32</sup> (CSBI) or a Category System Instructor<sup>33</sup> (CSI) to deliver formal training. A CSBI will normally be supervised for a minimum of 6 months by a CI.

Exhibit 1

Exhibit 6  
Exhibit 6

1.4.186 RAPA RA 2 identified the risk of the use of unqualified personnel delivering instruction. The JSATFA and TA specifically named the individual instructors who were to deliver training and also stated those personnel who were to receive it. The TA stated:

Exhibit 59  
Exhibit 1  
Exhibit 8

a. Para 4 - *'Instructors named as part of the JSATFA are not permitted to instruct personnel who are not named on the JSATFA. Likewise instructors must be named on the JSATFA to be able to participate in the exercise in any capacity.'*

b. Para 5 - *'Any changes to the number of students or instructors will invalidate this authority and the Exercise Leader (EL) will need to seek renewal and approval from the TA. The EL must confirm the instructors with the OC JSPC (N) no later than 2 weeks before departure. Substitution of an instructor needs to be approved by this TA.'*

c. Para 11 - *'The Advanced Instructor (AI) is to ensure that all instructors are current and competent in the intended instructional capacity.'*

Exhibit 8

<sup>32</sup> CSBI – BPA (NGB) Course, permitted to instruct/coach (Category System) Student Parachutist's, under supervision. The rating is valid for 12 months.

<sup>33</sup> CSI – BPA (NGB) Course and is able to instruct/coach Student Parachutist's up to BPA 'A' Licence.



**OFFICIAL SENSITIVE**

1.4.187 For EX DBF the following individuals were the named instructors on the JSATFA:

- a. CI - The CI and the designated AI.
- b. SI - CSI and the designated PES.
- c. Staff P - CSI.

Exhibit 1

1.4.188 The Panel found the SI was unaware that non-qualified BPA instructors could not be used for the delivery of training. The SI had seen the use of non-qualified instructors in other centres. This was despite the statement to the contrary in the TA letter from OC JSPCW(N), of which he was an action addressee, the RAPA RAs regarding the risk to students, the BPA Ops Manual CSBI card and the PES examination.

Witness 3  
Exhibit 8  
Exhibit 111  
Exhibit 120

1.4.189 EX DBF ground based training syllabus was instructed by the following personnel:

- a. Introduction – CI and SI.
- b. Documentation – Staff G and L.
- c. Orientation – The Centre Manager.
- d. After Landing Procedures – CI.
- e. Stability and Exits – Staff C and D.
- f. Introduction to Equipment – The Centre Manager.
- g. Aircraft Drills and Emergencies – Staff C and D.
- h. Parachute Landing Falls – Staff C and D.
- i. Canopy Control and Flight – SI.
- j. Abnormal Landings – SI.
- k. Malfunction theory – Staff C.
- l. Canopy Control (Suspended Harness Drill) – SI.
- m. Malfunctions Practical (Suspended Harness) – SI.
- n. Written Confirmation of Training – SI.

Witness 1  
and 3  
Witness 9  
and 13  
Witness 6

Witness 1

Witness 7  
and 8  
Witness 6

Witness 7  
and 8

Witness 7  
and 8  
Witness 3

Witness 3

Witness 7

Witness 3

Witness 3

Witness 3

1.4.190 The ground based training was delivered by 7 personnel, 5 of whom were unqualified. These 5 were supervised throughout by the CI or the SI apart from the documentation phase which was not supervised by any qualified staff. The non-qualified personnel were being developed in order to prepare for the CSBI course. Note 1 of the BPA Form 254a CSBI Proficiency Card stated: *'Any lesson or progression briefs must NOT be delivered to real students.'*

Witness 1

Exhibit 111

1.4.191 Student B, as the Expedition Leader (EL), was responsible for informing the OC of the JSPW(N) of any changes to the instructional staff in order for the expedition to remain authorised. Students did consider raising the use of non-qualified staff as an issue. This

Exhibit 8

did not occur because the non-qualified personnel were directly supervised and guided by 2 of the named instructors on the JSATFA who checked off the lesson plans as they were delivered. Students stated they felt the level of instruction was of a high standard. In the opinion of a witness the instruction was as good, if not better, than that received on a parachuting course at JSPW(N). The Panel **observed** that the content of the basic freefall parachute course is the same irrespective of the method used to deliver it (Type 3 or 4 AT, UAAT, Force Development or a BPA course).

Witness 5

1.4.192 During interviews students had good recall of the procedures and drills required for parachuting even though it was several weeks after they had received the training. The Panel concluded that the training received by students was **not a factor**.

1.4.193 The Panel concluded the use of non-qualified personnel to instruct students directly contravened the control measures in the TA, JSATFA, BPA CSBI Proficiency Card and RA 2 for instructors at RAPA. The Panel assessed that incorrect training information and practice could be delivered by unqualified personnel which might increase the likelihood of an accident. The CI, SI and Staff P were the appointed 'Safe Persons', both from a RAPA and TA perspective, to deliver parachute training to EX DBF. The CI and SI allowed non-qualified personnel to deliver instruction to EX DBF students. The Panel concluded that using non-qualified personnel to instruct parachuting to students whilst supervised by qualified instructors was **an other factor**.

1.4.194 The Panel concluded not informing the Technical Authoriser of the use of non-qualified personnel **an other factor**.

1.4.195 **Recommendations:**

- a. **The BPA should reiterate the requirement for qualified personnel only to deliver parachute training.**
- b. **The Armed Forces Sports Board through AOC 22 (Trg) Gp, RAF should ensure the delivery of parachute training in respect of SQEP is routinely assured at JSAT and Sports Clubs/Associations.**

1.4.196 **Safe Persons – Health & Safety (H&S) Training.** The CI was responsible for the safety of the parachute operation. The CI informed the Panel that he had completed a H&S course in 2001 but had not undertaken any training to conduct RA<sup>34</sup>, or received any training in 1<sup>st</sup> Party auditing. The CI did not feel he was qualified to conduct these activities during the period since the assumption of his role at RAPA.

Witness 1

Witness 1

1.4.197 The Centre Manager was responsible for H&S at RAPA but not the parachute operation. The Centre Manager had not received specific H&S training such as Fire Safety, RA or 1<sup>st</sup> Party Audit training at the time of the accident. The Centre Manager was unable to define his roles and responsibilities in regard to H&S and did not feel qualified to competently deliver key management H&S activities at RAPA. Specific training for personnel responsible for the delivery of H&S in organisations is required in order to protect the individual and the organisation. The Panel concluded that a lack of appropriate H&S training for the CI and Centre Manager to be **an other factor**.

Exhibit 85

Witness 6

Witness 6

1.4.198 **Recommendation: The President of RAPA should ensure that RAPA staff undertake all appropriate Health and Safety training commensurate with their roles and responsibilities at the site.**

<sup>34</sup> Asides from a Health and Safety Advisors course.

1.4.199 **Safe Persons - SMS Training.** The CI had a 2 day handover when he assumed the role at RAPA and was not familiar with the RAPA SMS. He was unaware that occurrence forms were to be completed after an incident or accident. He has subsequently familiarised himself with the RAPA SMS process. The CI had not undertaken SMS training. The Panel conclude a lack of SMS training to be **an other factor**.

Witness 1

Witness 1

1.4.200 **Recommendation: The President of RAPA should ensure that RAPA staff undertake appropriate SMS training.**

1.4.201 **Safe Persons – Job Descriptions.** The Panel found evidence of the following Job Descriptions (JD):

- a. Club Chairman: Generic ToR provided by the Directorate ASCB - dated 14 Jan 15.
- b. RAPA Chief Instructor dated 2014.
- c. RAPA Drop Zone Operator, undated.

Exhibit 116

Exhibit 117

Exhibit 85

1.4.202 The Panel was unable to find evidence of specific RAPA JD or ToR for the following positions:

- a. RAPA President.
- b. RAPA Chairman.
- c. RAPA Secretary.
- d. RAPA Centre Warrant Officer/Senior Instructor.
- e. RAPA PES.
- f. RAPA Rigger.
- g. RAPA BA(G)SB Representative.

1.4.203 The Panel was provided with evidence from RAPA of some JD but not for all RAPA personnel. The JD/ToR that were provided were not contained within one overarching document. The Panel concluded that the lack of dedicated JD/ToR were **an other factor**.

