Defence
Safety Authority

DSA 03.OME Part 3 (JSP 403)- Defence Code of Practice (DCOP) and Guidance Notes for Ranges (Formerly Volume 3 Part 1)

Defence OME Safety Regulator

DOSR

DSA VISION

Protecting Defence personnel and operational capability through effective and independent HS&EP regulation, assurance, enforcement and investigation.

PREFACE

AUTHORITY

1. This document is crown copyright and the intellectual property rights of this publication belong exclusively to the Ministry of Defence (MOD). However, material or information contained in this publication may be reproduced, stored in a retrieval system or transmitted in any form provided it is used for the purposes of furthering safety and environmental management.

STATUS

2. This document:

   a. Is uncontrolled when printed.

   b. Will be updated as part of a continuous improvement programme but at least 12-monthly from the period of document issue date.

REQUESTS FOR CHANGE

3. Proposed changes, recommendations or amendments to DOSR Regulations and Guidance publications can be submitted by anyone using the DOME Request for Change Function (RFC) available for every Dome publication in the DOME library located **here** or by completing the Word version of the Change Proposal Form available from the DOME Library, see figure 1 below for the location.

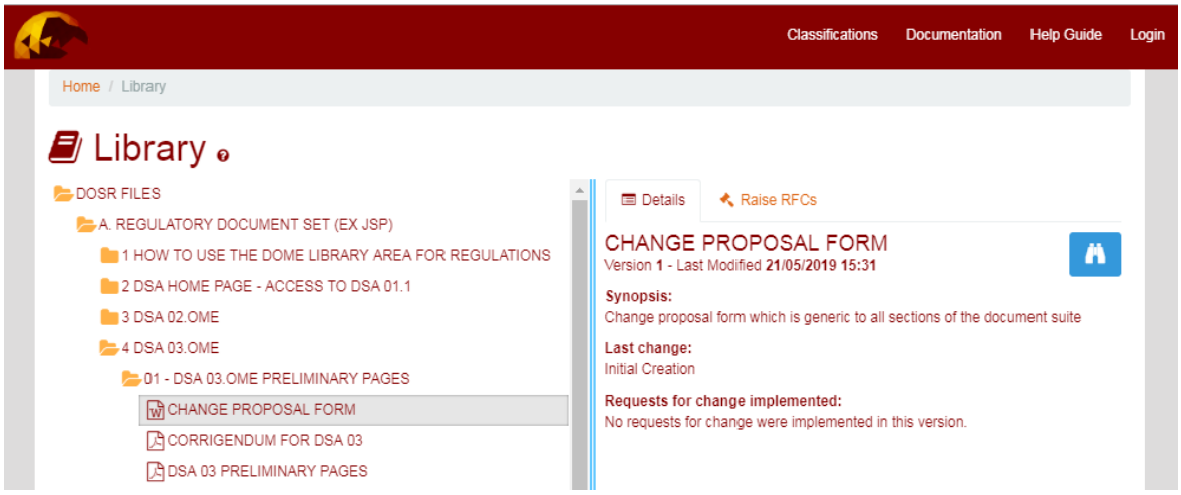


Figure 1. Change Proposal Form (Word version) Location

4. Any post and grammar change proposals can be approved or rejected by the DOSR PRG Authors without involvement of the associated Working Group.

5. Technical change proposals will need to be submitted to the associated Working Group for review and approval or rejection.

6. When incorporating changes care is to be taken to maintain coherence across regulations.

7. Changes effecting Risk to Life will be published immediately.

8. Other changes will be incorporated as part of routine reviews.

REVIEW PROCESS

9. The DOSR PRG team will ensure these OME Regulations remain fit for purpose by conducting reviews through the DOSR Governance Committees, involving all Stakeholders.

FURTHER ADVICE AND FEEDBACK

10. The document owner is the DOSR. For further information about any aspect of this document, or questions not answered within the subsequent sections, or to provide feedback on the content, contact:

Job Title	DOSR-Policy, Regulations and Guidance
E-mail	DSA-DOSR-PRG@mod.gov.uk
Address	Juniper #5004, Level 0, Wing 1, Abbey Wood North, Bristol, BS34 8QW

AMENDMENT RECORD

Version 1.0					
No	**Section**	**Para**	**Amendment Summary**	**Agreed**	**Date**

Contents

Chapter 1

Air-to-Surface Range Safety

Introduction

DSA03 (JSP 403) is designed to provide a comprehensive handbook covering safety on Ministry of Defence (MOD) ranges. It gives guidance and instructions on which the Services and MOD civilian organisations and agencies can base their safety regulations.

The aim of Part 1 of this Volume is to detail the policy and principles for the planning of air-to-surface firing practices on MOD Ranges. The term air- to-surface firing includes all firings from aircraft against targets on land or sea.

18. **Range Authorisation**. MOD Ranges may only be used for air-to-surface firings if authorised for this type of practice. The procedure for authorisation is given in DSA03 (Volume I Part 2) of this publication.

19. **Flight Authorisation.** All flights are to be authorised in accordance with Military Aviation Authority (MAA) Regulations and single Service instructions.

20. **Airworthiness and Aircraft Armaments Installations.** The regulations concerning Release to Service (RTS) and the safety of aircraft armament installations are given in MAA Regulations.

21. **Flights Outside Restricted Airspace.** Aircraft may overfly non-MOD land while carrying live ordnance subject to any restrictions imposed in the RTS.

22. Because of their specialised nature and for ease of reference, the terms and definitions used in air- to-surface engagements have been placed in Chapter 7.

23. **Lead Services**. Lead Services and HQ are as follows:

a. The Lead Service for coordinating the joint service procedures for Fixed Wing (FW) engagements is the RAF. The sponsor for Chapter 3 of DSA03 (JSP 403 Volume 3) is HQ Air Command / HQ 1Group, (HQ Air / HQ 1 Gp).

b. The Lead for coordinating the joint service procedures for Rotary Wing Crew Served Weapon Engagements is the Joint Helicopter Command (JHC). The sponsor for Chapter 4 of DSA03 (JSP 403 Volume 3) is HQ JHC[1].

c. The Lead for coordinating the joint service procedures for Rotary Wing Integrated Weapon Systems engagements is JHC. The sponsor for Chapter 5 of DSA03 (JSP403 Volume 3) is HQ JHC.

[1] Headquarters Joint Helicopter Command

Chapter 2

Air-to-Surface Range Safety

Introduction

The aim of this chapter is to define the responsibilities of the range organisation when involved in the conduct of air to surface practices and to define the interface between the Range Staff and the Exercising Unit.

The Range

24. When used for air-to-surface firing practices the range is to be established and operated in accordance with the range management system specified in Volume I of this JSP. Essentially, the range is to conform with the following provisions:

a. **Authorisation**. The Range Authorising Officer (RAO) shall approve a list of air- to- surface firing activities on the Range Authorising Certificate (**MOD Form 904**). The categories of weapon systems and any restrictions on munitions shall be listed on the MOD Form 904 and re-stated in the Range Standing Orders (Range SO).

b. **MOD Form 905.** When the range is first established, the initial MOD Form 905 (Range Safety Certificate) is issued to the Range Administrating Unit (RAU).

c. **MOD Form 906A.** A record of usage and management of the range is to be maintained by the Range Staff using the MOD Form 906A. This is to include a record of all 'Blinds'; which in this case refers to all incidents involving unexploded warheads or unobserved practice weapons known to have been launched or dropped on the range.

d. **Range Standing Orders**. These are the site-specific instructions for the safe use of the range. It is important to be aware that the task of drafting and updating these instructions may lie at very different levels depending on the Service controlling the range. Therefore:

(1) **DIO**. Ranges that are controlled by DIO are governed by Range SO written by the RAU and approved by the RAO.

(2) **DE&S**. Ranges operated for the DE&S by a contractor are subject to Range Standing Orders promulgated by the Head of Site with the approval of the RAO.

(3) **Air Weapon Ranges**. Air Weapon Ranges (AWR) are owned by DIO and governed as above but have additional orders for the release of air-to-ground weapons governed by Air Command Air Weapon and Electronic Warfare Range Orders (ACAWEROs), produced by HQ Air with the approval of the RAO.

25. The Range Staff are responsible for providing and maintaining a safe working environment (Safe Place) for the conduct of practices by Units. Because of past historical and Service associations the titles used by staff on the individual ranges vary and in some cases are not the same as those used by the Units. This has potential for confusion and therefore it is important that Exercising Units on the range are clear about who is doing which job and who is responsible for what part of the overall safety system.

