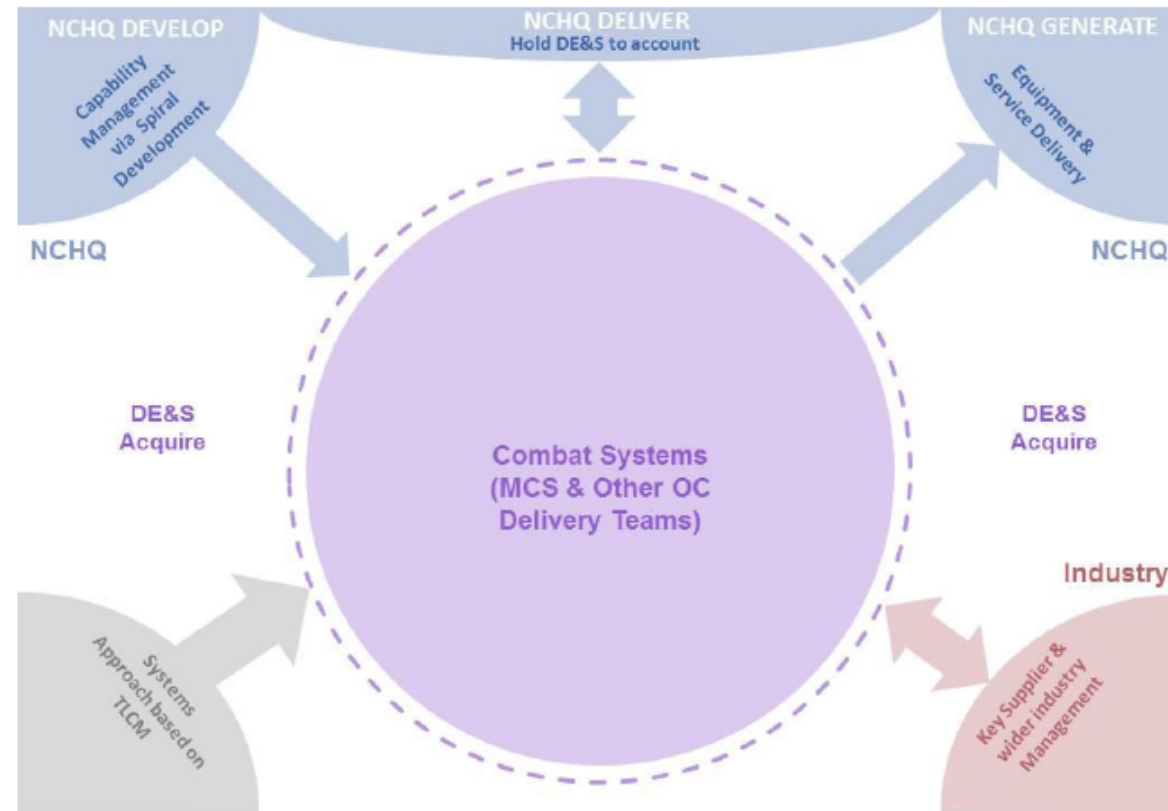


3. Overview of the Combat System Enterprise

The Combat System Enterprise encompasses the entirety of UK activities that relate to the provision and usage of Surface Warship Combat System Capabilities. This view briefly introduces the major components of the Combat System Enterprise which are then described in more detail in other chapters.

The Combat System (CS) Enterprise comprises all the acquisition activities undertaken by DE&S in conjunction with industry partners and suppliers to enable Navy Command Head Quarters (NCHQ) to develop, deliver, generate, and operate surface ship combat system capability. It embraces all surface ship combat system equipment, regardless of DE&S Operating Centre, across all surface ships, including new build, in service, and commercially supported shipping, along with their supporting structures in industry.