1.4.204 **Recommendation: The President of RAPA should ensure role specific JDs/ToR are produced for all RAPA staff.**

1.4.205 **Safe Persons - Duty Holding (DH).** MOD policy for DH requires the appointment of DHs where it has been assessed that there is credible and reasonably foreseeable Risk to Life<sup>35</sup> (RtL) from a Defence activity. Where appointed, a MOD DH is accountable for mitigating the RtL to As Low As Reasonably Practicable (ALARP) and to a level that is tolerable for those involved in the activity and anyone affected by it, including the public. Importantly, a MOD DH's legal responsibilities for H&S are no different to those of any

Exhibit 133

<sup>35</sup> Risk to Life refers to involvement in Defence activity that has high consequence should failure occur and applies to a fatality amongst the work force or members of the public that are both credible and foreseeable.



person who has responsibilities for managing or directing the safety of their activities. However, MOD DHs can be held formally to account for their actions. A DH shall put in place arrangements that conform to the MOD requirements for DH. It should be noted that in some cases, UK H&S legislation and the Health and Safety Executive (HSE) refer to those with specified legal responsibilities for managing the safety of activities as *duty holders*. The use of this term should not be confused with MOD's requirements for DH.

Exhibit 139

1.4.206 The fundamental elements of DH management arrangements are organised in three descending levels from the Senior Duty Holder (SDH), Operating Duty Holder (ODH) and Delivery Duty Holder (DDH) and that any RtL is ALARP at a level that is tolerable. Where this is not possible the DH arrangements shall allow risk to be elevated to the next level of DH. Importantly, the Secretary of State's (SofS's) Policy Statement makes provision for the SDH ultimately to elevate risks to the SofS.

Exhibit 133

Exhibit 139

1.4.207 A DDH is personally responsible for ensuring that resources are adequate to conduct activities safely, that effective management arrangements are implemented and that personnel under their command/management are suitably qualified, experienced, trained and equipped. A DDH owns the Safety Case for their Defence activity, if this is not owned by the ODH or others, and is to be personally satisfied that RtL has been reduced to ALARP. By virtue of their position in the command/management hierarchy and their proximity to the activity, the DDH provides for the supervision of the Defence activity being conducted. A DDH is accountable and has right of access to their appointed superior DH.

Exhibit 139

1.4.208 The Army implemented DH in Feb 14 under OP ORDER 14/002. This document articulated the responsibilities at each level of DH. Further to this the Army issued Fragmentary Order<sup>36</sup> (FRAGO) 01 TO OPO 14/002, which detailed the way in which RtL sport and AT activity would be managed through DH. EX DBF DDH was the CO of 1 RIFLES. He received Subject Matter Expert (SME) advice indirectly, in the form of the Technical Approval process applied to the JSATFA, from OC JSPW(N). The CO was not a parachutist. He took care to substantiate the Safety Case for EX DBF from a general Health and Safety perspective and the parachute activity itself. In accordance with FRAGO 01 TO OPO 14/002 the CO remained DDH whilst EX DBF deployed to RAPA and undertook training. The Chairman of RAPA described himself as DDH at RAPA, which in reference to the FRAGO is correct for delivery of DDH for sport training/competition activity and RAPA association/club activity. As Head of Establishment at RAPA, the Chairman was identified as the DDH for RAPA staff. The Chairman did not deliver DDH responsibilities for EX DBF.

Exhibit 133  
Exhibit 9  
Witness 28

Exhibit 8  
Exhibit 1  
Witness 28  
Witness 29  
Witness 4

Exhibit 82

1.4.209 In summary, the CO was DDH for EX DBF. He was informed by a SME about the propriety of the Safe System of Work at RAPA in order to satisfy himself that the activity risk was ALARP. This was completed in accordance with the JSATFA and TA letter. The Panel note that whilst the CO remained DDH for EX DBF once deployed, he was unable to directly stop the training if a safety issue was encountered. He had to rely primarily on the Senior Instructor (SI) as the Parachute Expedition Supervisor (PES) if issues arose. Student B, as the Expedition Leader (EL) and Student C, as OIC of EX DBF, were able to intervene as necessary. EX DBF members were placed into the hands of Suitably Qualified and Experienced Persons (SQEP) at RAPA in the form of the SI as the PES and the CI as the Advanced Instructor (AI). There were no interventions made when the JSATFA and TA were not followed in regard to who could instruct on EX DBF. This has already been identified as **an other factor** at para 194.

Witness 28  
Exhibit 1

Exhibit 8

1.4.210 The Panel **observed** that FRAGO 01 to OPO 14/002 identifies 2 DDH constructs

<sup>36</sup> Fragmentary Order (FRAGO) is a revisionary order.

for AT. At JSAT centres the DDH is identified as the OC of the training establishment for the delivery of JSAT Type 4<sup>37</sup> courses. For Type 3 AT Expeditions and Unit Authorised AT (UAAT) activity the DDH is identified as the CO of the respective unit.

1.4.211 **SSW - Safe Equipment.** Safe equipment is defined as equipment brought formally into service together with the associated documentation and underpinned by a Safety Case to ensure its safe use by a competent person. Where no Safety Case exists, any equipment hazards should form part of the activity specific RA.

Exhibit 66

1.4.212 The Panel has considered the following factors under Safe Equipment:

- a. Parachute systems:
  - (1) Main parachute.
  - (2) Reserve parachute.
  - (3) Ancillaries.
- b. Weighing Scales.
- c. Suspended Harnesses.
- d. Incident Response Box.
- e. Aircraft.

1.4.213 **Safe Equipment - Parachute Systems.** The parachute systems used by EX DBF were a Telesis 3 Container with a Parachute Industries of Southern Africa (PISA, now a subsidiary of Zodiac Aerospace) Skymaster 290 Ram Air Parachute (RAPs) Main canopy and a Performance Designs 253 Reserve parachute.

Exhibit 19  
Exhibit 43

- a. Main parachute – Skymaster 290.
- b. Reserve parachute – PR 253.
- c. Ancillaries – Radio, helmet, life jacket, jumpsuit and altimeter.

1.4.214 These parachute systems are Federal Aviation Administration (FAA) approved. Both main and reserve parachutes are packed into a container from which they are deployed. The manufacturer of the container was Rigging Innovations and the version used at RAPA was the Telesis 3. The Panel visited the container manufacturer and was provided a walk-through of the entire assembly process, including the built in safety checks. Rigging Innovations has a worldwide distribution of their products, including the type of parachute container used at RAPA that all meet the standards required by the FAA. Rigging Innovations' products are used extensively in sport parachuting.

Exhibit 42

Exhibit 35

1.4.215 The main parachutes used by LCpl Woodford (red) and Student A (blue) had accurate and up to date packing histories. This was in accordance with the packing book. The reserve parachute of LCpl Woodford had been checked and re-packed on 5 Aug 15 by the Rigger at RAPA. Student A's reserve parachute had been checked and re-packed by the Rigger on 14 Jul 15. These procedures were in accordance with policy. All the

Exhibit 19  
Exhibit 43  
Exhibit 44

<sup>37</sup> Type 4 AT is an instructional course in any AT discipline provided at a JSAT Centre.

associated documentation was up to date with the exception of a minor anomaly in the reserve packing check sheet which has already been discussed in this report at para 1.4.40.

Exhibit 6

1.4.216 The ancillary equipment issued to LCpl Woodford was inspected by RAF CAM and found to be serviceable. The jumpsuit and life jacket were not provided for inspection. The Panel note that the helmet worn by all students had been modified to accommodate the externally mounted radio. The radio was fitted by drilling holes into the helmet. The Panel was not able to locate a record of modification for the helmet. The Panel noted there were differences in the type of helmets used in sport parachuting in the Armed Forces.

Exhibit 19

1.4.217 The Panel received a report from RAF CAM that indicated the main and reserve parachutes of LCpl Woodford and Student A were serviceable. This supports the fact that both subjects had flown their respective parachutes without incident once earlier in the day and that their descent during their second jump up to the point of the collision was without significant incident.

Exhibit 19  
Exhibit 22

1.4.218 The RAF CAM report identified damage to the main canopy flown by LCpl Woodford which was attributed to the collision between LCpl Woodford and Student A. The damage related to the collision was substantiated by the report produced by 1710 NAS which identified that the red fibres found in the steering lines of Student A's canopy were most likely to have originated from the red canopy.

Exhibit 19  
Exhibit 38

1.4.219 The main and reserve parachutes were in a serviceable condition. The main parachute had flown appropriately during both descents undertaken by LCpl Woodford and Student A. The reserve parachute systems were serviceable and fit for purpose. The Panel concluded that the main and reserve parachutes were **not factors** in this accident.

1.4.220 In the course of the investigation the Panel visited all JSAT PTOs. It was highlighted that at FDTC(W) and JSPCW(N) parachute systems that have reached the end of their serviceable life were being replaced with systems that are fitted with a Mains Activated Reserve Deployment System (MARDS). This is a safety feature that purportedly reduces the time taken to fully deploy the reserve parachute should the reserve drill be conducted by the parachutist. A version of a MARDS is fitted to military parachute systems. The Panel **observed** that MARDS systems are being introduced across military and sport parachuting.