26. Once the range has been authorised by the RAO, the following functions belong to the Range staff and the RAU:

a. The Officer accountable to the RAO for providing a safe environment at the range. This is normally the CO / Manager of the RAU. At AWRs, this task is fulfilled by a DIO Training Safety Officer (TSO).

b. There shall be an Officer who has the overall responsibility for the safe operation of the range and is responsible for the clear range procedure. He may be referred to as the Range Safety Officer (RSO) or, because there are several functions combined in one post, he may be under another title but still carry out the function of RSO. On an AWR the role is conducted by an air traffic controller with the title Air Weapon Range Controller (AWRC). The Range Conducting Officer (RCO) shall be provided by the Exercising Unit.

c. The Officer responsible for liaison with the exercising Unit is often referred to as the Range Liaison Officer (RLO). He / she shall issue a Daily Range Summary which shall detail the Units and type of practice authorised to be carried out on the range. He / she may be responsible for the day to day functioning of the range and the compliance of civilian contractors, the Range Staff and the Exercising Units with Range SO. On DIO ranges he / she could also be the Range Officer or RSO / TSO.

d. There may well be a requirement for a specific Air Traffic Control Officer (ATCO) and his direct responsibility shall be for control of the movement to and from the range boundary as well as the air units using the range. He would be referred to as an ATC on a DIO range but on an AWR this function may be linked to the AWRC.

The Exercising Unit

27. The Unit using the range shall require some or all of the following functions to ensure the safe conduct of their particular training practice. It may well be possible to link the various functions under one person in accordance with individual service procedures but as a general rule safety and training functions are to be kept separate on the range, see Figure 1:

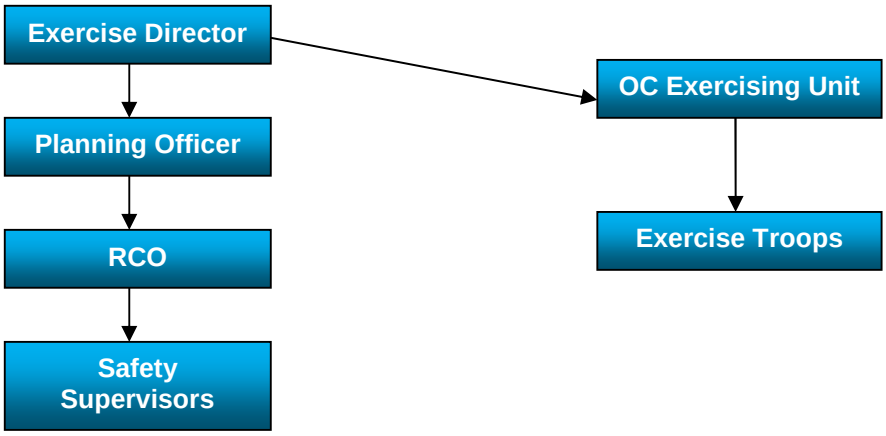


Fig 1 – The Exercising Unit

a. There is a need to distinguish between the Commandant of the Unit and the Senior Officer accompanying the firing Unit. An Exercise Director[2] (the person who directs the training to take place) is unlikely to be with the firing Unit. However, he may appoint Officers to carry out specific functions, such as Senior Planning Officer (SPO) Planning Officer (PO) or Range Conducting Officer (RCO).

b. The RCO is the person who is authorised to conduct a particular air-to-surface weapon event and is qualified as such. The AWRC .is responsible for the co-ordination of the practice should there be more than one aircraft or type of weapon system operating on the range simultaneously. The RCO is a member of the Exercising Unit and not part of the Range staff.

c. There may be a need for a Training or Planning Officer who shall be responsible for an agreed schedule of training with the range staff. On a busy range, detailed and timely planning is essential for safe practice.

d. Depending on the type of training, there is likely to be a requirement for one or more Safety Officers / Supervisors to oversee the individuals operating the weapons to be used on the range. The requirement for Safety Officers / Supervisors and their responsibilities shall be laid down in the appropriate training pamphlets issued by the Subject Matter Expert (SME) HQs. Typically, Safety Officers would be known by their function such as a Firing Point Officer (FPO) or a Visual Flight Safety Officer (VFSO).

e. It is possible that the Unit may need to bring in other personnel to support training; for example, a Forward Air Controller (FAC).

Documentation

28. On occasions there may be no requirement for a Exercising Unit to become involved in range documentation beyond reading the Range SO (and ACAWEROs for

[2] It is the responsibility of the Exercise Director, normally the Unit CO, to appoint a Senior Planning Officer (SPO).

AWRs) and making the user aware of his responsibilities; for example, an RAF fixed wing pilot wishing to use a dedicated AWR for a bombing practice. Provided the range is open and the pilot is in contact with the Range Control he / she shall be cleared to enter the range and drop their ordnance. They shall be given a hit / miss indication as they leave. There is no requirement to book the range and all the arrangements can be made whilst he is in the air (known as bootlegging). In other circumstances the range space shall need to be booked in advance, the training practice discussed, target facilities specified and booked, a reconnaissance made and a full planning cycle instigated. Where airspace has been booked (e.g. at AWRs) and is subsequently no longer required, the booking must be cancelled at the earliest opportunity.

29. **The Range Standing Orders.** The RAU is responsible for preparing and maintaining Range SO. The Range SO shall typically include amongst other matters:

a. The titles and responsibilities of members of the Range Staff.

b. The format for submitting the Practice Request, the timings involved, the need for a reconnaissance and the processing of that request.

c. The facilities available on the range including targetry and miss-distance indications.

d. Procedures for publishing warnings and notices as may be required by statute or Byelaws.

e. Procedures for providing a safe environment for the conduct of the practice.

f. The identification of firing lines / firing boxes / way points / IPs, PUPs as appropriate by day and night.

g. Procedures for ensuring that the intended impact area and manoeuvre zone is clear of intruders.

h. The orders for maintaining surveillance as necessary to ensure the range remains free from intruders during the range detail or that in the event of intrusion the practice may be aborted.

i. The control of authorised personnel within the Weapon Danger Area.

j. Allocation of safe areas / routes for support teams including Forward Arming and Re-fuelling Points (FARPs), ground based LASER designator teams etc.

k. The maintenance of communications with the exercising aircraft and persons with a safety critical function.

l. The maintenance of a Range Log (**MOD Form 906A**), by date and time, of all activity on the range including the identity of the exercising unit, the number and nature of participating aircraft, the number and nature of munitions fired / released on the range, non-eye safe LASER firing, the location and final disposal of blinds (where applicable) and of all incidents.

m. The maintenance of a log of all communication with the exercising aircraft and persons with a safety critical function. This may be achieved electronically by means of audio recording equipment.

n. Authorising the commencement of the training and the finish of training.

o. Instructions for the safeguarding of Activity Logs and Communication Logs for a minimum of 10 years after the activity to which they relate.

p. Emergency actions.

q. Range communication networks.

r. Danger areas.

s. Transit corridors.

t. Byelaws and MOD responsibilities.

u. LASER Firing Orders.

Co-ordination between Range Staff and Exercising Unit

30. Where the range is run by a single Service and is mainly used by Units from that Service, there is usually little difficulty in understanding the terminology in use on the range. The difficulty arises when Units of another Service come on to the range that are familiar with operating under one set of Range SO and need to adapt to another. It is the responsibility of the Range Staff to fully brief the in-coming Unit on the Range SO - see Fig 2. It is the responsibility of the Exercising Unit to ensure that all members of the Exercising Unit understand the Range SO. UK Military aircrews are to be fully conversant with ACAWEWROs prior to conducting a range detail on an AWR.

At an early stage:	-	Planning Officer goes to range to discuss with the RSO / AWRC / TSO the training plan and to be briefed on the range facilities.
Later:	-	Confirm plan and allocation of facilities and space with RSO / AWRC / TSO.
Planning Officer issues Exercise Instruction - vetted by Exercise Director / SPO		
Resources:	-	RCO and Safety Staff allocated.
	-	OC Troops nominated.

Fig 2 - The Planning Cycle

31. **Dispensations.** For operational reasons, there may be a requirement for a Unit to carry out exceptionally hazardous training activities. Details on the procedure for a place / practice waiver or exemption, on the personal authority of the appropriate ODH, are given in paragraph 23 in DSA03 (JSP 403 Volume I Part 2).

LASERS

32. For use of LASERs on MOD Ranges see DSA03 (**JSP390**)[3].

Range Airspace Infringements

33. Infringements of range airspace and instances of dangerous flying in the range area are to be reported using the Defence Flight Safety Occurrence Reporting (DFSOR) process.

34. **DE&S Ranges**. DE&S Air Ranges operate under the same basic rules as other Defence ranges with **MOD Form 904** defining the categories of weapons / systems that can be accepted. However, as these ranges provide a data gathering capability and historically have provided a test and evaluation service, any weapon activity shall be in accordance with a local Trial Specification. This shall be produced by the Range Staff and shall define flight lines, WDA, target information and any instrumentation requirements. Controls related to the release / firing of defined weapons shall be specified together with mandatory calls between aircrew and the range and air controllers. Local Range Standing Orders shall define the general local rules and range management infrastructure.