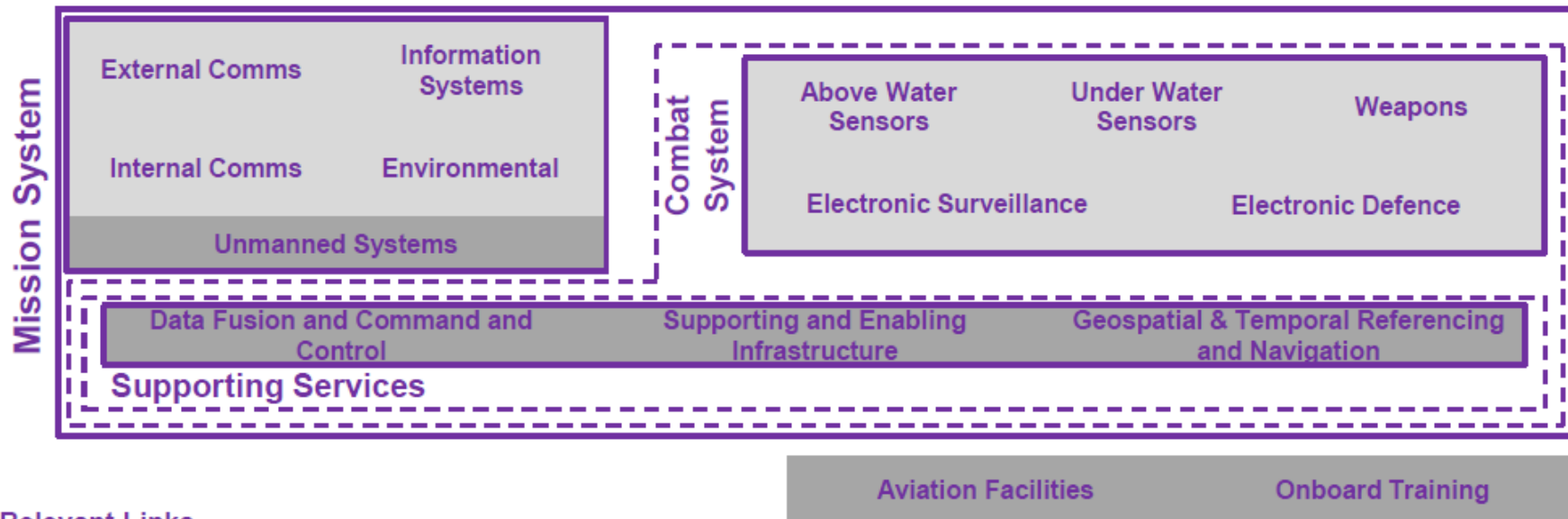
4. What is a Combat System?

A Systems of Systems Approach

The Combat System is formed of many individual equipments which contribute to the warships ability to sense, detect, identify and if necessary neutralise targets. Sub sets of these equipments in turn form individual lower level systems which, alongside the personnel that operate and maintain them come together to form the Combat System as a whole.

Warships of all shapes and sizes will have components of the generic Combat System elements shown below. The groupings below and throughout this handbook use the Generic Combat System Framework (GCSF) to divide Combat System Equipments into similar categories. The conventions below are also largely consistent with the Combat System Architectural Model (CSAM).

The core systems denoted in light grey below provide the warships capability whilst the dark grey boxes are supporting functions. For more information click on the box below for detail about the breakdown of systems in this category.



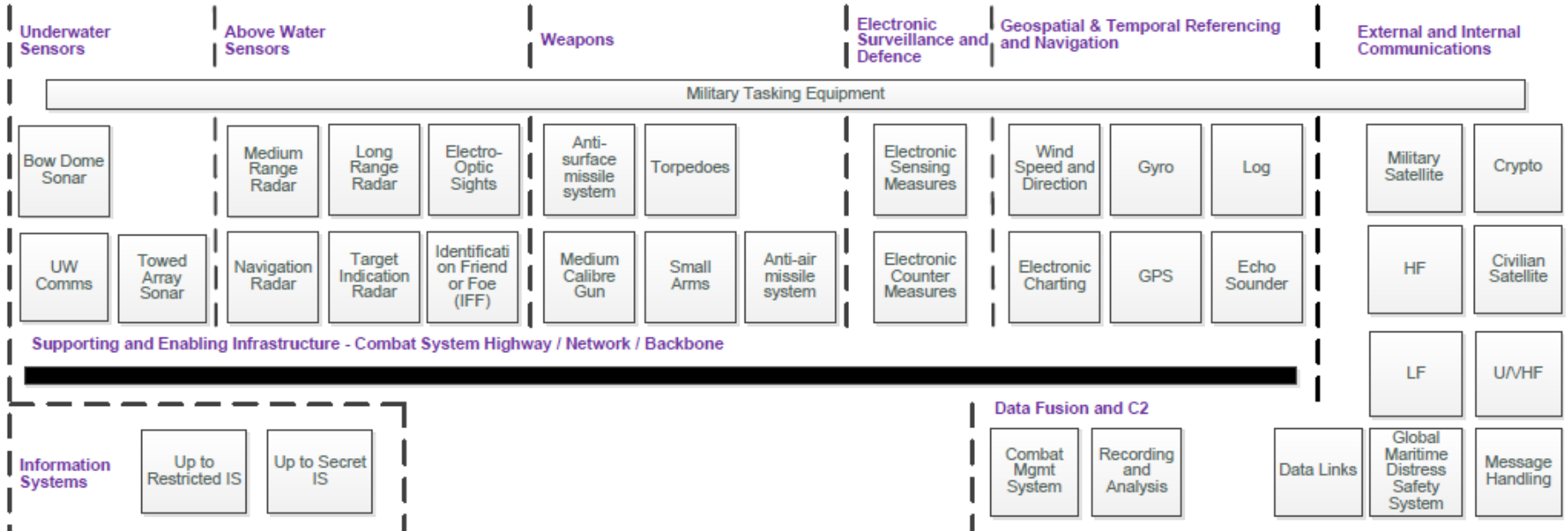
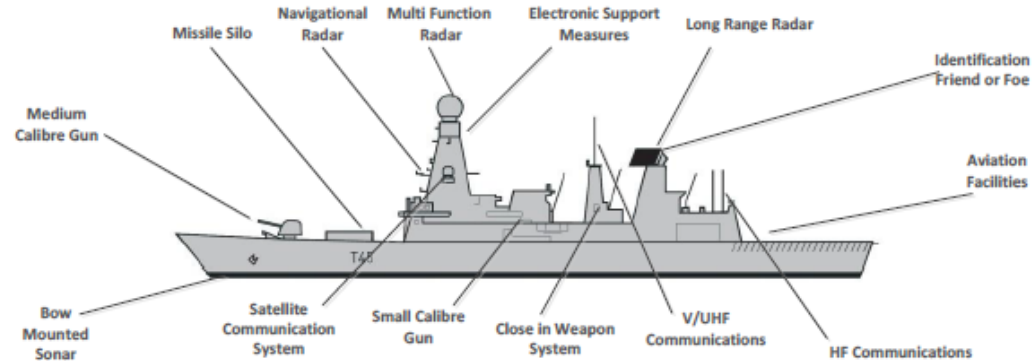
Relevant Links