Exhibit 140  
Exhibit 131  
Exhibit 135

1.4.221 **Recommendations:**

- a. **The Armed Forces Sports Board through AOC 22 (Trg) Gp, RAF, should investigate the introduction of MARDS into Sport Parachute systems across Armed Forces Sport Parachuting.**
- b. **RAPA should clarify the propriety of the helmet modifications made to accommodate the radios used for STD.**

1.4.222 **Safe Equipment - Weighing Scales.** The Panel found two sets of scales at RAPA for the intent of weighing students but were unable to verify which were used for the weighing in process. On investigation the 2 sets of scales, one electronic and one mechanical, had not been calibrated since 2008. The CI acknowledged that they were not calibrated and ultimately he was responsible. The Centre Manager did not know who was responsible for them and was not aware of their calibration status. The Panel **observed** that the scales had not been calibrated. The Panel **observed** that the scales are not included in an audit process. The Panel discussed this as **an other factor** at para 1.4.246.

Exhibit 130

Witness 1  
Witness 6



1.4.223 **Recommendation: The President of RAPA should ensure the scales are calibrated and regularly audited.**

1.4.224 **Safe Equipment - Suspended Harness.** A suspended harness is a training aid mandated across PTOs. A student parachutist is put into the harness in order to develop their understanding of parachute drills. The Panel noted that, as with other sites visited in the course of the SI, the cut away pad and reserve handle did not have the same resistance as the issued parachute system.

Exhibit 6

1.4.225 **Safe Equipment - Incident Response Box.** RAPA has an incident response box. This was used during the accident on 29 Sep 15. The 2 responders reported that the camera contained in the incident response box required an SD card. This entailed them having to return to the RAPA Centre from the scene of the accident in order to obtain a memory card before they could continue their duties. The Panel **observed** a lack of an audit process applied to the incident response box.

Witness 1  
Witness 7  
Witness 8

1.4.226 **Recommendation: The President of RAPA should ensure the Incident Response Box at RAPA is included in the audit process and inspected at regular intervals.**

1.4.227 **Safe Equipment - Aircraft.** The aircraft and pilot were provided under a contract arranged by RAPA. The aircraft used was a Dornier 28, registration D-IMOC and the pilot was a BPA member and qualified for parachute dropping. The Panel has not included this as an area of investigation.

Exhibit 141  
Witness 14

1.4.228 **SSW - Safe Practice.** Safe Practice covers the safe conduct of any activity. Such activity should be risk assessed in detail and include hazards arising from the use of equipment in the specific location by Competent Persons to ensure the RtL remains ALARP.

Exhibit 66

1.4.229 The Panel has considered the following factors under Safe Practice:

- a. Training Content.
- b. Parachute Operations.
- c. Training Ratios.
- d. Post-Accident Management.

1.4.230 **Safe Practice - Training Content.** The content of the training syllabus is laid down in the BPA Ops Manual. The BPA also have guidelines for the content of lesson plans required to meet the syllabus but PTOs, such as RAPA, commonly produce their own site specific lesson plans. The training syllabus at RAPA was laid out in 12 lesson plans. The lessons were in a standard format and dated Apr 14. The aims and objectives of the lessons were all clearly listed. At the end of each lesson the student's understanding is confirmed by questions posed by the instructor. Two of the lessons at RAPA were delivered initially via PowerPoint presentations (canopy control and malfunctions) as theory based training. The canopy control and malfunctions practical suspended harness lessons were combined. The final lesson plan was a confirmation of student understanding and entailed an examination where students must answer all questions correctly prior to undertaking their first parachute descent. The Panel reviewed the content of all the lessons at RAPA and comment:

Exhibit 6  
Exhibit 147

Exhibit 26

Exhibit 26

**OFFICIAL SENSITIVE**

a. **Written Examination.** The examination was delivered by the SI. Students were required to place an 'X' in the box for the correct answer. Some students placed an 'X' and others circled the answer; both were accepted to denote an answer. If an incorrect answer was selected a new 'X' (or circle) was to be placed in the box. The Panel found that on completion of the examination the question set was reviewed by the SI and incorrectly answered questions were discussed with individual students and the group. The Panel found that a single dot was used to identify correct answers where incorrect answers had been given to a question. LCpl Woodford was the only student to answer 3 questions incorrectly. The 3 questions LCpl Woodford answered incorrectly were:

- (1) Question 10 – after carrying out the safety count you look up if you see damage to your canopy or broken lines you should do which of the following? LCpl Woodford answered option a. Take hold of steering toggles and carry out a control check. The correct answer was d: Carry out the reserve drill.
- (2) Question 15 – if your reserve canopy deploys and is flying next to your main canopy you should do which of the following? LCpl Woodford answered option b. Carry out the reserve drill. The correct answer was a: Steer with main toggles, use small input, land into an open free area, do not flare.
- (3) Question 17 – after collapsing the canopy how should you indicate to DZ Control that you are ok? LCpl Woodford answered option c. Go down onto one knee. The correct answer was b: Wave.

b. These were corrected by the SI during review. The RAPA lesson plan for the examination stated that any student incorrectly answering more than 4 questions was to be retrained and take an additional examination. The Panel visited other PTOs and found that different question sets were used. The standards for the number of incorrect answers before a student required re-training were also different. Table 1.4.1 contains a summary of answers provided by EX DBF personnel.

EX DBF PERSONNEL	QUESTIONS ANSWERED INCORRECTLY	REVISION TRG GIVEN BY THE SI	CROSS (X) OR CIRCLE (O) ON ANSWER PAPER
Student C	10A	YES	Cross
Student G	22A	YES	Circle
Student D	22A	YES	Circle
Student N	10A	YES	Cross
Student B	22A	YES	Cross
Student L	22A	YES	Cross
LCpl Woodford	10A, 15B, 17C	YES	Cross
Student J	NIL	N/A	Cross
Student A	NIL	N/A	Cross
Student K	15B, 17C	YES	Cross
Student H	10A, 17C	YES	Cross
Student E	NIL	N/A	Cross
Student F	NIL	N/A	Cross
Student M	NIL	N/A	Cross

**Table 1.4.1 – EX DBF Personnel Examination Summary.**

Witness 3

Exhibit 16a  
Exhibit 16b

Exhibit 16a

Witness 3  
Exhibit 26  
Exhibit 16a  
Exhibit 26  
Exhibit 87

Exhibit 16a  
Exhibit 16b



c. Incorrectly answered questions were to be initialled on the RAPA examination instruction by students once corrective training has been received. The Panel found that the SI did not have the students carry out this requirement.

Exhibit 26  
Exhibit 121

d. Any additional instructors used in the ground based training must be annotated on the answer sheet. The Panel found that the additional instructors section on the answer sheets was not completed.

Exhibit 26  
Exhibit 16a  
Exhibit 16b

e. In summary, the Panel found that questions answered incorrectly were not initialled by students or appropriately modified on completion of corrective training. The Panel found that additional instructors were not identified in the answer sheets. The Panel found that the examination process at RAPA was not completed in accordance with Lesson 12 or the BPA STC minutes. There was no evidence linking the incorrect answers to the accident or the actions of LCpl Woodford once entangled. However, the Panel consider the examination process at RAPA **an other factor** that could contribute to future accidents.

f. **Student Talk Down (STD) Lesson Content.** The Panel found evidence that STD was discussed in lessons 2 and 10 of the RAPA syllabus. There was no specific lesson period for STD delivery or a separate lesson plan detailing the content required to be taught including the words of command given by the instructor providing STD. The Panel could not find any evidence of a consolidated list of instructions that the STD would be expected to deliver to student parachutists apart from that contained in the CAA Parachutists Aeronautical Radio Operators Guide. This reference was not linked to RAPA SOPs or lesson plans. After the first lift had completed their descent the CI conducted an impromptu brief on canopy control and STD (the CI provided STD for the majority of the descents made by the first lift). He stated that this was required because of the perception that students demonstrated poor canopy control. The Panel found evidence that students were confused as to who was being spoken to by the STD during their descent on the first lift. The Panel concluded that the lack of a defined lesson plan and lesson period for STD to be **an other factor**.