Anomalous Occurrence Reporting

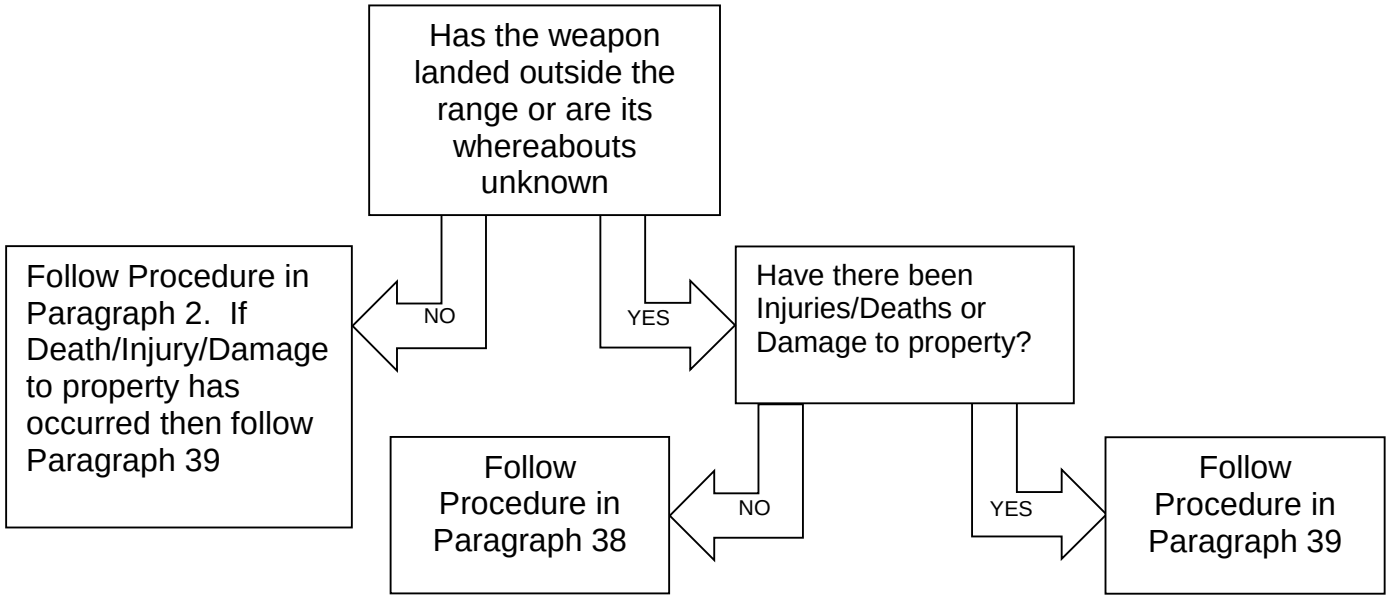
35. The circumstances when anomalous occurrences must be reported are detailed in Chapters 3, 4 and 5.

[3] DSA03 (JSP 390 Defence Laser Safety)

Chapter 2 Annex A

Aircrew Anomalous Occurrence Report

36. Procedures. In the event of an anomalous occurrence as defined in para 35 the HQ 1Gp ranges desk is to be contacted with the details of the incident as quickly as possible. The HQ 1Gp Ranges desk shall then ensure that all interested parties are informed. The flowchart below describes the best method to contact the ranges desk depending on the severity of the incident and time of day. If it is not possible to contact the Ranges Desk then the addressees at Para 41 are to be contacted.



37. **Wide Weapon impacting within the SDA**:

a. **During Working Hours**. SO2 / SO3 Ranges 95221 7357 / 7561 or 0494 497357 / 7561. If they are unavailable an email is to be sent to Air 1GP-HQMAILBOX@MOD.uk detailing the circumstances.

b. **Outside Working Hours**. An email is to be sent to 1GP-HQMAILBOX@MOD.uk detailing the circumstances.

38. **Wide Weapon impacting outside the SDA, no death / injury / damage.**

a. **During Working Hours**. SO2 / SO3 Ranges are to be contacted on 95221 7357 / 7561 or 01494 497357 / 7561. If they are unavailable an email is to be sent to Air 1GP-HQMAILBOX@MOD.uk detailing the circumstances.

b. **Outside Working Hours**. The HQ Air Cmd Duty Officer is to be contacted on 01494 494072 or 01494 564913 and provided with the details of the incident. The HQ Air Cmd Duty Officer is to contact SO2/SO3 Ranges via the HQ 1Gp Duty Officer. Additionally, an email is to be sent to Air 1GP-HQMAILBOX@MOD.uk detailing the circumstances.

39. **Wide Weapon impacting outside the SDA causing death, injury or damage.**

a. **During Working Hours**. SO2 / SO3 Ranges are to be contacted on 95221 7357 / 7561 or 01494 497357 / 7561. If they are unavailable an email is to be sent to 1GP-HQMAILBOX@MOD.uk detailing the circumstances.

b. **Outside Working Hours**. The HQ Air Cmd Duty Officer is to be contacted on 01494 494072 or 01494 564913 and provided with the details of the incident. The HQ Air Cmd Duty Officer is to contact SO2 / SO3 Ranges via the HQ 1Gp Duty Officer. Additionally, an email is to be sent to 1GP-HQMAILBOX@MOD.uk detailing the circumstances.

40. **Information.** The following information should be supplied to HQ 1Gp Ranges:

a. Best estimate of impact position and whether in or out of SDA.

b. Any Death / Injury or Damage caused (including livestock).

c. Ac type, operating base and Callsign.

d. Date and time of incident, range and target being attacked, type of attack and attack track.

e. Quantity and type of weapons.

f. Any other pertinent information.

41. **Addressees.** If HQ 1GP Ranges cannot be contacted the following units are to be informed;

a. Action.

(1) Parent Command.

b. Information.

MODUKAIR / ARMY / NAVY[4]

HQ AIR / HQ LAND / FLEET HQ (unless notified at 4a).

HQ of aircraft concerned.

DIO through the Weapons range where incident occurred.

Authorising HQ when appropriate.

MODUK DE&S for DOSG.

[4] According to aircraft type

Chapter 2 Annex B

RSO / AWRC Signal Report

42. **Precedence**. ROUTINE, unless death or injury to persons and livestock or damage to property is known or suspected, when it should be IMMEDIATE.

43. **Classification**. UNCLASSIFIED unless death or injury to persons and livestock or damage to property is known or suspected, when it should be OFFICIAL -STAFF.

44. **SIC**.

a. B2B / IYL - for conventional weapons (plus I3F if weapon landed outside range danger area).

b. B2B / IIL / 13F / HWH - for air-to-air missiles.

c. B2B / IFL / 13F / HWH - for air-to-surface missiles.

d. B2B / IYL / 13F / HNH - for irregular release.

45. **Addressees**.

a. **Action**. Parent Command.

b. **Information**.

(1) MODUKAIR / ARMY / NAVY[5]

(2) MODUK DE&S for DOSG

(3) HQ AIR / HQ LAND/FLEET HQ (unless notified at 4a).

(4) HQ of aircraft concerned.

(5) Operating base of aircraft concerned.

(6) Authorising HQ when appropriate.

(7) Range where incident occurred.

46. **Text**. All of the following:

WIDE WEAPON / IRREGULAR RELEASE / INADVERTENT RELEASE - RANGE REPORT

a. Aircraft type, operating base and call-sign.

b. Date and time of incident, range and target being attacked, type of attack and attack track.

c. Quantity and type of weapons.

[5] According to aircraft type

d. Best estimate and impact position, and whether in or out of range danger area. Damage or injury if known.

Chapter 3

Fixed Wing Air-to-Surface Engagements

The aim of this chapter is to detail the procedures for the planning and conduct of fixed-wing (FW) engagements on MOD Ranges.

47. **Lead Service**. The lead Service for coordinating the joint service procedures for FW engagements is the RAF. The sponsor for Chapter 3 of DSA03 (JSP 403 Volume 3) is HQ 1Gp.

48. Air weapons training by FW aircraft is only to take place in approved danger areas, which are classified as follows:

a. Permanent and scheduled danger areas that are allocated a danger area number and may be subject to UK Byelaws.

b. In exceptional circumstances, a temporary danger area may be authorised at Command level.

c. Air-to-surface firing over the sea in other than designated ranges must be conducted in accordance with single Service regulations.

49. Engagements must be conducted in accordance with the relevant Range Orders and Unit Flying Orders, whichever is the more stringent. Range firing must be carried out under the authorisation of the Range Safety Officer (RSO) or AWRC.