[DEF STAN 21-88](#), [DEF STAN 21-59](#).

4.1 The Generic Combat System

These diagrams represent the key elements of a generic surface ship combat system.

The second block diagram expands the system further, however due to their complexity it does not show the interconnections between systems or processing layers.





4.2 Above Water Sensors

Description

Above Water Sensors contribute to Above Water Warfare (AWW) by providing the warship with the ability to Search, Track, Identify and Determine Intent of Air and Surface targets. These sensors use a variety of techniques and advanced technology to make best use of a wide range of Electro-Magnetic (EM) spectrum wavelengths.

Radars

Operating in the Radio Frequency (RF) part of the EM spectrum radars operate by transmitting a pulse or continuous wave of RF energy and detecting any return from an object in the transmission path. It can be used to detect aircraft, missiles, ships, land and even space objects and can be used to search for and track contacts determining their position, speed and course. There are different types of radars used by the RN from air surveillance used to search for threats and control aircraft to navigation radars and fire control radars that are used to guide surface to air missiles to their targets.

Electro-Optics / Infra-Red Sense

Infra-Red (IR) and visible light Electro-Optic (EO) sensors provide a warship with the ability to see air and surface contacts in more detail than is available with current radars. EO sensors operate in a similar way to the human eye and are designed to make best use of IR and light emitted from contacts. EO sensors are used for a variety of reasons from providing a visual sight for targeting a gunnery system to providing an ability to search and identify small contacts near to a warship that may not be detected by radar. It may also be possible to determine the intent of a contact using EO.

IFF

Identification Friend or Foe (IFF) equipment makes use of an interrogator and a transponder setup. When a unit with an interrogator wants to interrogate a suspect air or surface target it transmits a signal to the target; if the target is a friend it understands the signal and responds correctly thus allowing the interrogator to know this is a friendly unit. IFF can be insecure to talk to civilian units and also encrypted to ensure that friendly military forces can be correctly identified.

Major Equipments

Radar

- RT996
- RT997
- RADAR 1007/1009
- RADAR 1008
- RADAR 1045 45
- RADAR 1046 45
- RADAR 1047 45
- RADAR 1048 45
- RADAR RRB
- LFC

IFF

- IFF 1018/19
- 2ATH

EO/IR Sense

- GFCS EOSS
- GFCS GPEOD
- QPD 45
- EOSP 45



4.3 Under Water Sensors

Description

Under Water sensors contribute to Under Water Warfare (UWW) by providing the ability to Search, Track and Identify Subsurface targets. These sensors use a variety of techniques and technology to make best use of the properties of acoustic propagation in water. These sensors can be either passive (listening only) or active (emits a sound and waits for the echo from a submerged target).

Hull Mounted Sonar

Hull Mounted Sonars can be active or passive and are physically mounted under the ship. Generically these systems are divided into inboard and off board equipment. Sound is generated in the outboard equipment by an array of elements mounted in the water in a hull enclosure.