Exhibit 26  
Exhibit 26

Exhibit 50

Witness 1

Witness 24

Witness 17  
Witness 25

#### 1.4.231 Recommendations:

a. **AOC 22 (Trg) Gp, RAF should review the Basic Freefall Parachute examination process to provide standardisation when delivered during an expedition and at JSAT Centres.**

b. **The President of RAPA should ensure that the examination documentation is completed correctly and compliance should be audited.**

c. **The Chief Operating Officer of the BPA should include a lesson plan on STD with specific instructions and terminology.**

1.4.232 **Safe Practice - Parachute Descents.** There are a number of hazardous possibilities that could occur during a parachute descent including a collision with or without entanglements; a parachute land-off (parachutist not landing on the designated DZ); a low canopy turn and an uncontrolled landing. It is the responsibility of the parachutist to control their canopy by carrying out the training they have received to descend and land safely.

Exhibit 121

1.4.233 The following paragraphs deal specifically with a collision/entanglement. In order to reduce the risk of collisions to ALARP, parachute operations contain a number of control



measures which are either directly or indirectly applied:

a. Direct measures used by students to maintain separation:

(1) Checking all round observation. This training element is important in that it promotes and develops awareness of the parachutist's position in the air relative to other parachutists and the parachute landing area. All round observation is undertaken before and after the execution of turns and prior to checking the altimeter.

Exhibit 26

Exhibit 26

(2) Turning away on detecting another parachutist. Each parachutist steers away from each other to increase their separation.

Exhibit 26

(3) Turning right if detecting another parachutist on a head-on flight path. Both parachutists turn right and increase their separation.

Exhibit 26

b. Indirect means to influence the maintenance of separation:

(1) Student Weights and Wing loading.

(2) Canopy Colours.

(3) Despatch Order.

(4) Canopy Turns.

1.4.234 Any number of these elements could be absent or applied incorrectly, which might contribute to a collision. It is reiterated that a student parachutist has the direct means by which to control their parachute by applying turns based on visual cues but can also be assisted indirectly by procedures built into the parachute operation. The Panel believed that if applied correctly these measures would reduce risk of a collision to ALARP.

Exhibit 121

1.4.235 The Panel has already analysed the direct means of controlling a parachute descent in the section covering the collision. The following section of the report discusses the indirect means of influencing the control of a parachute descent.

1.4.236 **Safe Practice - Student Weights and Wing Loading.** Wing loading is a measurement of how much total weight is supported by how large a wing, and is usually expressed in pounds per square foot. Everything the parachutist exits the aircraft with, including clothing, the parachute system and ancillary equipment must be included in the weight<sup>38</sup>.

Exhibit 137

1.4.237 Practice according to the BPA is for a maximum wing loading to be applied to students conducting their initial parachute descents. The wing loading limitation is therefore a safety measure to provide the student parachutist with a relatively slow rate of descent.

Exhibit 6

1.4.238 In accordance with the BPA Ops Manual, students completing their first descent are to have a wing loading of 0.8 lbs/sq.ft. The next descent can be undertaken using a maximum wing loading of 0.85 lbs/sq.ft. The exception to these limitations is where the manufacturer of the parachute system published that a higher wing loading is suitable; this advice may then be followed. Parachute Industries of South Africa (PISA), the

Exhibit 6  
Exhibit 6  
Exhibit 6  
Exhibit 6

<sup>38</sup> Wing Loading and its Effects – John Le Blanc.

manufacturers of the Skymaster 290 parachutes used at RAPA, stated a maximum all up mass of 250 lbs (113kg) must not be exceeded. RAPA used a wing loading of 0.86 lbs/sq.ft published on a weight chart in the kit store, for student parachute descents. This was commensurate with PISA's maximum all up mass (250 lbs / 290 sq.ft = 0.86 lbs/sq.ft) but in excess of the BPA Ops Manual limitation. The reserve parachute had an all up mass of 115kg which must not be exceeded.

Exhibit 6  
Exhibit 93  
Exhibit 119  
Exhibit 26  
Exhibit 15  
Exhibit 134

1.4.239 The weight of a student is required so that a correctly sized parachute is issued in order to meet wing loading guidance published by the BPA or the respective parachute manufacturer. The weight of a student parachutist should be recorded during the induction process.

Exhibit 6  
Exhibit 26

1.4.240 The induction and weigh-in process was undertaken by non-qualified junior staff. The CI and SI did not supervise the induction process. The Panel are not able to verify if all students used the scales as self-reporting of weight may have occurred. The Panel has already described that the 2 sets of scales found at RAPA were not calibrated. Students' weights were recorded on a self-declaration form and on the parachute 'one jump course confirmation of training and control sheet'.

Witness 24  
Witness 13  
Witness 1,3  
Witness 5,  
21, 9  
Exhibit 15

1.4.241 LCpl Woodford's weight is recorded as 97kg on the self-declaration form and the confirmation of training sheet. The Panel could not ascertain whether the recorded weight was self-reported or measured using the scales. LCpl Woodford's weight gives a wing loading of 0.86 lbs/sq.ft for the parachute system he was issued – a Skymaster 290. LCpl Woodford's wing loading is commensurate with the standards published at RAPA and the manufacturer of the parachute but was outside of the BPA recommendations for his first and second descent.

Exhibit 134

1.4.242 LCpl Woodford's Post Mortem (PM) weight was 110kg. It has been established by the Panel that the scales in the mortuary had an error of approximately 10kg (over reading). If this was correct his weight at PM (after correcting for the error) indicated that he was 2kg in excess of the 98kg weight permitted for the parachute he was issued by RAPA.

Exhibit 32  
Exhibit 146  
Exhibit 119

1.4.243 There is evidence that Student L had a weight recorded as 100kg on his self-declaration form. The Panel also found evidence that states Student L's weight of 100kg was subsequently amended (crossed out) and over-written with a weight of 93kg. Student L was issued a parachute the same size as LCpl Woodford. If he was 100kg he used a parachute outside of the policy requirements set at RAPA and by the BPA. This would have been contrary to the control measures detailed in the Risk Assessments for students being too heavy for issued parachutes.

Exhibit 134  
Exhibit 15  
Exhibit 119  
Exhibit 6  
Exhibit 59

1.4.244 Based on the evidence the Panel was unable to verify the weights of any of the members of EX DBF. Subsequently, the Panel was unable to confirm that correctly sized parachutes were issued to EX DBF personnel.

1.4.245 The Panel noted that the BPA stated a wing loading limitation on the main parachute for the first 2 descents. This can be overridden if the manufacturer of the respective parachute stated a higher wing loading limit. The Panel noted that the wing loading at RAPA was in accordance with the manufacturers' maximum all up weight for the parachute. The Panel assessed that the BPA wing loading limitations of 0.8 and the manufacturer's wing loading guidelines conflict and create ambiguity.

1.4.246 The Panel concluded that the unsupervised weighing of students was **an other factor**. The Panel concluded the use of un-calibrated scales was **an other factor**. The Panel concluded that student self-reported weight to be **an other factor**. These factors

increased the potential for incorrectly sized parachutes, exceeding the RAPA wing loading guidance, to be issued to students.

**1.4.247 Recommendations:**

- a. **The Chief Operating Officer of the BPA should clarify the wing loading policy applied to main canopies for the first 2 student descents in order to remove ambiguity.**
- b. **AOC 22 (Trg) Gp, RAF, should ensure wing loading policy for main canopies in JSAT activity is applied across JSAT sites and on expeditions.**
- c. **The President of RAPA should ensure the documentation lesson is delivered by BPA qualified instructors.**
- d. **The President of RAPA should ensure that students are formally weighed during the documentation process. This should be undertaken and recorded by a qualified instructor.**

**1.4.248 Safe Practice - Colour of Canopy.** Directly linked to STD, canopy colour is the means by which the person conducting the talk down duties at RAPA identifies parachutists as they descend. There are no instructions in the BPA Ops Manual describing the means by which to identify student parachutists during their descents. Equally, there was nothing in JSAT documentation that indicates a specific system should be used to identify parachutists. The operation at RAPA used canopy colours to identify those in the air although there was nothing in the RAPA SOPs that stipulates this practice. The parachute colours for main canopies used at RAPA are blue, red and yellow. The colours of packed main parachutes are identified by a coloured tab in the packing book.

Witness 1  
Exhibit 19

**1.4.249** Student parachute operations at RAPA could see up to four parachutists in the air simultaneously. When there are two or more canopies of the same colour in the air the STD used the terms 'pass 1' and 'pass 2' and the specific canopy colour to differentiate between parachutists. During the first lift students reported confusion as to who the STD gave instructions. The terms high and low with the respective canopy colour were used by the STD. It was considered that some students ignored instructions by the STD and were shouted at by the STD during their descents because they were not responding to instructions. The third lift, during which the accident occurred, contained exactly the same students as were on the first lift albeit in a different despatch order.