Safety

50. The safety of personnel, property and livestock is paramount. The ultimate responsibility for the safe delivery of weapons remains at all times with the aircraft commander. The following procedures are to be adhered to:

a. **Range Preparation**. Before he allows range operations to begin, the RSO / AWRC is to ensure that the range is clear of people, livestock, shipping and aircraft. He is to ensure that all warning devices are displayed or illuminated. Where the range has a land or shore area, the RSO / AWRC is to ensure that a suitably equipped vehicle with driver is available for crash rescue duties, either at the main tower or within the range area.

b. **Clear Range Procedure**. Steps are to be taken, in so far as is reasonably practicable, to ensure that the Range Impact Area / Zone and the airspace through which any weapon or store is liable to pass, is clear of unauthorised personnel, livestock air or sea traffic. The RSO / AWRC is to ensure that clear range procedure is observed at all times. He / she may use sentries, vedettes, radar, EO devices, closed circuit television surveillance, or a combination thereof to satisfy clear range procedures. He / she is not to authorise an attack if the target danger area for that attack is fouled and is to order the aircraft Commander to discontinue an authorised attack if the area is subsequently fouled. On air-to-sea ranges, the Commander of the attacking

aircraft or leader of the aircraft formation normally carries out the duties of RSO / AWRC. The civilian Master of a towing vessel is not qualified to undertake clearance procedure; he can only advise the aircraft Commander of shipping fouling the range. Notwithstanding this, MOD Instructions to the contractor's Masters clearly place on them a responsibility to warn the pilot when an aircraft is apparently about to attack the wrong target. Aircraft Commanders have ultimate responsibility for ensuring that clear range procedures are adhered to during a range detail.

c. **Ballistic Safety Traces**. Hazard Impact Area Traces (HIATs) are recommended and approved by the Air Weapons Advisory Committee and authorised for use by HQ 1Gp. FW weapon events are only permitted if the weapon, any associated furniture, the ricochet boundary and the explosive risk area shall impact within the Range Impact Area / Zone. In exceptional circumstances, subject to Air Command approval, the ricochet boundary may lie outside the published surface danger area over the sea with Clear Range Procedure enforced.

d. **LASER Safety**. LASER Safety clearances for specific target attack profiles are approved by the LASER Safety Review Panel (LSRP) of the DLSC and are implemented by HQ 1Gp. Targets are not to be attacked with LASER, ground or airborne, unless a current clearance exists. See DSA03 **JSP390**[6] for details.

e. **T&E Ranges**. See Volume I, Part 2, Chapter 8 of this DSA03.

Safety

51. All FW air-to-surface engagements are to be under the control of an RSO / AWRC or FAC, as outlined in ACAWEWROs.

a. **RSO / AWRC**. The RSO / AWRC is the person who coordinates the safe execution of a particular range detail. On dedicated Air Weapons Ranges (AWR) this duty is performed by the AWRC. The AWRC is to be an officer or SNCO of the Air Traffic Control Branch who holds a minimum endorsement of TC (AWR). The AWRC is responsible for the co-ordination of the safe practice should more than one aircraft be operating on the range. As per Air Traffic Management Force Orders the AWRC is responsible for:

(1) The maintenance of flying discipline in so far as it affects the conduct of weapons exercises over the range.

(2) The maintenance of a range log book.

(3) Cancelling or postponing any exercise if for any reason he considers the activity would be dangerous.

[6] Defence LASER Safety Committee

(4) Taking appropriate action in the event of an anomalous occurrence.

b. **Requirement for AWRC**. The AWRC is to be employed when:

(1) Air-to-surface weapons training takes place at a dedicated AWR.

(2) Aircraft require integration, separation or holding within the Air Danger Area (ADA).

c. **Forward Air Controllers (FAC)**. On tactical ranges and dedicated AWRs, weapons release clearance may be given by a suitably qualified FAC whose logbook is endorsed “AWRSO” by the JFACTSU Supervisory AWRSO. If only one aircraft is scheduled upon the range, a current aircrew member from the exercising unit may issue release clearances.

d. **DE&S / TEST Ranges**. The contractor exercises control in accordance with the relevant Range Standing Orders and where appropriate the Trial Specification.

General Orders for Aircrew

52. Each range operating authority shall promulgate any additional orders necessary for the safe operation of its aircraft and ranges in ACAWEROs.

53. **Knowledge of Orders**. Squadron Commanders are to ensure that all aircrew taking part in air weapon sorties are fully conversant with the contents of DSA03 (JSP 403 Volume 3) and any additional operating authority orders (e.g. ACAWEROs). They are to ensure that aircrew sign as having read and understood the orders on the following occasions:

a. On arrival at the unit.

b. Immediately after the incorporation of an amendment.

c. Annually.

54. **Selection of Switches to LIVE and Release of Ordnance**.

a. Armament switches are to be kept in a SAFE condition until:

(1) The aircraft is within the air danger area.

(2) Any weapon released from the aircraft deliberately or accidentally shall impact within the WDA / Z.

b. Switches are not to be selected to LIVE before a clearance has been received from the AWRC or the FAC.

c. Switches are to be selected SAFE immediately after each weapon event.

Communications and Control

55. Radio calls are to be in accordance with ATM3000. Radio calls are classified as mandatory or advisory. On DE&S / TEST Ranges, additional RT may be required in accordance with the relevant Trial Specifications.

a. **Mandatory Radio Calls**. The following radio calls are mandatory:

(1) Ac captain: Joining the range pattern, giving call-sign, number and type of ac, booked or bootleg, TOT, event and target.

(2) RSO / AWRC: Call-sign, clearance to join, pressure setting, surface wind and range state.

(3) RSO / AWRC / FAC: Clearance to deliver weapons.

(4) RSO / AWRC: Informing aircraft of no impact observed.

(5) RSO / AWRC: Informing aircraft they have been judged to incur a foul.

(6) Ac Captain: Confirmation that aircraft armament switches are SAFE on departure.

(7) STOP-STOP-STOP call to stop a weapons delivery can be give by any party on the range frequency; however, it is normally given by RSO / AWRC / FAC.

(8) Where possible and under the provisions of an ATC Basic Service, relevant traffic information and precautionary warnings should be passed by the AWRC.

(9) Ac Captain: Calling ‘downwind last pass’.

(10) Ac Captain: Intention to use LASER.

b. **Advisory RT.** It is only advisory that the following information is transmitted:

(1) Ac Captain passes the aircraft position in range pattern.

(2) Weapon scores may be given by AWRC when aircraft is established downwind.

56. **Loss of Communications**. An aircraft that loses communication with range control, regardless of who has suffered the communications failure, is to select switches SAFE and depart the range.

Anomalous Occurrences

57. Normally, the first indication of an anomalous occurrence shall be a report of an unobserved or wide weapon. The cause shall usually be due to a hang-up, irregular

release, inadvertent release or gross aiming error. A wide weapon is one where the impact point relative to the desired point of impact is outside the following parameters:

a. Low & High Angle Dive and Laydown (visual and EO). - 750ft

b. Radar laydown and Reversionary Attack - 1750ft

c. Loft / Toss. - 3000ft

d. Medium and High Level Bombing - 3000ft

e. Outside range boundaries irrespective of miss distance.

f. LASER failing to track / remain on target.

58. **Immediate Actions**. The RSO / AWRC is to:

a. Inform the TSO and log all details.

b. Where the weapon has fallen outside the surface danger area on to land, he / she is to send personnel to locate the weapon and initiate any necessary safety precautions.

c. Where death / injury to person(s) / livestock, or damage to property, has been caused, the range shall be closed and assistance and rendered as appropriate.

d. If the weapon could endanger shipping, he is to inform the nearest Coastguard agency and RN authority.

e. Inform HQ Parent Command immediately in the event of death, injury, damage to property, or wide weapon. A DASOR should be submitted.

59. Aircrew Immediate Actions. Following an anomalous occurrence, aircrew are to:

a. Avoid over-flying populated areas (or pointing at populated areas if a forward firing weapon is involved) and remain within the Air Danger Area (ADA) while executing b - d below.

b. Note all armament switch positions.

c. Make all armament and LASER switches safe.

d. Inform the RSO / AWRC confirming weapon type.

60. **Subsequent Actions – Hang-Up**.

a. **Practice Bomb**. A further attack may be made using normal procedures. If a second hang-up occurs, the particular station / pylon is to be de-selected and the range detail may be continued using other weapon stations.

b. **Other Configurations**. For all other weapon hang-ups, an inspection fly past may be made over the range at the discretion of the AWRC followed by a pass to initiate jettison if required. Should the inspection reveal that the suspected weapon is not present, the occurrence is to be reported as a wide weapon. Where jettison at the range is not possible, the Commander is to attempt to jettison over sea within a designated range danger area using clear range procedures. The aircraft may then return to the range for a confirmation inspection fly past if required.

c. **Unsuccessful Jettison**. In the event of an unsuccessful jettison, the sortie is to be discontinued and the Commander is to take all necessary action to minimise the risk of further hazard. During the transit and recovery, the Commander is to avoid overflying populated areas. The track flown is to be noted and, if possible, a second aircraft is to provide escort. Armament engineering personnel should meet the aircraft after landing.

61. **Subsequent Actions – Irregular Release**. An irregular release indicates a weapon system malfunction. The sortie is to be discontinued and, in addition, aircraft Commanders are to act in accordance with MAA Regulations.

62. **Subsequent Actions - Inadvertent Release**. Following an inadvertent release, and at the discretion of the AWRC, the range detail may be continued if the cause can be identified and its repetition avoided. If the occurrence is repeated, the range detail is to terminate (this does not necessarily mean the sortie is to be discontinued). The AWRC / FAC is to treat simulated weapon passes in the same manner as live passes with regard to clearance, in order that any inadvertently released weapon shall impact within the WDA / Z.

63. **Subsequent Actions – Gross Aiming Error**. In the case of a wide weapon caused by gross aiming error, the range detail may be continued provided the Commander / crew carry out a dry familiarisation run first. If the occurrence is repeated, the range detail is to terminate.