Towed Array and Variable Depth Sonar

Due to the noise the platform makes in the water hull mounted sonars can find it difficult to detect quiet or weak targets. To overcome this arrays of sonar transducers can be towed far behind the platform. Free of the self noise generated by the platform the towed array is able to determine possible directions of targets.

Minor Sonars

Note minor sonars are included under Environmental Sensors.

Acoustic Countermeasures

To defend against torpedoes acoustic countermeasures are used to detect, classify and identify threats and then deploy active countermeasures to distract the incoming torpedo.

Major Equipments

Hull Mounted Sonar

- S2050
- S2091 MFS 45
- HULL OUTFITS
- S2093/S2193

Towed Array and Variable Depth Sonar

- S2087
- S2093
- S2193

Acoustic Countermeasure

- S2170



4.4 Weapons

Description

The primary purpose of a weapon is to destroy enemy targets whether these be in the air, on the sea, under the sea or on land. There are numerous types of weapons from complex missiles to gunnery systems to torpedoes and depth charges. Weapons can be launched directly from a platform or air launched from the platforms air asset.

Anti-Air Weapons Anti-Air Weapons are used to destroy air targets whether these be anti-ship missiles, anti-air missiles or enemy aircraft. Broadly there are two main types: Guided Weapon Systems (GWS) and Close-In Weapon Systems (CIWS). GWS use fast moving missiles to intercept air targets in flight at a safe range from the platform. CIWS systems provide defence nearer to the platform and tend to use radar controlled guns.

Anti-Surface Weapons Anti-Surface Weapons are designed to engage surface contacts and targets on the land. There are four main types of surface weapons: Guided Weapon Systems (GWS), Medium Calibre Guns, Small Calibre Guns and Small Arms. The use of each type of weapon is defined by the range at which the target can be engaged effectively, with GWS representing the greatest range and Small Arms the closest.

Under Water Weapons Under Water Weapons are any weapon that deploys under the water to engage surface or sub-surface targets. The broad types of under water weapons are: Torpedoes, Depth Charges and Mines. Torpedoes are complex weapons that can be controlled and/or home actively or passively; they can also be ship or air launched. Depth Charges and Mines can be launched from a ship or air launched.

Air Launched Armament Apart from storing air launched munitions for use with a platform's aircraft, warships also have systems to move munitions within the air weapons magazine. Naval Aircraft are capable of supporting all forms of offensive warfare and can carry a wide range of air launched weapons from Torpedoes and Depth Charges to Air-to-Surface and Air-to-Air Missiles.

Major Equipments

Anti-Air Weapons

- SRAD GWS36 (SEA CEPTOR)
- MRAD GWS45 (SEA VIPER)
- PDMS GWS26 (SEAWOLF)
- CIWS GOALKEEPER
- PHALANX

Anti-Surface Weapons

- SSGW GWS 60 (HARPOON)
- MCG MOD1 GUN
- GFCS GSA8
- GSA9 45
- CRGS 20MM GUN
- CRGS 30MM GUN
- CRGS MINIGUN
- GPMG
- Small Arms

Under Water Weapons

- MTLs

Air Launched Armament

- AIR WPNS HANDLING 45



4.5 Electronic Surveillance

Descriptions

Electronic Surveillance (ES) is a sub-division of Electronic Warfare (EW). ES refers to any action taken to detect, intercept, identify, locate, record, and/or analyse sources of radiated electromagnetic energy for the purposes of immediate threat recognition (such as warning that a hostile RADAR has locked on to a ship) or longer-term operational planning. Onboard surface warships ES provides Signals Intelligence (SIGINT) through use of special receivers and processing equipment. Broadly the SIGINT systems can be categorised as Electronic Intelligence (ELINT) or Communications Intelligence (COMINT)

RADAR Electronic Support Measures (RESM)

RESM systems are used to intercept and classify radar transmissions and make use of the fact that an enemy radar is detectable at approximately twice the range that the target radar can detect a contact providing significant range advantage. Onboard RN warships the RESM systems will provide the user with an ELINT capability.

Communications Electronic Support Measures (CESM)

CESM systems provide a COMINT capability and work in a very similar way to RESM.

Major Equipments

Electronic Surveillance

- UAT(16)
- UAT MOD 2.0
- UAT MOD 2.1
- UAT MOD 2.3
- UAT MOD 1
- MADEST
- T23 CESM
- SHAMAN



4.6 Electronic Defence

Descriptions

Electronic Defence (ED) is a sub-division of **Electronic Warfare (EW)**. ED refers to any action involving the use of the **electro-magnetic (EM) spectrum** or directed energy to control the EM spectrum or deny access to the EM spectrum.