Witnesses  
1, 2, 17, 23,  
24  
Witness 7  
Witness 2  
and 25

**1.4.250** On completion of the first lift and prior to the second lift, the CI ordered the aircraft to be shut down so that he could re-brief all students on the required standard of canopy control and to listen to the instructions provided by the STD. After this briefing by the CI, students on the second lift of the day conducted their descents without incident.

Witness 1  
and 17  
Witness 1  
and 17

**1.4.251** The Panel witnessed JSAT centres using student numbering to identify parachutists during their descents. There was one exception to this where a centre used colours to identify parachutists because every canopy has a distinct and unique marking. This could be identified by the STD and the student parachutist.

**1.4.252** The CI delivered STD to all those who parachuted on the third lift. Table 1.4.2 and Table 1.4.3 detail the canopy colour order.



Lift 1	Exit Order	Canopy colour
1 <sup>st</sup> Pass	Student C	Red
	Student N	Blue
2 <sup>nd</sup> Pass	Student K	Blue
	LCpl Woodford	Red
3 <sup>rd</sup> Pass	Student J	Red
	Student A	Blue
4 <sup>th</sup> Pass	Student L	Blue
	Student M	Red

Table 1.4.2 – Canopy Colours for Lift 1.

Lift 3	Exit Order	Canopy colour
1 <sup>st</sup> Pass	RAPA Staff D	Yellow
	Student M	Red
	Student J	Red
2 <sup>nd</sup> Pass	Student A	Blue
	LCpl Woodford	Red
3 <sup>rd</sup> Pass	Student K	Blue
	Student L	Blue
4 <sup>th</sup> Pass	Student C did not jump	Red
	Student N did not jump	Blue

Table 1.4.3 – Canopy Colours for Lift 3.

1.4.253 The Panel did not find evidence that students were confused during the parachute descents on the third lift. The Panel could find no evidence connecting the use of canopy colours to the accident. RAPA staff did not use the coloured tab associated with respective rigs to inform a subsequent parachute despatch order. Based on the confusion experienced during the first lift of the day the Panel believed that RAPA's continued use of either 'pass 1' 'pass 2' and/or canopy colours, or the terms high and low and canopy colour, as the means of identifying parachutists to be inadequate. The Panel concluded that using canopy colours as a means of identifying descending parachutists without de-confliction of the despatch order to be **an other factor**.

**1.4.254 Recommendation: The Chief Operating Officer of the BPA should clarify the most suitable means of identifying student parachutists during STD and publish the findings in the BPA Ops Manual.**

**1.4.255 Safe Practice - Despatch Order.** When despatching student parachutists the BPA limit the number to exit the aircraft at 2 per pass and RAPA adopted this policy. The Panel visited JSPW (N) where the procedure was to have the heaviest student exit the aircraft first followed by the lighter student. If 2 students are issued the same sized parachutes theoretically the heavier student would have a higher rate of descent. The BPA Ops Manual does not define a policy regarding student despatch order. The practice of heavy first and lighter second is purported to facilitate the maintenance of vertical separation between parachutists. The intent at RAPA was to apply this practice. EX DBF students were all issued the same sized parachutes.

1.4.256 The SI's intent was to put EX DBF students into an appropriate despatch order according to their size and weight. The Panel found evidence that a jump order was not directed by the SI. The students on the first lift were the same students on the third lift. Table 1.4.4 and Table 1.4.5 describe the despatch order for lift 1 and 3. The students were not in weight order for the first lift but were better distributed for the third lift.

Exhibit 17  
Witness 2

Witness 24

Witness 2  
Witness 26

Exhibit 22

Exhibit 19

Exhibit 6  
Witness 1

Witness 1  
Exhibit 15

Witness 3

Exhibit 17  
Exhibit 15

Lift 1	Exit Order and Weight Individual Recorded	Weight (Kg)
1 <sup>st</sup> Pass	Student C	85
	Student N	75
2 <sup>nd</sup> Pass	Student K	94
	LCpl Woodford	97
3 <sup>rd</sup> Pass	Student J	75
	Student A	97
4 <sup>th</sup> Pass	Student L	93
	Student M	75

Table 1.4.4 – EX DBF Lift 1 Despatch Order.

Lift 3	Exit Order and Weight Individual Recorded	Weight (Kg)
1 <sup>st</sup> Pass	RAPA Staff D	N/A
	Student M	75
	Student J	75
2 <sup>nd</sup> Pass	Student A	97
	LCpl Woodford	97
3 <sup>rd</sup> Pass	Student K	94
	Student L	93
4 <sup>th</sup> Pass	Student C did not jump	85
	Student N did not jump	75

Table 1.4.5 – EX DBF Lift 3 Despatch Order.

1.4.257 The Panel concluded that the evidence indicated that appropriate control of the despatch order was not applied. Omitting to size parachutists off according to their weight and prioritising a heavy first and light second despatch order is considered by the Panel an **other factor**. The Panel **observed** there is no policy for despatch order according to the size of an individual.

1.4.258 **Recommendation: The Chief Operating Officer of the BPA should confirm the requirement for despatch order by weight in relation to wing loading and parachute sizes for student parachutists.**

1.4.259 **Safe Practice - Canopy Turns.** Effective canopy control during all phases of the parachute descent was a fundamental aspect of ground based training. Systematic and repetitive training was delivered in order to maximise the student's ability to perform the required control actions during their first descent. Deliberately controlling turns during descents helps to maintain separation of parachutes in the airspace. The Panel found evidence that lessons 7 and 9 contained contradictory information in relation to the extent of turns permitted during initial parachute descents. The content of the presentation related to Lesson 7 (Canopy Control) limits the turns to 180 degrees for the first 2 descents. The presentation associated with Lesson 9 (Malfunctions Theory) advised that spiralling below 1500ft agl was not to be undertaken. During the descent in which the accident occurred, the CI instructed students to do spirals (360 degree turns). The Panel found no evidence linking instructions about turning to the accident. The Panel found that lessons 7, 9 and STD instructions were contradictory. The Panel concluded that contradictory information in lessons and during STD was an **other factor**.

1.4.260 **Recommendation: The Chief Operating Officer of the BPA should define the turns permissible for student parachutists during the first 2 descents and publish its findings in the BPA Ops Manual.**

Witness 2

Witness 24

Witness 2

Witness 26

Exhibit 22

Exhibit 121

Exhibit 26

Witness 1

Witness 2



1.4.261 **Safe Practice - Training Ratios.** Parachute training ratios are set by the BPA and aim to define the number of instructors required to deliver training safely. The basic freefall parachute course required a ratio of 1 instructor to 12 students (1:12). MOD JSAT Centres are provided a dispensation by the BPA to use a 1:15 instructor/student ratio. The Panel found evidence that the ratio for Military expeditions was 1:12 in accordance with 2014 DIN 07-094.

Exhibit 6  
Exhibit 118  
Exhibit 74

1.4.262 RAPA ceased to be a JSAT parachute Centre in 2012 and therefore lost its right to implement the dispensation provided by the BPA to JSAT parachute sites of a 1:15 instructor/student ratio. The SI, who was the nominated PES for EX DBF, had sat the PES examination at JSPW(N) and answered the ratio question 1:15. This was incorrect but was marked as being correct. The CI sought clarification from the BPA Chief Operating Officer (COO) in Jun 15 that the 1:15 ratio was applicable to RAPA. The CI was given verbal confirmation this was the case. This was rescinded after the accident in Sep 15.

Exhibit 10  
Exhibit 120  
Witness 1  
Exhibit 122

1.4.263 A number of ground based training elements were delivered to EX DBF students outside of the 1:12 ratio. The evidence indicated that RAPA made an effort to clarify what ratio they should work to and this was provided by the BPA even though they were no longer a JSAT site.

Witness 3  
Witness 1

1.4.264 The Panel concluded the training delivered at RAPA for EX DBF was in excess of the extant ratios published in 2014 DIN 07-094. Non-adherence to training ratios for parachuting is **an other factor**.

1.4.265 **Recommendations:**

- a. **The President of RAPA should ensure that instructor/student ratios are adhered to in the delivery of training in accordance with the BPA Ops Manual and 2014DIN07-094.**
- b. **AOC 22 (Trg) Gp, RAF should clarify the rationale for working in excess of the BPA limitations for instructor/student ratios at JSAT Centres.**

**Post-Accident Management.**

1.4.266 The Panel has reviewed the following post incident management processes:

- a. Immediate response.
- b. Follow up actions.

1.4.267 The immediate responses to the accident by RAPA staff were in accordance with their SOPs. The CI took control of co-ordinating the various elements of the accident response and is commended for that action. The medical emergency services, military and civilian police authorities, BPA and military points of contact were all informed in a timely and efficient manner. The first civilian emergency medical responders were on site within 15 mins. Staff C and D conducted the accident scene management and apart from an issue with the SD card for the camera no issues arose in their ability to conduct these duties.