64. **Subsequent Actions - Discontinued Sortie**. When a sortie is discontinued, the Commander is to take all necessary action to minimize the risk of further hazard. He / she is to avoid overflying populated areas during his transit and recovery. In addition, he / she is to inform ATC of his problem and is to request armament engineering personnel to meet his ac upon arrival at his destination.

65. **Anomalous Occurrences – Reporting Procedure**. In the event of an anomalous occurrence, the AWRC is to submit a DASOR within 12 hours. Commanders are to submit a DASOR if the weapon impact is outside the Range Danger / Impact Area / Zone, if required by HQ Air or as required by the following:

a. **Death / Injury to Persons / Livestock or Damage to Property**. Whatever the circumstances of release Commanders are to submit a signal report within 2 hours of landing.

b. **Irregular / Inadvertent Release or Hang Up**. Commanders, in consultation with armament engineering staff, are to submit a DASOR within 12 hrs of landing. In the case of an irregular release, the AWRC is to submit a

DASOR within 12 hours of the occurrence. Armament engineering staffs are to report the results of an irregular release investigation.

Chapter 4

Rotary Wing (Crew Served Weapon) Engagements

The aim of this chapter is to detail the policy and principles for the safety of Rotary Wing Crew Served Weapons (RWCSW) engagements on MOD Ranges worldwide.

66. **Definition.** Crew served weapons are pintle mounted and fired from helicopter doors and / or ramps; they are aimed and operated by a crew member other than the flying pilots / observer / Weapons Systems Operator (navigator) in the front crew positions. Handheld weapon systems can be fired from helicopter doors and / or ramps by Special Forces (SF) personnel, SASC[7] qualified snipers or Fleet Protection Group Royal Marine personnel (Maritime Sniper Teams) but are not classed as RWCSW.

67. **Lead**. The Rotary Wing Air to Surface Working Group is the lead for coordinating the MOD procedures for RWCSW engagements. As the Defence Competent Authority, Joint Helicopter Command Headquarters (JHCHQ) provides the Chairman and Secretary for the Rotary Wing Air- to-Surface Working Group (RWASWG) which reports through the Air- to- Surface / Surface-to-Air Working Party (ASSAWP) to the Defence Ranges Safety Committee (DRSC).

68. **Competent Authority**. RWCSW are classified as Personal, Individual or Support weapons. Commander JHC is the Defence Competent Authority for all RWCSW and is the awarding body for Skill at Arms (SAA) and range qualifications required for their use (JHC CSW (A) qualification).

69. **MOD Range Use**. RWCSW live firing is only to take place on MOD ranges authorised and operated in accordance with DSA03 (JSP403).

Safety

70. The safety of personnel, property and livestock is paramount and the ultimate responsibility for the airborne safe practice rests with the RCO. The following practices are to be adhered to at all times:

a. **Clear Range Procedure**. Steps are to be taken, in so far as is reasonably practicable, to ensure that the Range Impact Area / Zone is clear of unauthorised personnel, livestock and traffic before firing or hazardous training commences; and that it remains clear for the duration that the hazard exists. Sentries, vedettes, radar, closed circuit television surveillance, or a combination thereof, may be used to satisfy clear range procedures. These measures are to be laid down in Range Standing Orders.

b. **Ballistic Safety Traces**. Only Weapon Danger Areas (WDA) / Hazard Impact Area Traces (HIAT) recommended by the Defence Ordnance Safety Group (DOSG), approved by the Service / Agency chain of command and

[7] Small Arms School Corps. The SASC, as recognized subject matter experts for training with Inf WS and pyrotechnics, are on the establishment of all qualifying authorities. They are responsible for ensuring best practice and maintaining the necessary standards of instruction, evaluation and testing on courses awarding Range Qualifications

authorised by the relevant Project Team (PT) within DE&S may be used for RWCSW engagements on MOD ranges.

c. **LASER Safety**. LASER Safety Clearances are to be obtained by the relevant Service / Agency chain of command. LASERs are not to be employed unless a clearance is held by the range. Further details are contained within DSA03 **JSP390**.

Range Control

71. Air- to-surface gunnery is only to be carried out on a range with the approval of the Range Safety Officer (RSO) or the Range Safety Officer (Air Traffic Control) (RSO(ATC)). The conduct of live firing practices is the responsibility of the user unit which provides the Range Conducting Officer (RCO).

a. **RSO**. The RSO, a member of the Range Staff, is the person who has the overall responsibility for the safe operation of a particular range and is responsible for the clear range procedure.

b. **RSO(ATC**). The RSO(ATC) on dedicated Air Weapons Ranges (AWR) is an officer or senior NCO of the Air Traffic Control Branch who holds a minimum endorsement of TC(AWR)L. The RSO(ATC) has overall responsibility for the safe execution of a particular range detail and for the co-ordination of the practice should more than one user be on the range.

c. **RCO**. The RCO is the qualified, current and competent person who is appointed by the Exercise Director / Commanding Officer / Head of unit or organisation to be responsible for the safe conduct of firing in accordance with the relevant Service / Agency range instructions.

d. **DE&S/TEST**. Range control at DE&S / TEST ranges shall be in accordance with the relevant Range Standing Orders and with the Trial Specification where applicable.

e. **Sea Ranges**. Air-to-surface firing entirely over the sea, in other than designated ranges, is to be conducted in accordance with single service regulations.

72. **Qualification**. For air-to-surface firing to take place, firers must be qualified current and competent, or firing under the supervision of the relevant Service air-to-surface gunnery instructor. Only JHC Crew Served Weapon Instructor (CSWI) qualified personnel are authorised to conduct air-to-surface gunnery.

73. **Currency**. Firers are not to fire unless they are deemed current and competent in accordance with individual Service regulations, are undergoing initial training or are regaining currency under supervision of a suitably qualified CSWI. T&E operations are to be in accordance with the Trial Specification.

Preparation and Supervision

74. The RCO shall be responsible for the planning, preparation, briefing, safe conduct and supervision of all air-to-surface live firing practices.

75. The RCO shall ensure that:

a. A suitable range is identified, booked and liaison established.

b. The RSO / RSO(ATC) has access to the relevant WDA / HIAT.

c. The WDA / HIAT has been applied to the satisfaction of the Range Staff for that range.

d. The firer has completed all appropriate training and is under the supervision of a Safety Supervisor.

e. A full safety brief is given to all those who shall be on the range during the firing period.

f. A detailed range brief and air gunnery exercise safety brief is conducted. As a minimum, these briefs should include the following points:

(1) Weapon Safety.

(2) LASER Safety.

(3) Communications.

(4) Voice Procedures.

(5) Range clearance.

(6) Maximum height & speed of aircraft.

(7) Circuit Patterns / Profile.

(8) Movement box and firing line identification.

(9) Dry / Live / Hot Runs.

(10) Arcs & Arc markers.

(11) Refuelling location.

(12) Loading.

(13) Arming.

(14) Firing.

(15) Targets.

(16) Stop actions.

(17) Actions on - Weapons Misfires / Stoppages.

(18) Limitations

(19) Emergencies.

(20) Debrief and Reports.

(21) Accident / Incident Procedures.

g. An armourer and / or AT is to be either present or available in accordance with regulations applicable to the weapon type.

76. The following conditions apply to all air-to-surface RWCSW live firing on to ranges:

a. Weapon safety catches are to be kept in the SAFE position until the aircraft is in such a position that any deliberate or accidental firing would result in all rounds impacting in the RDA.

b. The weapon is not to be made ready until a clearance has been given by the RCO or RSO(ATC).

c. Weapons may not be fired until the correct target has been positively identified and confirmed by the firer and Safety Supervisor.

d. Safety catches are to be applied after each weapon event.

e. It is the responsibility of the aircraft Commander to ensure that the maximum height and speed stipulated for the WDA are not exceeded.

77. **LASER**. Non-eye safe LASERs are to be treated as live weapons since direct, diffuse, wet target and specular LASER reflections can be dangerous. Further details are in **JSP390**.

Command and Control

78. **Radio**. Definitions of standard terminology used on ranges are given in Annex A to Chapter 7. Calls may be classified as mandatory or advisory.

a. Mandatory Radio Calls. The following occurrences are to be requested or reported:

(1) Joining the range – requested by aircraft Commander.

(2) Clearance to join – given by RCO or RSO(ATC).

(3) Clearance to use the LASER – given by RCO or RSO(ATC).

(4) Clearance to live fire – given by RCO or RSO(ATC).

(5) Stopping of live firing – given by RCO or RSO(ATC).

(6) Confirmation that the weapons are unloaded and cleared by inspection – given by Safety Supervisor.

(7) Passing of essential traffic information and precautionary warnings – given by RCO or RSO(ATC).

b. **Advisory Radio Calls**. It is only advisory that the following information is transmitted:

(1) Aircraft position on the range – given by aircraft Commander.

(2) Weapon scores – given by RCO or RSO(ATC).

Loss of Communication

79. **Loss of Communication**. In the event of loss of communications the following actions are to take place:

a. The gunner is to cease firing.

b. The Safety Supervisor is to ensure that all weapons are unloaded and cleared by inspection, with the weapon pointed in a safe direction at all times.

c. The practice is to be terminated and the RCO informed at the earliest opportunity.