Countermeasures

EW Countermeasures are concerned with providing a defence against enemy missiles or by confusing enemy radar. This type of defence involves providing a soft kill of the incoming missile. It is known as soft kill, as opposed to hard kill, as the enemy missile is not actively engaged with a kinetic weapon; it is either confused or distracted by the countermeasure. Broadly countermeasures can be classified as passive or active; this is determined by whether they transmit a false radar return or present a false target for the incoming missile seeker head. Passive countermeasures can make use of Infra-Red (IR) distraction by emitting hotly glowing material (such as white phosphor) or chaff distraction by creating a bloom of radar reflecting strips or confetti. Another form of countermeasure is to deploy a large radar reflector into the sea which then moves down the length of the platform with a larger radar cross section (RCS) seducing the missile away from the vessel.

Major Equipments

Countermeasures

- SEAGNAT
- DAS-SS
- Mk 251ADR
- DLF(3)b
- Mk 217
- Mk 216
- Mk 245



4.7 External Communications

Description

Operating in the Radio Frequency (RF) part of the EM spectrum external communications is concerned with communicating with other units or locations. The RF spectrum is divided into a number of radio bands that external communications operate in, these range from Low Frequencies (LF) (used mainly for communicating with submarines) to Ultra High Frequencies (UHF) (used typically for line of sight voice communications) to Super High Frequency (SHF) (used for satellite based communications). As well as being used for transmitting voice messages external communications can also transmit data.

LF/MF/HF/VHF/UHF Radios

Equipment using the RF spectrum from LF to UHF. Information can be passed as speech or digital messages. Equipment typically consists of an aerial, a transmitter/receiver, signal processing and a user interface. The range of the radios is limited by frequency used and the transmit power. Higher frequencies are limited to line of sight whereas lower frequencies have a longer range but require more power.

Satellite Communications

Like other forms of radio communication satellite communications make use of orbiting satellites to relay RF signals to distant ground based stations. This systems make use of the UHF, SHF and EHF parts of the EM spectrum and offer high bandwidths for transferring large amounts of information. Although speech can be transmitted it is usually turned into information and transmitted as data.

Message Handling

Prior to Internet and Emails messages were transmitted as Signals to Warships around the world. These signals are passed via High Grade Messaging Systems that unlike Emails are high integrity, assured delivery and have reputability so that recipients can be sure of the senders authenticity.

Secure Speech

When communicating speech via RF without resorting to digitisation it can be necessary to encrypt messages. Rather than force users to talk in code Secure Speech systems encrypt spoken messages for transmission so that any intercepted messages appear unintelligible unless the same encryption key is held by the sender and recipient.

Major Equipments

LF/MF/HF/VHF/UHF

- 1202
- 1207
- 2QCD
- 2QCB
- BOWMAN
- FICS
- GMDSS
- ICS25, ICS 6

Satellite Communications

- SCOT 5

Message Handling

- TRAMHS
- NSTN

Secure Speech

- NBDVS



4.8 Internal Communications

Description

Communications contribute to all areas of warfare and the control of the platform. These systems use a range of techniques to achieve communications which can be classed as secure or insecure depending on whether the message is encoded or not.

Integrated Communications

Some communications blur the distinction between external and internal communications by providing an integrated interface. In these systems users are able to access internal and external communications lines using a single input device.

Internal Communications

Based entirely on the host platform, internal communications equipment covers all methods by which the ship's company communicate with each other on board. Internal communications can make use of RF or Infra-Red (IR) particularly if operators need the flexibility to move around the ship without being physically connected to a terminal. Internal Comms equipment is used to provide internal command and control (C2) when warfighting, internal C2 for damage control, communicating between machinery spaces, bridge communications, internal telephone systems and point to point communications for specialist functions.

Major Equipments

Integrated Communications

- FICS
- LPD ICS

Internal Communications

- DIGITAL PABX
- FLIGHT DK COMMS
- IR COMMS
- FPC2
- MAIN BROADCAST
- RICE 1/2, RICE 10



4.9 Information Systems

Description

Information Systems are a vital part of the platforms wider mission system and perform a variety of functions at a number of security classifications.

Information Systems

This category of system covers a range of different systems that typically make use of commercial off the shelf computers similar to those used at home and in the office. The diversity of these systems are vast and range from office automation (Microsoft Word etc.) to passing sensitive information over large distances.

Major Equipments

Information Systems

- DII Maritime Deployed
- RNCSS
- JOCS SG
- OEHE
- CENTRIX



4.10

Environmental

Description

Understanding the environment that the Combat System operates within is critical as meteorological and oceanographic conditions have a large impact on overall system performance.