Exhibit 18  
Witness 1  
Exhibit 28  
Witness 7  
Witness 8

1.4.268 Staff C and D were nominated to respond to the accident because they were the first 2 personnel identified by the CI. These staff members were involved in parachute operations at the time. The Panel **observed** a daily nominated response team was not recorded at RAPA. Overall, the Panel is satisfied that what was necessary in terms of a response to the accident was conducted effectively by RAPA staff.



1.4.269 Actions following the accident included:

- |    |   |                      |
|----|---|----------------------|
| a. | SIB/Mil police inspection/analysis of the scene.            | Exhibit 27<br>and 28 |
| b. | Identification of the deceased.                             | Witness 1            |
| c. | Removal of the parachute system from the deceased.          | Witness 17           |
|    |   | Witness 1            |
| d. | Removal of the deceased from the scene.                     | Exhibit 30           |
| e. | Post mortem.  | Exhibit 32           |
| f. | Trauma risk management for EX DBF personnel and RAPA staff. | Witness 8            |
|    |   | Witness 5            |
| g. | Repatriation of the deceased.                               | Witness 30           |

1.4.270 RAPA had an internal training process aimed to ensure all personnel were appropriately trained for the tasks expected of them in the conduct of their duties at the site. This training was delivered between 4 - 6 Mar 15. The training included:

- |    |   |             |
|----|---|-------------|
| a. | Aircraft Awareness Training 4 Mar 15.           | Exhibit 101 |
| b. | Manual Handling 4 Mar 15.                       | Exhibit 123 |
| c. | Incident Procedures 5 Mar 15.                   | Exhibit 124 |
| d. | Fire Awareness Training 5 Mar 15.               | Exhibit 125 |
| e. | Bulk Fuel Installation (BFI) Training 5 Mar 15. | Exhibit 126 |
| f. | First Aid Training 6 Mar 15.                    | Exhibit 127 |
| g. | DZ Procedures 6 Mar 15.                         | Exhibit 128 |
|    |   | Exhibit 129 |

1.4.271 The Panel **observed** that it was not able to verify the lesson content of each training element less the BFI training.

1.4.272 **Recommendation: The President of RAPA should ensure each element of internal training is detailed in a lesson plan.**

1.4.273 The Panel is satisfied that immediate and follow up responses relevant to the accident were conducted appropriately and competently.

1.4.274 **Recommendation: The President of RAPA should identify accident responders on a roster prior to the start of parachute operations. These personnel should not be involved in parachuting activity.**

#### Duty of Care

1.4.275 The Secretary of State for Defence's Health, Safety and Environmental Protection (HS&EP) Policy Statement of Aug 14 states that 'both the employer and employees have duties under the Health, Safety and Environmental Protection legislation; the duty of the employer is devolved in his Area of Responsibility (AoR) on each commanding officer or manager; this is referred to as a 'duty of care'. The Chairman was Head of Establishment for RAPA and therefore held the responsibility for ensuring the workplace and the activities

Exhibit 139  
Witness 3  
Witness 4

undertaken at RAPA were conducted in accordance with HS&EP policies. In the Panel's opinion this 'duty of care' responsibility took precedence over the Duty Holding model when EX DBF arrived at RAPA.

1.4.276 The Panel has identified a number of command/control, safety, training and parachute issues at RAPA. In the Panel's opinion these issues indicated a complacent approach to safety, training and parachute operations. The areas identified as **factors** in this report could all lead to future accidents and there is a duty of care obligation to address them appropriately.

### **Summary of Findings**

#### **Causal Factor (CF)**

1.4.277 The Panel identified one causal factor. Those factors which, in isolation or in combination with other factors and contextual details, led directly to the accident.

- a. CF 1 – LCpl Woodford and Student A continued on a converging flight path because of a lack of visual detection. 1.4.78

#### **Contributory Factors (Con F)**

1.4.278 The Panel identified 3 contributory factors. Those factors that may have made the accident more likely.

- a. Con F 1 – LCpl Woodford and Student A undertook converging downwind legs due to conflicting instructions regarding the LP. 1.4.81
- b. Con F 2 – Combining the duties of STD and DZ Controller. 1.4.96
- c. Con F 3 – The loss of vertical separation between LCpl Woodford and Student A as they commenced their downwind legs. 1.4.101

#### **Aggravating Factors (AF)**

1.4.279 The Panel identified 4 aggravating factors that made the outcome worse.

- a. AF 1 – LCpl Woodford was at a low height when he conducted his reserve drill. 1.4.21
- b. AF 2 – LCpl Woodford's body position as he conducted his reserve drill. 1.4.25
- c. AF 3 – The lack of specific training on procedures to be conducted when entangled. 1.4.53
- d. AF 4 – The lack of a stated minimum cut away height. 1.4.62

#### **Other Factors (OF)**

1.4.280 The Panel identified 21 other factors that, whilst not causal or contributory in the accident, may cause or contribute to a future accident.

- a. OF 1 – The lack of a specific RA for actions on collision and entanglement between student parachutists. 1.4.53

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b.	OF 2 – STD positioned in the control tower.	1.4.85
c.	OF 3 – Non-adherence to policy in regards to reviewing RA.	1.4.154
d.	OF 4 – Not reviewing or appropriately completing sections of the SMS related to incidents and accidents could lead to safety omissions in the future.	1.4.160
e.	OF 5 – An overall failure to apply adequate Safety Management at RAPA.	1.4.161
f.	OF 6 – The application of assurance at RAPA was inadequate.	1.4.172
g.	OF 7 – The lack of clarity in the Technical Authority letter in defining who should be in charge of a given expedition.	1.4.183
h.	OF 8 – Using non-qualified personnel to instruct parachuting to students whilst supervised by qualified instructors.	1.4.193
i.	OF 9 – The EL not informing the Technical Authoriser of the use of non-qualified personnel.	1.4.194
j.	OF 10 – The lack of appropriate H&S training for the CI and Centre Manager.	1.4.197
k.	OF 11 – The lack of SMS training.	1.4.199
l.	OF 12 – The lack of dedicated JD/ToR.	1.4.203
m.	OF 13 – The examination process at RAPA.	1.4.230e
n.	OF 14 – The lack of a defined lesson plan and lesson period for STD.	1.4.230f
o.	OF 15 – Unsupervised weighing of students.	1.4.246
p.	OF 16 – The use of un-calibrated scales.	1.4.246
q.	OF 17 – EX DBF students self-reporting of weights.	1.4.246
r.	OF 18 – Using canopy colours as a means of identifying descending parachutists without de-confliction of the despatch order.	1.4.253
s.	OF 19 – Omitting to size parachutists off according to their weight and prioritising a heavy first and light second despatch order.	1.4.257
t.	OF 20 – Contradictory information in lessons and during STD.	1.4.259
u.	OF 21 – Non-adherence to training ratios.	1.4.264

**Observations (O)**

1.4.281 The Panel made 389 observations.

a.	O1 – There is no minimum spring compression force stated either in published documentation from Rigging Innovations or the spring manufacturer.	1.4.27
b.	O2 – Reserve 6 monthly checks are conducted by the Rigger without 1st	



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Party Assurance measures applied to the re-packing of the respective parachute.	1.4.40
c. O3 – When LCpl Woodford and Student A were entangled whilst they could have remained in that state until they landed their training conditioned them to conduct the reserve drill as an immediate action.	1.4.60
d. O4 – The CI did not use binoculars when conducting STD and DZ Controller duties.	1.4.86
e. O5 – The Stage One Assessment – Self Certificate of Health document was not completed by members of EX DBF.	1.4.104
f. O6 – Sport Parachuting in the Armed Forces is not co-ordinated by a single MOD organisation.	1.4.106
g. O7 – Incremental staff at RAPA were placed on duty for all aspects of RAPA activity including RAPA ‘sports association’ parachuting.	1.4.117
h. O8 – RAPA was a non-publically funded sports association employing publically funded incremental staff.	1.4.117
i. O9 – The request for manpower dated Jan 16 still referred to RAPA as JSPC(L) some four years after the closure of the site as a JS Parachute Centre.	1.4.118
j. O10 – RAPA has delivered ‘club’ sport parachuting to its members and also facilitated and delivered JSAT Expeditions.	1.4.120
k. O11 – There was no recorded audit of RAPA undertaken by the Lead Service after the site ceased to be the JSPC(L) and that the BPA was the sole deliverer of such activity.	1.4.128
l. O12 – TA approval for the Expedition location was solely dependent on the site being included in the 2014DIN 07-094.	1.4.134
m. O13 – The Expedition Incident and Level 3 Parachuting Expedition brief were not signed by the extant OC JSPW(N).	1.4.134
n. O14 – The UATO had not completed the on-line UATO training course when he supervised the completion of the JSATFA but note that he researched the relevant documentation whilst conducting these duties.	1.4.134
o. O15 – The RA provided by RAPA were out of date and that this fact was not picked up in the review/approval process.	1.4.134
p. O16 – The APA is deemed the lead in Army sport parachuting but do not govern or influence RAPA.	1.4.137
q. O17 – There are differing means by which military sports parachute associations/clubs are governed although all are affiliated and assured by the British Parachute Association (BPA).	1.4.138
r. O18 – The DIA 2015 report detailed that there was no agreed encroachment in place between DIO and RAPA for the year 2015.	1.4.143
s. O19 – An agreement was not in place at the time of the accident.	1.4.143