Armament of Anomalous Occurrences

80. In the event of an armament or LASER anomalous occurrence, including a negligent discharge, the following actions are to be implemented:

a. Ascertain the status of the weapon and if unsafe, place the weapon in a safe condition. If this is not possible or doubt exists about status, ensure the weapon remains pointed in a safe direction.

b. Report nature of malfunction and weapon status to the RCO and RSO / RSO(ATC).

c. Land at pre-nominated landing point and shut down.

d. Brief armourer / AT and verbally handover weapon.

e. Submit Initial Report in accordance with Range SO, if required.

Chapter 5

Rotary Wing (Integrated Weapon Systems) Engagements

The aim of this chapter is to detail the procedures for the planning and conduct of Rotary Wing Integrated Weapon Systems (RW(IWS)) engagements on MOD Ranges.

81. **Definition**. Integrated Weapon Systems are those that are either permanently attached or appended to the Helicopter. These weapon systems are remotely operated by the pilots / observer. If weapon systems are not remotely operated then Chapter 4 applies.

82. **Lead**. The Rotary Wing Air-to-Surface Working Group is the lead for coordinating the MOD procedures for RW(IWS) engagements. As the Defence Competent Authority, Joint Helicopter Command Headquarters (JHCHQ) provides the Chairman and Secretary for the Rotary Wing Air-to-Surface Working Group (RWASWG) which reports through the Air-to-Surface / Surface-to-Air Working Party (ASSAWP) to the Defence Ranges Safety Committee (DRSC).

83. **Responsibility**. JHCHQ is the Defence Competent Authority for all RW(IWS); the following Services have responsibility for integrated weapon systems:

a. Director Army Aviation (DAAvn) is the Competent Army Authority and is the awarding body for Army RWIWS range qualifications (M230E1 Area Weapon System; CRV-7 Aerial Rocket System; AGM 114K/L (SAL/RF) Hellfire).

b. CINC FLEET ACOS AV is the Competent Naval Authority and is the awarding body for FLEET RWIWS range qualifications (Air- to-Surface weapon - Sea Skua; Anti-Submarine weapons - Torpedoes and Depth Charge).

84. **Ranges**. Air-to-surface live firing using RW(IWS) is only to take place on MOD ranges operating within the constraints of DSA03 (JSP403).

Safety

85. The safety of personnel, property and livestock is paramount and the ultimate responsibility for the safe conduct of live firing practice resides with the Range Conducting Officer:

a. **Clear Range Procedure**. Steps are to be taken, in so far as is reasonably practicable, to ensure that the Range Impact Area / Zone is clear of unauthorized personnel, livestock and traffic before firing or hazardous training commences; and that it remains clear for the duration that the hazard exists. Sentries, vedettes, radar, closed circuit television surveillance, or a combination thereof, may be used to satisfy clear range procedures. These measures shall be laid down in Range Standing Orders; the ultimate responsibility for the safe conduct of the live firing practice resides with the Range Conducting Officer.

b. **Ballistic Safety Traces**. Only Weapon Danger Areas (WDA) / Hazard Impact Area Trace (HIAT) recommended by the Defence Ordnance Safety Group (DOSG) and authorized by the relevant Project Team Leader (PTL) may be used

in addition to any further requirements in the relevant Service overriding document.

c. **LASER Safety**. LASERs are only to be used in accordance with the direction given by the PTL. Further details are in **DSA03 JSP390**.

Range Control

86. All RW(IWS) air-to-surface engagements are to be approved by the Range Safety Officer (RSO). On dedicated Air Weapons Ranges (AWR) this duty is performed by the Range Safety Officer (Air Traffic Control) (RSO(ATC)).

a. **Exercise Director.** It is the responsibility of the Exercise Director (i.e., the person who directs that firing is to be carried out) to appoint the Planning Officer, the Senior Range Conducting Officer (Senior RCO) if one is required and the RCO and Safety Supervisors (SS). In doing so the Exercise Director is to ensure that they are competent and:

(1) Of sufficient experience to match the complexity of the exercise. For example, in the case of a large-scale exercise incorporating a number of supporting weapons/arms it would be appropriate to nominate a qualified and experienced officer of field rank to be the Planning Officer / Senior RCO.

(2) Suitably qualified or authorised.

(3) Given the Training Objectives (TOs) and Enabling Objectives (EOs) to be covered, or the scope of the training, and sufficient time to plan and conduct the firing correctly.

(4) Given guidance on, and provided with the resources and manpower to be able to plan, conduct and supervise the firing. This includes the specific provision of Safety Supervisors.

b. **Planning Officer**. The Planning Officer is the Officer, Warrant Officer or Senior NCO who is appointed by the Exercise Director and is responsible for the planning of the exercise. This shall include the definition of the firing area, arcs of fire, permitted ammunition natures, target siting, safe location of all weapon firing positions and the production of a detailed written exercise instruction. If as a result of this detailed planning the Planning Officer considers there are insufficient resources or manpower available and in particular qualified safety staff, then the Planning Officer is to refer the matter back to the Exercise Director for a decision. The Planning Officer is to be qualified, current and competent and may, or may not be, the Senior RCO or RCO. The Planning of all aspects of firing must be meticulous and HIAT / WDA templates must be produced for each weapon type. The qualified personnel responsible for the supporting weapons are to hold the appropriate HIAT / WDA templates. This activity shall need to be co-ordinated by the Planning Officer who is then responsible for compiling the overall exercise trace showing the danger area of all weapons involved in the exercise. The overall exercise trace and written instructions are then to be submitted to the range control authority by the

Planning Officer who shall liaise with them as necessary. In order to discharge these duties correctly the Planning Officer shall need to consult all relevant publications applicable to the exercise.

c. **Senior RCO**. An overall Senior RCO, who is qualified, current and competent shall be appointed by the Exercise Director whenever supporting arms (e.g., Artillery, Armour, Infantry Support Weapons, Fixed Wing Aircraft or Engineer assets) are incorporated into the firing exercise. The Senior RCO is to conduct briefings and rehearsals for all Unit safety staff and Range Staff as necessary. Subordinate RCOs for all weapon systems are to be present and are to be thoroughly briefed and have a clear understanding of all aspects of the exercise plan.

d. **RCO**. The RCO[8] is appointed by the Exercise Director to be responsible for the safe conduct of the firing as specified by the Exercise Director in accordance with the relevant Single Service regulations; he may also be the Planning Officer. The RCO is to be qualified, current and competent. For large exercises or those involving supporting arms and / or Infantry support weapons the RCO may be one of several subordinate RCOs reporting to the Senior RCO. During the conduct of the firing it is essential that all subordinate RCOs be sited so as to maintain effective communications with, and control of, their respective elements. They are to be in contact with the Senior RCO at all times. At the direction of the Exercise Director, or in accordance with the relevant Service instructions, the RCO may be assisted by a number of Safety Supervisors.

e. **Aircraft Commander**. The Aircraft Commander is responsible for issuing fire control orders and controlling the fire of his aircraft, as directed by the RCO / RSO(ATC) in accordance with Range Standing Orders. During the conduct of the firing it is essential that effective communications are maintained with the RCO / RSO(ATC). The Aircraft Commander is to be qualified, current and competent in accordance with the relevant single Service regulations.

f. **Safety Supervisor.** The level of supervision required for a particular exercise / range practice is to be determined by the Exercise Director. The minimum level must not be less than what is stated in the relevant Single Service regulations. Safety Supervisors[9] are responsible for the safe conduct of firing as directed by the RCO or RSO(ATC) in accordance with range instructions. Safety Supervisors are to be qualified or authorised, current and competent in accordance with the relevant single Service regulations.

[8] The RCO is responsible for the safe conduct of the firing, in accordance with the plan. The RCO is to be qualified, competent with the weapons being used and may also be the Planning Officer or SRCO

[9] Safety Supervisors are to be competent and are responsible for the supervision of firing as directed by the RCO.

g. **Arming Area Safety Officer**[10]. The Arming Area Safety Officer (AASO) of the practising unit, who is normally a SNCO, is to ensure that:

(1) All personnel involved in the loading and unloading of RW(IWS) ordnance have been tested in accordance with the relevant Air Publication (AP) and their Training Records are suitably endorsed.

(2) All ordnance is loaded onto the aircraft correctly with all weapon management switches SAFE, in accordance with the relevant AP.

(3) The Ammunition Technical Officer (ATO) inspects all missiles and rockets as they are unpacked, and that any 'dropped' ordnance is reported to ATO immediately.

(4) Both flight and general safety are not compromised in the weapon loading area. The movement of all personnel is to be carefully controlled.

(5) It is advised that Aircraft are not refuelled at any time with live missiles, rockets, chaff or flares loaded. However, if it is required to be conducted for training purposes, it must be carried out in accordance with the specific to type Service Deviation and / or Military Aircraft Release.