Environmental Sensors

Environmental sensors are used to measure meteorological and oceanographic conditions. This data is then employed for deriving general meteorological and oceanographic (METOC) data and predicting propagation characteristics. Understanding the effect of the environment on Electro-Magnetic (EM), Infra-Red (IR) and subsea acoustic signals is crucial to calibrating sensors accordingly as well as being aware of any constraints that may be placed on the system that day. Oceanographic data capture equipment is often referred to as Minor Sonars.

Major Equipments

Environmental Sensors

- S2090
- S2117
- WINDGEAR
- AUASS
- BATHY 45



4.10

Environmental

Description

Understanding the environment that the Combat System operates within is critical as meteorological and oceanographic conditions have a large impact on overall system performance.

Environmental Sensors

Environmental sensors are used to measure meteorological and oceanographic conditions. This data is then employed for deriving general meteorological and oceanographic (METOC) data and predicting propagation characteristics. Understanding the effect of the environment on Electro-Magnetic (EM), Infra-Red (IR) and subsea acoustic signals is crucial to calibrating sensors accordingly as well as being aware of any constraints that may be placed on the system that day. Oceanographic data capture equipment is often referred to as Minor Sonars.

Major Equipments

Environmental Sensors

- S2090
- S2117
- WINDGEAR
- AUASS
- BATHY 45



4.11 Aviation Facilities

Description

Modern warships use embarked aircraft for a range of roles from search and rescue to anti-surface warfare and reconnaissance. To support these aircraft a range of systems and services are needed. Additionally specialist systems are needed to move the aircraft safely around the flight deck and to aide the pilot in landing.

Major Equipments

Aviation Facility

- AGSS
- DF - Direction Finder
- FLIGHT DECK LIGHTING
- GPC - Glide Path Camera
- GPI
- HELO HANDLING 45
- HRDF
- IAL
- JCAMS - Joint Combat Aircraft Management System
- JPALS - Joint Precision Landing System
- TACAN - Tactical Air Navigation



4.12 Support and Enabling Infrastructure

Description

The Shared Infrastructure refers to the hardware and software infrastructure that provides the Shared Computing Environment (SCE), Shared Network Infrastructure (SNI), and Common Consoles (CC) which is housed in a number of Shared Infrastructure Cabinets and Enclosures (SICE) and which provide access to a number of Shared Infrastructure Services (SIS).

Combat System Highway / Network

A real-time network used to connect Combat System Equipment together and forms an integral part of the Combat System. There are different standards of Combat System Highway/Networks. Networking provides resilience over federated equipment topographies.

Shared Computing Environment

The Shared Computing Environment (SCE) is a centralised computing infrastructure that can host other supplier's subsystems as well as SI subsystems. It comprises common processing hardware and common data storage which replaces all or parts of the hosted subsystem general purpose processing.

Shared Network Infrastructure

The Shared Network Infrastructure (SNI) provides elements of the physical network on which the virtual networks reside and builds a number of services upon that physical network. These virtual networks and services are then used by SI, hosted subsystems and even systems that use no other part of SI.

Common Console

The Common Console (CC) enables a single console position to provide the user with access to multiple hosted subsystems' display functionality (HCIs). The SI Common Console is based around a Zero Client allowing access to Console applications running remotely within the SI.

Shared Infrastructure Services

The purpose of the Shared Infrastructure Services (SIS) is to provide a common set of infrastructure functions that can be used by any equipment, so avoiding the need to have functions duplicated in individual equipments.

Major Equipments

Combat System Highway / Network

- Outfit R.J.L
- DTS

Shared Computing Environment

- SCCS V1

Shared Network Infrastructure

- Blown Fibre Network



Description

Presenting target information from an array of sources and in different formats is a complex task. The Combat Management System (CMS) in RN platforms does this through a combination of data correlation of target information and data fusion. Data fusion can be conducted automatically by the system or manually by users and seeks to enrich target information to provide a context of amplifying details that are useful to the Command. Once displayed on the CMS the user can then decide what action to take and use the CMS to provide Command and Control of the equipment integrated into the Combat System.

Combat Management System

The Combat Management System (CMS) provides the heart of the Combat System and the primary way that operators interact with the weapons and sensors. The CMS is networked to other Combat System Equipment in a similar way to other IS systems that make use of Ethernet or fibre optic based networks. There is now increasing commonality between networks used on board warships.

Combat Management System

- CMS1
- DNA2
- ADAWS 2000
- NAUTIS 3
- NAUTIS 4
- MAORCS
- RFACTS

Recording and Analysis

- TACS
- OI Recording

Recording and Analysis

Recording and Analysis tools are used to record the Combat System in real time during exercise, trials or operations for later analysis. Additionally ships are fitted with radar and voice recorders in the event of an incident that can be used later to understand the cause of an incident.