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t.	O20 – RA 2 and 5 were not signed off by the Line Manager.	1.4.153
u.	O21 – H&S notices were out of date.	1.4.153
v.	O22 – The requirement for the auditing, monitoring and reporting process was not explicit in the RAPA SMS documentation.	1.4.160
w.	O23 – The same member of staff was detailed as the Safety Officer, Accountable Manager and Area Manager for parachuting in the SMS.	1.4.160
x.	O24 – The responsibilities associated with the delivery of the SMS are conducted without any oversight by the RAPA Committee.	1.4.160
y.	O25 – Amendment state and document control of the RAPA SMS was not implemented.	1.4.160
z.	O26 – There was no evidence of a mechanism of checking that standards at RAPA were being maintained in terms of training, instructor qualifications, and parachute operations since 2012 other than the biennial BPA assurance/audit visit of Feb 14.	1.4.172
aa.	O27 – The intent was that the PES was the responsible person to supervise the parachute operation for EX DBF.	1.4.182
bb.	O28 – The TA also named the CI as the authorised AI responsible for all parachuting activity on EX DBF.	1.4.182
cc.	O29 – There are no ToR/extent of authority detailed for the PES over the civilian AI.	1.4.182
dd.	O30 – The content of the basic freefall parachute course is the same irrespective of the method used to deliver it (Type 3, 4 or UAAT).	1.4.191
ee.	O31 – The FRAGO 01 to OPO 14/002 identifies two DDH constructs for AT. At JSAT centres the DDH is identified as the OC of the training establishment for the delivery of JSAT Type 4 courses. For Type 3 AT Expeditions and Unit Authorised AT (UAAT) activity the DDH is identified as the CO of the respective unit.	1.4.210
ff.	O32 – MARDS systems are being introduced across military and sport parachuting.	1.4.220
gg.	O33 – The scales had not been calibrated.	1.4.222
hh.	O34 – The scales are not included in an audit process.	1.4.222
ii.	O35 – A lack of audit on the Incident Response Box.	1.4.225
jj.	O36 – There is no policy for despatch order.	1.4.257
kk.	O37 – A daily nominated response team was not recorded at RAPA.	1.4.268
ll.	O38 – It was not able to verify the lesson content of each internal training element less the BFI training.	1.4.271

**PART 1.5 – RECOMMENDATIONS**

<b>Recommendations</b>	<b>Analysis Reference</b>
1.5.1. <b>Introduction.</b> The following recommendations are made:	
1.5.2. The Chief Operating Officer of the BPA should consider the introduction of 1 <sup>st</sup> Party Assurance on the re-packing element of the 6 monthly reserve parachute check.	1.4.43
1.5.3. Armed Forces Sports Board should introduce 1 <sup>st</sup> Party Assurance on re-packing reserve parachutes during the 6 monthly check for all Sport Parachute activities.	1.4.43
1.5.4. The Chief Operating Officer of the BPA should review and revise the BPA Basic Freefall course syllabus to include training on actions to be conducted in the event of a collision and/or entanglement with another parachutist.	1.4.54
1.5.5. The President of RAPA should address the risk of student canopy collisions in its RA and establish appropriate measures to mitigate this risk to ALARP.	1.4.54
1.5.6. The Chief Operating Officer of the BPA should define the minimum height below which conducting the reserve drill becomes dangerous during student parachute descents.	1.4.63
1.5.7. AOC 22 (Trg) Gp RAF should consider implementing a defined minimum height below which conducting the reserve drill becomes dangerous for JSAT courses and expeditions.	1.4.63
1.5.8. The Chief Operating Officer of the BPA should mandate the separation of the DZ Controller and STD duties when despatching 2 student parachutists per pass.	1.4.97
1.5.9. The AOC 22 (Trg) Gp, RAF should mandate the separation of the DZ Controller and STD duties when despatching 2 student parachutists per pass in JSAT parachuting.	1.4.97
1.5.10. The President of RAPA should ensure the SOPs are separated and clarified for the DZ Controller and STD responsibilities including where these duties are delivered from at RAPA.	1.4.97
1.5.11. The UK Armed Forces Sports Board should define how Sports Parachuting in the Armed Forces is governed and assured. This provision should be resourced in order to deliver the intended regulating effect.	1.4.107
1.5.12. The President of RAPA should ensure that all Military staff employed at RAPA are formally placed on duty whilst working with Military personnel conducting AT, FD or official sport training/competitions. This requirement should be recorded for audit purposes.	1.4.121
1.5.13. The Panel recommends that Commander British Forces Germany (BFG) review the DIA audit report dated Aug 15 in order to ensure each issue has been addressed in accordance with current policy.	1.4.144



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<b>Recommendations</b>	<b>Analysis Reference</b>
1.5.14. The President of RAPA should ensure that RAs are reviewed by the Chairman of RAPA after accidents and incidents in accordance with JSP 375. This requirement should be formally recorded for audit purposes.	1.4.155
1.5.15. The President of RAPA should ensure that H&S notice boards in RAPA are updated and audited at regular intervals.	1.4.155
1.5.16. The President of RAPA should ensure an up to date SMS is maintained at RAPA as the overarching safety document for all activity at the site.	1.4.162
1.5.17. The President of RAPA should clarify who should hold the responsibilities of the Safety Officer and Accountable Manager. Amendments should be recorded in the SMS.	1.4.162
1.5.18. The President of RAPA should provide oversight of the implementation of the SMS processes and formally record interactions in the SMS.	1.4.162
1.5.19. The President of RAPA should implement a SMS document control system that facilitates appropriate maintenance of the SMS.	1.4.162
1.5.20. The President of RAPA should ensure the SMS 'after incidents and accidents' sections are completed and that such action is recorded.	1.4.162
1.5.21. The President of RAPA should amend the SMS documentation to include the requirement and process for monthly sample audits.	1.4.162
1.5.22. For 3 <sup>rd</sup> Party Assurance, the Chief Operating Officer of the BPA should ensure that parachute operations for student parachutists are audited during the formal BPA audit process and that documentation should be amended accordingly.	1.4.173
1.5.23. For 2 <sup>nd</sup> Party Assurance AOC 22 (Trg) Gp, RAF should audit JSAT/FD/Military Sports Association sites annually and on change-over of Cls.	1.4.173
1.5.24. For 1 <sup>st</sup> Party Assurance the President of RAPA should ensure internal audit is conducted in order to inform governance and assurance. This should cover the critical areas of parachute operations, general Health and Safety and equipment.	1.4.173
1.5.25. AOC 22 (Trg) Gp, RAF, should clarify and publish the requirement for a PES. This should entail the specific duties expected of a PES in the form of a ToR for the role.	1.4.184
1.5.26. The BPA should reiterate the requirement for qualified personnel only to deliver parachute training.	1.4.195
1.5.27. The Armed Forces Sports Board, through AOC 22 (Trg) Gp, RAF should ensure the delivery of parachute training in respect of SQEP is routinely assured at JSAT and Sports Clubs/Associations.	1.4.195
1.5.28. The President of RAPA should ensure that RAPA staff undertake all appropriate Health and Safety training commensurate with their roles and	1.4.198