(6) Loading of ordnance, with or without rotors turning, is carried out only after all servicing including refuelling is complete. Aircraft are loaded facing the safe heading.

h. **Forward Air Controller (FAC)**. At tactical ranges, firing clearance may be given by a suitably qualified FAC, although the RCO remains responsible for the safety of the live firing practice.

i. **DE&S / TEST Ranges**. Range control at DE&S / TEST (contractor operated) ranges shall be in accordance with the relevant Range SO and, where appropriate, the Trial Specification.

j. **Air-to-Surface Firing**. Air-to-surface firing entirely over the sea in other than designated ranges is to be conducted in accordance with single Service regulations.

General Orders and Conduct

87. The RCO will be responsible for the planning, preparation, briefing, safe conduct and supervision of air-to-surface live firing practices.

88. The RCO shall ensure that:

a. A suitable range is identified, booked and liaison established.

b. The RSO / RSO(ATC) has access to the relevant WDA / HIAT.

[10] Within Army Aviation this role is conducted by the FARP Commander for operations and live fire training. During live fire training the FARP Commander conducts operations in co-ordination with the RCO

c. The WDA / HIAT has been applied to the satisfaction of the Range Staff for that range.

d. The firer has completed all appropriate training.

e. A full safety brief is given to all those who shall be on the range during the firing period.

f. A detailed range brief and air gunnery exercise safety brief is conducted. As a minimum, these briefs should include the following points:

(1) Weapon Safety.

(2) LASER Safety.

(3) Communications.

(4) Voice Procedures.

(5) Range clearance.

(6) Maximum height & speed of aircraft.

(7) Circuit Patterns / Profile.

(8) Movement box and firing line identification.

(9) Dry / Live / Hot Runs.

(10) Arcs & Arc markers.

(11) Refuelling location.

(12) Loading.

(13) Arming.

(14) Firing.

(15) Targets.

(16) Stop actions.

(17) Actions on - Weapons Misfires / Stoppages.

(18) Limitations.

(19) Emergencies.

(20) Debrief and Reports.

(21) Accident / Incident Procedures.

n. An armourer and / or AT is to be either present or available in accordance with regulations applicable to the weapon type.

89. The following conditions apply to all air to surface RW(IWS) live firing on to ranges:

a. Weapon management switches are to be kept in a SAFE condition until the aircraft is in such a position that any deliberate or accidental firing would result in all munitions impacting in the RDA.

b. The weapon is not to be selected to LIVE until a clearance has been given by the RCO or RSO(ATC).

c. Weapons may not be fired until the correct target has been positively identified and confirmed by the firer and confirmed with the RCO or RSO(ATC).

d. Weapon management switches are to be selected to SAFE immediately after each weapon engagement.

e. It is the responsibility of the aircraft Commander to ensure that the maximum height and speed stipulated for the WDA / HIAT are not exceeded.

90. **LASER**. Non-eye safe LASERs are to be treated as live weapons since direct, diffuse, wet target and specular LASER reflections can be dangerous. Further details are in DSA03 **JSP390**.

Communications and Control

91. **Radio**. Calls may be classified as mandatory or advisory.

a. **Mandatory Radio Calls.** The following occurrences are to be requested or reported:

(1) Joining the range – requested by aircraft Commander.

(2) Clearance to join – given by RCO or RSO(ATC).

(3) Clearance to use the LASER – given by RCO or RSO(ATC).

(4) Clearance to live fire – given by RCO or RSO(ATC).

(5) Stopping of live firing – given by RCO or RSO(ATC).

(6) Confirmation that weapon management switches are SAFE on departure – given by aircraft Commander.

(7) Passing of essential traffic information and precautionary warnings – given by RCO or RSO(ATC).

b. **Advisory Radio Calls**. It is only advisory that the following information is transmitted:

(1) Aircraft position on the range – given by aircraft Commander.

(2) Weapon scores – given by RCO or RSO(ATC).

c. **Loss of Communications**. In the event of loss of communications the following actions are to take place:

(1) The firer is to cease firing.

(2) The aircraft Commander is to ensure that all weapon management switches are selective to ‘SAFE’ and weapons maintained on a safe heading.

(3) The practice is to be terminated and the RCO and RSO / RSO(ATC) informed at the earliest opportunity.

Armament Anomalous Occurrences

92. In the event of an ammunition accident, incident and weapon / ammunition defect, RCOs are to comply with the reporting procedures contained in the relevant Service safety document and also submit an accident / incident signal in accordance with Chapter 2.

Chapter 6

Unmanned Aircraft Systems

The aim of this chapter is to detail the policy and principles for the planning and safe conduct of UAS training including UAS development, test and evaluation activities.

93. **Definitions**. An Unmanned Aircraft System (UAS) / Remotely Piloted Aircraft System (RPAS) is an aircraft system which is designed to operate with no human pilot onboard. A UAS comprises individual "Unmanned Aircraft System Elements" consisting of the Unmanned Aircraft (UA), the Ground Control Station (GCS) and any other UAS Elements necessary to enable flight, such as a communications link and Launch and Recovery Element. There may be multiple UAs, GCS, or Launch and Recovery Elements within a UAS.

94. **Safety in Use**. UASUAS come in many shapes and sizes from full size Remotely Controlled Aircraft (RCA) to micro Models. The planned use of a UAS shall dictate the way in which it is regulated and operated. Generally, there are three categories of use; as a target or target towing vehicle, as a sensor platform and as a weapon platform. Although these categories of use are not mutually exclusive on operations, it would be unusual to train in or practice more than one role with the same UAS on a range. Policy dictates that the operation of UASs should be no more likely to cause injury or fatality to personnel or the general public than the operation of a manned aircraft. This is achieved by both appropriate regulation and currently by restricting peacetime military UAS operations to segregated airspace.

95. **Regulation**. This chapter addresses only the range safety issues arising from flying UAS on MOD ranges and training areas. The relevant flying regulations are as follows:

a. **Military**. Military UAS flying is regulated by MAA Regulatory Publications, (MRP), in particular Regulatory Article (RA) 2320. The airworthiness of military UAS is regulated by MRP and Manual of Maintenance and Airworthiness Processes (MAP). The manner in which the UK Armed Forces are to operate an individual type of UAS and its flight limitations, is contained in the Release to Service (RTS) for the type, supported by a Safety Case.

b. **Civilian**. Where a civilian UAS is flown on a MOD range without the involvement of any Service or MOD personnel the operation is to be in accordance with the appropriate Civil Aviation Authority (CAA) regulation or AvP 67 (if applicable).

c. **Contractorisation**. At present there are two types of contractorisation. In both cases the aircraft shall appear on the UK military aircraft register and be subject to military regulation either under AvP 67 for UAS undergoing development, test and evaluation or under MRP[11] for in-service UAS used in training. The contractorisation types are:

[11] Military Aviation Authority Regulatory Policy

(1) The MOD owns the aircraft and equipment but has a recognised contractor to operate the equipment in order to provide a specific service.

(2) The contractor provides both the equipment and the service. For example, this is how the Combined Aerial Targets Service (CATS) operates.

Release to Service and Aircraft Operating Authority

96. **Release to Service Authority**. The Release to Service (RTS) authority for UAS within each Service is:

a. **RN**. FLEET (DACOS(AE)) on behalf of CNS.

b. **Army**. DAAvn (RTS-SO1) on behalf of CGS.

c. **RAF**. ACAS (RTSA-FW) on behalf of CAS.

d. **Joint Force Aircraft**. As agreed by the relevant COS.

97. For Aircraft that have been RTS, detailed rules for operating and maintaining flying discipline are issued by the Aircraft Operating Authority (AOA). The AOA for UAS in each of the Services and Defence Equipment and Support (DE&S) is:

a. **RN**. FLEET ACOS (CSAV).

b. **Army**. HQ 1 Arty Bde.

c. **RAF**. HQ 1 Gp.

d. **DE&S**. DGS & E AD Air Sys TESD.

Range Safety Management

98. **Responsibilities**. At Annex A is a diagram of the various bodies involved with the through life safety management of UAS. The following appointments must be filled by the Operating Unit for each UAS sortie:

a. The UAS System Commander (UAS Sys Cdr): responsible for the overall command of the entire UAS and its safe and effective operation. They may be responsible for a number of concurrent UAS flights or missions. This person may be the unit CO, or other designated officer.

b. The UAS Commander (UAS Cdr): responsible for the conduct and safety of a specific flight and for supervising the person in direct control of the UAS. His duties are equivalent to those of an Aircraft Commander.

c. The UAS Pilot (UAS-p): the person in direct control of a UAS.

d. The Flight Safety Officer (FSO): a Suitably Qualified and Experienced Person (SQEP) responsible for independently checking the drills and procedures associated with the build and launch of the UAS and to monitor

the safe execution of the flight. The FSO may be assisted by Assistant Flight Safety Officers (AFSOs).

99. **Flying Orders**. Each AOA is to publish Flying Orders for the particular unit and UAS. The orders are to address such issues as Pilot / Controller Qualifications and Competency, Flight Responsibilities, Competency & Currency, Medical Standards, Airworthiness, Flight Authorisation, Flight Safety, Emergency Procedures, Documents and Records, Incident Reporting, Post Crash Management and Investigation Procedures. This list is not exhaustive.