4.14

Geospatial & Temporal Referencing and Navigation

Description

Combat System equipment relies upon Geospatial & Temporal Referencing (G&TR) systems to provide the systems position, velocity, attitude and time as well as synchronising time critical systems together. It is common now for the G&TR requirements of the Combat System to exceed that of the Navigation system; for this reason Navigation is seen as being part of G&TR. Additional Navigation specific hardware such as an integrated bridge system may also be provided.

Position, Velocity and Attitude Sensors

There are a wide range of sensors used to provide an input to the navigation system, these sensors include but are not limited to: ships log, gyro compasses, inertial navigation systems and global positioning systems. These sensors are combined to provide a ships position and to characterise the platforms movement through the water. Due to the nature of these systems most platforms have at least one level of redundancy if not more so that in the event of a system failure the provided functionality continues to be provided.

Time and Frequency Measurements

To operate effectively the Combat System needs to work together to a common clock; especially when operating with other units. Systems such as data links and many Information Systems require an accurate and common time reference; this is ultimately derived from the Coordinated Universal Time (*Temps Universel Coordonné*, UTC) signal which is used by the GPS system.

Navigation Information System

To allow the safe navigation of the platform it is necessary to be able store charts and navigation plans and also be able to display the platforms G&TR data in an understandable way.

Major Equipments

Position, Velocity and Attitude Sensors

- AGILOG
- GYRO NCS1
- GYRO Mk12
- NAVTALK
- PDM2, PDM3
- QYF
- SCTS
- NAVFIX
- CRPA

Time and Frequency Measurement

- PTFS
- FSF

Navigation Information System

- W-AIS
- WECDIS



4.15

Onboard Training

Description

On-board trainers are used to allow the Ship's Company to train at sea without requiring access to bespoke shore side facilities. These systems need to be realistic enough to mimic real world equipments and scenarios.

Trainer

On-board trainers are used to provide a range of training from damage control to machinery break down drills and warfare operator training. These systems can either be physically separate from the real world system or be used on the real system in a training mode of operation.

Major Equipment

Trainer

- ONBOARD TRAINERS



4.16

Unmanned Systems

Description

Unmanned systems are off-board systems that are unmanned vehicles that are used to perform a task. These vehicles could be remotely operated, have an automatic ability with a degree of latitude to perform a mission or be fully autonomous and able to conduct missions with little human interaction.

Unmanned Systems

These are off-board vehicles which are used to provide a capability either impossible for a human to perform or one which is too risky. Typical types of unmanned systems are Unmanned Aerial Vehicles (UAVs), Unmanned Surface Vehicles (USVs) or Unmanned Underwater Vehicles (UUVs).

Major Equipment

Unmanned Systems

- MINE DISPOSAL SYSTEM SEAFOX

5. A Platform View

This view sets out the platforms that the Maritime Combat Systems Team support today and looking ahead to 2020. This view shows how the Royal Navy Surface Fleet will change over the next few years as well as providing an insight into each of the Combat Systems of the major warship classes. Royal Fleet Auxiliary vessels, patrol craft and survey vessels operated by the RN that have a combat system (or components of one) are not covered in detail although their combat system equipments are included in the overall enterprise.

The Royal Navy SurFlot - 2016

- Ocean Class Landing Platform Helicopter (LPH)
- Albion Class Landing Platform Dock (LPD)
- Duke Class Frigates (T23)
- Daring Class Destroyers (T45)
- Sandown Class Single Role Mine Hunter (Sandown)
Hunt Class Mine Countermeasures Vessel (Hunt)
- Patrol Boats (River, OPV(H), Scimitar, Archer)
Survey Vessels (Ice Patrol Ship, SVHO, OSV, ISV)
- Royal Fleet Auxiliaries (AFSH, AO, AOL, AOR, AOT, FRS, LSD(A), ATS/PCRF)



The Royal Navy SurFlot - 2025

- Queen Elizabeth Class Aircraft Carriers (QEC)
- Albion Class Landing Platform Dock (LPD)
- Duke Class Frigates (T23), Global Combat Ship (T26),
General Purpose Light Frigate (TBC)
- Daring Class Destroyers (T45)
- Sandown Class Single Role Mine Hunter (Sandown)
Hunt Class Mine Countermeasures Vessel (Hunt)
- Patrol Boats (River, OPV(H), OPV B2, Scimitar, Archer)
Survey Vessels (Ice Patrol Ship, SVHO, OSV, ISV)
- Royal Fleet Auxiliary (AFSH, AO, AOR, FRS, LSD(A),
ATS/PCRF, Tide)



5.1 The Royal Navy of 2016 – Part 1

This page shows the Royal Navy classes of 2015 which have significant Combat Systems. Additionally the four letter code shown in brackets is commonly used within the RN when abbreviation is appropriate. For more information click on the class of interest for a description of the platform and a list of some of its major combat system equipments. Alternatively visit <http://www.royalnavy.mod.uk/>.