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<b>Recommendations</b>	<b>Analysis Reference</b>
responsibilities at the site.	
1.5.29. The President of RAPA should ensure that RAPA staff undertake appropriate SMS training.	1.4.200
1.5.30. The President of RAPA should ensure role specific JD/ToR are produced for all RAPA staff.	1.4.204
1.5.31. The Armed Forces Sports Board through AOC 22 (Trg) Gp, RAF should investigate the introduction of MARDS into Sport Parachute systems across Armed Forces Sport Parachuting.	1.4.221
1.5.32. RAPA should clarify the propriety of the helmet modifications made to accommodate the radios used in STD.	1.4.221
1.5.33. The President of RAPA should ensure the scales are calibrated and regularly audited.	1.4.223
1.5.34. The President of RAPA should ensure the Incident Response Box at RAPA is included in the audit process and inspected at regular intervals.	1.4.226
1.5.35. AOC 22 (Trg) Gp, RAF should review the Basic Freefall Parachute examination process to provide standardisation when delivered during an expedition and at JSAT Centres.	1.4.231
1.5.36. The President of RAPA should ensure that the examination documentation is completed correctly and compliance should be audited.	1.4.231
1.5.37. The Chief Operating Officer of the BPA should include a lesson plan on STD with specific instructions and terminology.	1.4.231
1.5.38. The Chief Operating Officer of the BPA should clarify the wing loading policy applied to main canopies for the first 2 student descents in order to remove ambiguity.	1.4.247
1.5.39. AOC 22 (Trg) Gp, RAF, should ensure wing loading policy for main canopies in JSAT activity is applied across JSAT sites and on expeditions.	1.4.247
1.5.40. The President of RAPA should ensure the documentation lesson is delivered by BPA qualified instructors.	1.4.247
1.5.41. The President of RAPA should ensure that students are formally weighed during the documentation process. This should be undertaken and recorded by a qualified instructor.	1.4.247
1.5.42. The Chief Operating Officer of the BPA should clarify the most suitable means of identifying student parachutists during STD and publish the findings in the BPA Ops Manual.	1.4.254
1.5.43. The Chief Operating Officer of the BPA should confirm the requirement for despatch order by weight in relation to wing loading and parachute sizes for student parachutists.	1.4.258
1.5.44. The Chief Operating Officer of the BPA should define the turns permissible for student parachutists during the first 2 descents and publish its findings in the BPA Operations Manual.	1.4.260

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<b>Recommendations</b>	<b>Analysis Reference</b>
1.5.45. The President of RAPA should ensure that instructor/student ratios are adhered to in the delivery of training in accordance with the BPA Operations Manual and 2014DIN07-094.	1.4.265
1.5.46. AOC 22 (Trg) Gp, RAF should clarify the rationale for working in excess of the BPA limitations for instructor/student ratios at JSAT Centres.	1.4.265
1.5.47. The President of RAPA should ensure each element of internal training is detailed in a lesson plan.	1.4.272
1.5.48. The President of RAPA should identify accident responders on a roster prior to the start of parachute operations. These personnel should not be involved in parachuting activity.	1.4.274



## **PART 1.6 - CONVENING AUTHORITY COMMENTS**

1.6.1 After an extensive investigation, the Service Inquiry (SI) Panel has identified that the most likely cause of this tragic accident was due to converging flight paths and a lack of visual detection between the 2 parachutists causing a collision. This sounds clear but what is less straightforward are the organisational and cultural issues at the Rhine Army Parachute Association (RAPA) including a whole catalogue of safety shortcomings and poor governance. The SI Panel has identified a range of contributory, aggravating, other factors and observations that made this event not only more likely to happen but possibly aggravated the outcome. I concur with all the findings and recommendations and commend the Panel for their efforts. For members of the Armed Forces, it should be reasonably expected that Adventurous Training (AT) can be used to expose our people to various levels of risk in a controlled and supervised manner, which in turn develops our people and improves our operational effectiveness. The very nature of AT means that an element of risk will remain but this should be minimised by tight control and supervision of that activity. Unfortunately, the SI has revealed many lapses in the control measures for the activity at RAPA, created by an unquestioning culture internally and lack of rigorous external assurance; both of which are born from an unengaged safety culture. LCpl Woodford's command chain complied with their responsibilities to allow him to undertake AT in an appropriate way and handed him into the care and supervision of RAPA where they could have reasonably expected him to be looked after and trained to conduct what should have been a relatively safe activity. There are numerous lessons to come out of this accident but I will confine my comments to the contributory factors surrounding the collision and the major organisational issues surrounding RAPA.

1.6.2 The Panel noted that LCpl Woodford and the student that he collided with were on different approach courses to the downwind leg, with converging headings. This was likely due to them being given conflicting instructions regarding the direction of the downwind leg by the supervisory staff. It should also be noted that there was a requirement for both a Drop Zone controller and a Student Talk Down (STD) for their first 2 jumps as students. Contrary to written instructions, these 2 roles were both being conducted by the Chief Instructor (CI) from the control tower rather than an individual conducting the STD from the Parachute Landing Area. Following entanglement the CI provided some instruction to the 2 students but the full nature of the instructions cannot be confirmed. What is clear is that the students were not taught any form of entanglement or collision drill. Indeed, collision and entanglement training is not included as part of the British Parachute Association (BPA) Basic Parachute syllabus which was delivered by RAPA. Instead, RAPA delivered control measures to avoid such collisions as it was generally believed that this type of training had the potential to confuse students by overloading them at an early stage in their training. In this case those control measures failed and LCpl Woodford and the other student found themselves entangled at low altitude with a much increased rate of descent with neither the training nor experience to understand how to deal with such a situation. In addition, they were not trained to understand or handle a minimum cut-away height. With nothing to fall back on it is easy to see why they both did cut-away at a perilously low height. I am surprised that there is no training for the eventuality of a collision or entanglement and this should now be considered as recommended in the report. It is clear that every eventuality cannot be prescribed and trained for, but some basic understanding may preserve life in the future. I am also surprised that more specific guidance is not given on minimum cut-away heights. The RAPA instruction of as "high as possible" and "dangerous at low altitude" are, in my opinion, worthless statements of the obvious providing little value in reality.

1.6.3 Looking at RAPA more widely, it is clear that there were numerous weaknesses in the conduct of safe parachuting at the Centre. Whilst many of them might appear to be minor or not directly related to the accident, they do provide some insight into the culture and

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governance of the RAPA organisation. Examples include, but are not restricted to; a poor Safety Management System, use of non-qualified instructors, operating in excess of military training ratios, use of un-calibrated scales to ensure accurate wing loading, and contradictory information in lessons and STD. As the military relied upon RAPA to provide a safe place to conduct this type of student parachute training, the questions arise as to what assurance mechanisms were in place and why these issues were not detected? Overall, the Panel observed that there was no system for checking that standards at RAPA were being maintained in terms of their use of trained personnel and parachute operations other than the BPA visit of March 2014 and an annual BPA accreditation requirement. It was noted that neither the Army Sport Control Board (ASCB), RAF Lead Service (22 (Training) Group) or RAPA Committee used anything other than the British Parachuting Association (BPA) National Governing Body (NGB) to assure that the right standard of training was being delivered. Whilst at the level of the ASCB, it would appear reasonable that the BPA were providing assurance, at the level of the RAPA Committee, it should have been more apparent that this was not a complete assurance solution. Moreover the BPA audit can be as infrequent as once every 3 years and surprisingly may not review the delivery of actual parachute activity at the Centre. It is readily concluded that the provision of assurance at RAPA was inadequate at every level. The Panel have made a number of recommendations with regard to governance and assurance which I will not repeat here, other than to say that despite their obvious expert authority it would be wrong to rely only on a NGB for a complete assurance solution.

1.6.4 There is much detail in the SI with regard to various weaknesses at RAPA. I agree with the opinion of the Panel that there was a complacent approach to safety, training and parachute operations which, when combined, did not make RAPA a safe place to conduct this type of student training. It is worthy of note that the Army's reaction to this accident has been both supportive to the Panel and clear and decisive from the outset, for which I am grateful; indeed, RAPA has now been closed down permanently by GOC Regional Command. It is clear that RAPA as a BPA affiliated Parachute Training Organisation should have complied with BPA direction as the NGB for this activity at the time of the accident. It is less clear what the requirement was to comply with the RAF Lead Service direction and evident that some confusion existed. It is also of note that we have differences in the direction for Sport and AT parachuting which should be addressed across the Armed Forces. As a postscript, GOC Regional Command has now issued direction that the Army Parachute Association should comply with 22 (Training) Group direction for all Sports and AT parachuting with immediate effect and this is to take precedence over BPA direction.

1.6.5 The tragic circumstances in which LCpl Woodford lost his life are unique and were potentially avoidable. This tragedy has enabled a review of RAPA which has identified that the training, supervision and control of the activity fell short of the standards that the military could reasonably expect of such a Centre. In my opinion, this was due to complacency, the complexity of structures and inadequate training, supervision and control of parachute operations. Finally, the role of quality 1<sup>st</sup> and 2<sup>nd</sup> Party assurance cannot be overemphasised and this accident serves as an important reminder of the need for this activity. The lessons from this tragic accident can be used both across service parachuting and much wider where we place our people at risk during AT and Sport.

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