100. **Range Orders**. Each Range Administering Unit (RAU) is to produce UAS Standing Operating Procedures (SOP) dealing with the particular local control and safety arrangements, taking into account AOA Flying Orders. Topics such as UAS DA, Safe Flying Areas, Launch & Recovery Areas, Control of Segregated Airspace, Meteorological Information, Range Communications, Authority to Launch Procedures, Overflight of other Users, Incident Reporting, Emergency Procedures, Air Sentries and Coordination with other weapon systems are to be addressed. This list is not exhaustive and shall vary in content and complexity depending on the particular range and UAS capability.

101. **UAS Danger Area**. The DA is defined as that area associated with launch, flight and recovery of the UAS. There may be a training requirement for personnel or assets to operate within the DA when the UAS is flying and appropriate measures must be put in place for the warning and protection of those personnel or assets. Range safety planning criteria and safety distances for individual types of UAS can be found in the special-to-arm range safety regulations and / or in the RTS. If the UAS is armed the relevant DA for the weapon system must be applied.

102. **Visual Control**. Care must be taken to avoid flying to the limit of visual control if local weather conditions can change sufficiently in a short space of time to cause a potential loss of the UAS.

103. **Radar Tripwire**. On ranges where radar is available for tracking UAS flight and it is possible to overlay the radar display, consideration should be given to putting a tripwire boundary on the display to warn the UAS commander and / or range control staff when the flight path, dependent on the height and speed of the UAS, is in danger of going outside the range boundary. Crossing the tripwire would then trigger action to either activate the FTS or change the course of the UAS.

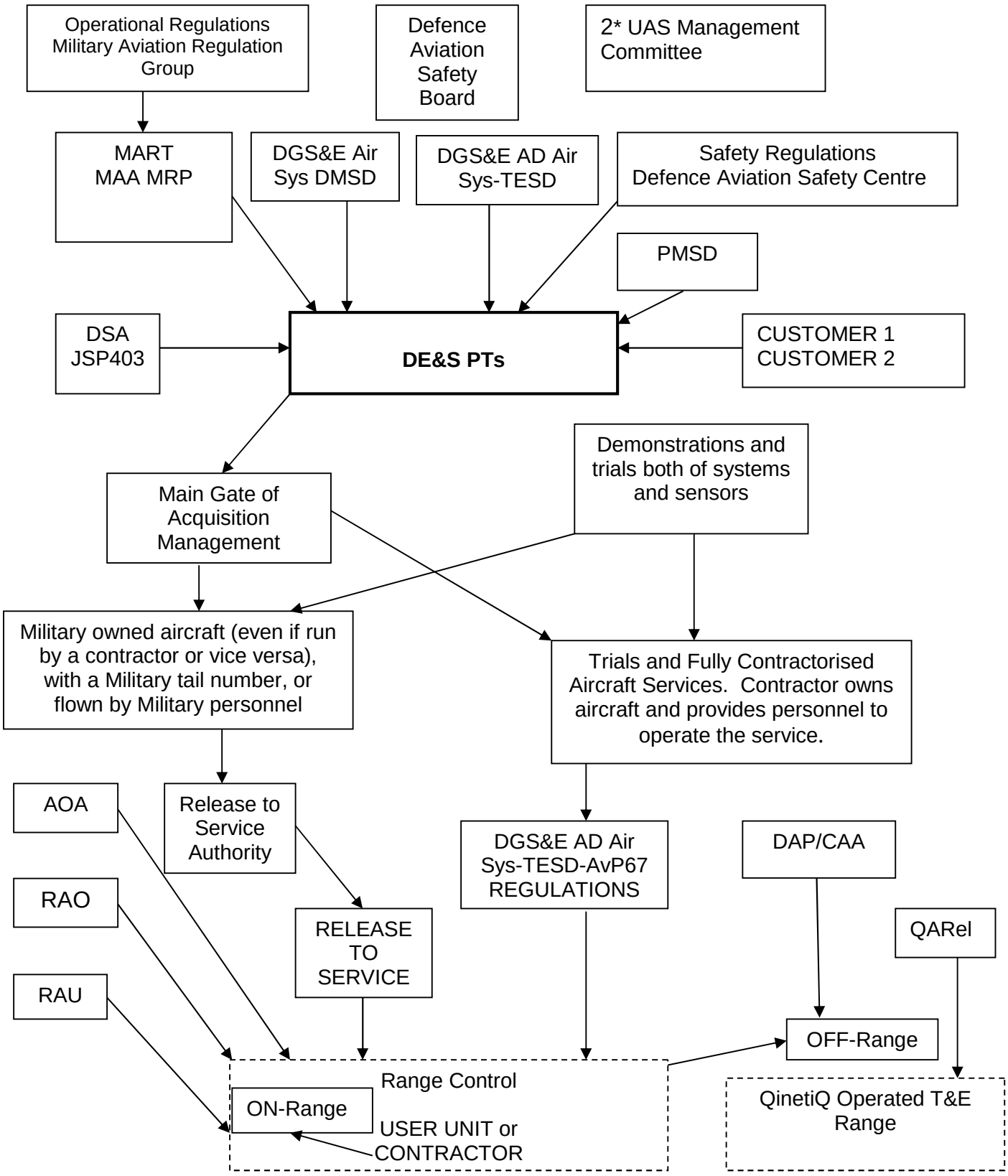
104. **UAS Incident Reporting**. All UAS occurrences that lead to the loss or damage of an airframe or to injury to personnel are to be reported in accordance with JSP 551 Vol 1 and unit flying orders. An example of the standard UAS Occurrence Report is shown at Annex B. The RAU is to be informed immediately in the event of any occurrence. In the event of a serious accident the RAU is to have a Post Crash Management Plan (PCMP) to deal with casualties and any resultant environmental or pollution matters.

Annexes:

A. Input to Safety Management.
B. UAS Incident Reporting.

Chapter 6 Annex A

Input to Safety Management



Chapter 6 Annex B

UAS Incident Reporting

1. **Precedence:**

a. Accident - Action and Information - PRIORITY or higher.

b. Incident - Action and Information - ROUTINE unless higher is justified. If the incident might attract public attention, PRIORITY is to be used.

2. **Security Classification.** Classify according to content; a classification higher than RESTRICTED should be avoided whenever possible.

3. **Subject Indicator Codes (SIC).** See Annex H (for RN see Annex A) to Section 200 of JSP 551 Volume 1.

4. **Addressees:** Each Service and DE&S / TEST to provide a list of signal addressees who should receive the report.

5**.** **Message Content.** The standard message content is listed below. No section should be left blank; use NA or UNKNOWN as applicable. Where asterisk* insert / delete as applicable.

REPORT FORMAT

a. UAS Incident / Accident.

b. UAS / equipment type, mark, serial number.

c. Parent ship / unit / station / establishment.

d. Reporting individual's rank / grade, initials, name and role.

e. Pilot / controller's rank / grade, initials, name and role if different to D.

f. Range name, date and local time of occurrence (include zone suffix).

g. Environmental circumstances surrounding occurrence, eg *day / night / dawn / dusk; *VMC / IMC; *Stage of Flight; Height.

h. Operational circumstances at time of occurrence, eg training, test, trial.

i. Description of occurrence in plain language, giving relevant details of weather, UAS system / equipment indications, action taken, effect, and originator's assessment of safety implications.

j. (1) Main cause of occurrence.

(2) Contributory factor(s) if appropriate. (See Note 1)

(3) Brief summary of initial analysis undertaken.

k. Equipment damage (to UAS).

l. Remedial action taken or proposed, and recommendations to prevent recurrence. (See Note 2)

m. Damage to civilian property, owners name and address.

n. Completeness of this report: Complete/Under Investigation (UI). FOLLOW-UP REPORT YES / NO* (if UI follow-up signal must be released within 15 days). If applicable state which associated specialist reporting procedures are to be raised.

o. State if further investigation/assistance proposed or required:

The following sections are to be used for Accident reports only.

p. Whether salvage required. State any factors that may assist recovery.

q. Details of any dangerous cargo, explosives or ammunition on board.

r. Nationality and service of individuals killed / missing / injured. State degree of injury, location of casualties and whether bodies have been recovered. State whether next-of-kin informed.

Notes:

1. **Contributory Factors**. Describe contributory factors in plain language. These may include, but not be limited to: distraction, interruption, fatigue, inappropriate decision, incorrect diagnosis, lack of knowledge, too high workload, sensory limitations, time constraints, peer pressure, working environment, inadequate publications etc. Every incident must be examined in sufficient depth to ensure that all of the contributory factors are determined*.*

2. **Remedial Action**.

a. For an incident caused by a technical fault, summarise the action taken or proposed to prevent a recurrence of the occurrence both on the UAS concerned and throughout the fleet. If no fleet wide action is required state why.

b. For an incident caused by human error, summarise the reasons behind the occurrence and any action taken or proposed to address the contributory factors that led to the human error. These comments should not address blame or negligence, nor indicate any disciplinary action taken