LPD

- ALBION (ALBN)
- BULWARK (BULW)

LPH

- OCEAN (OCEA)

T23

- ARGYLL (ARGL)
- IRON DUKE (IRDK)
- KENT (KENT)
- LANCASTER (LANC)
- MONMOUTH (MONM)
- MONTROSE (MTRO)
- NORTHUMBERLAND (NORT)
- PORTLAND (PTLD)
- RICHMOND (RCMD)
- SOMERSET (SMST)
- ST ALBANS (STAL)
- SUTHERLAND (SUTH)
- WESTMINSTER (WSTR)

T45

- DARING (DRNG)
- DAUNTLESS (DTLS)
- DEFENDER (DFND)
- DIAMOND (DMND)
- DRAGON (DRGN)
- DUNCAN (DUNC)

Sandown

- BANGOR (BNGR)
- BLYTH (BLYTH)
- GRIMSBY (GMBY)
- PEMBROKE (PEMB)
- PENZANCE (PENZ)
- RAMSEY (RAMS)
- SHOREHAM (SHOR)

Hunt

- ATHERSTONE (ATHR)
- BROCKLESBY (BROC)
- CATTISTOCK (CATT)
- CHIDDINGFOLD (CHID)
- HURWORTH (HURW)
- LEDBURY (LEDB)
- MIDDLETON (MIDD)
- QUORN (QUOR)



5.1.1 The Royal Navy of 2016 – Part 2

This page shows the names of all the remaining Royal Navy platforms that have a less complex Combat System. Additionally the four letter code shown in brackets is commonly used within the RN when abbreviation is appropriate. For more information visit <http://www.royalnavy.mod.uk/>.

Royal Fleet Auxiliary

AFSH

- FORT AUSTIN (FTAU)
- FORT ROSALIE (FTRO)

AO

- WAVE KNIGHT (WVKN)
- WAVE RULER (WVRU)

AOL

- BLACK ROVER (BRVR)
- GOLD ROVER (GORV)

AOR

- FORT VICTORIA (FTVR)

AOT

- ORANGELEAF (ORAN)

FRS

- DILIGENCE (DILG)

LSD(A)

- CARDIGAN BAY (CRDG)
- LYME BAY (LYME)
- MOUNTS BAY (MNTS)

ATS/PCRF

- ARGUS (ARGU)

Patrol Boats

River

- MERSEY (MRSY)
- SEVERN (SVRN)
- TYNE (TYNE)

OPV(H)

- CLYDE (CLYD)

Scimitar

- SABRE (SBRE)
- SCIMITAR (SCIM)

Archer

- ARCHER
- BITER
- BLAZER
- CHARGER
- EXAMPLE
- EXPLOIT
- EXPLORER
- EXPRESS
- PUNCHER
- RAIDER (RAID)
- RANGER
- SMITER
- TRACKER (TRAC)
- TRUMPETER

Survey Vessels

Ice Patrol Ship

- PROTECTOR (PRTR)

SVHO

- ECHO (ECHO)
- ENTERPRISE (ENTP)

OSV

- SCOTT (SCTT)

In Shore Survey Vessel

- GLEANER (GLEA)



5.2 The Royal Navy of 2025 – Part 1

This page shows the Royal Navy classes of 2025 which have significant Combat Systems. Additionally the four letter code shown in brackets is commonly used within the RN when abbreviation is appropriate. For more information click on the class of interest for a description of the platform and a list of some of its major combat system equipments. Alternatively visit <http://www.royalnavy.mod.uk/>.

QEC

- PRINCE OF WALES (PWLS)
- QUEEN ELIZABETH (QNLZ)

LPD

- ALBION (ALBN)
- BULWARK (BULW)

T23

- ARGYLL (ARGL)
- IRON DUKE (IRDK)
- KENT (KENT)
- LANCASTER (LANC)
- MONMOUTH (MONM)
- MONTROSE (MTRO)
- NORTHUMBERLAND (NORT)
- PORTLAND (PTLD)
- RICHMOND (RCMD)
- SOMERSET (SMST)
- ST ALBANS (STAL)
- SUTHERLAND (SUTH)
- WESTMINSTER (WSTR)

T26

- T26-01 (Under Design)
- T26-02 (Under Design)
- T26-03 (Under Design)
- T26-04 (Under Design)
- T26-05 (Under Design)
- T26-06 (Under Design)
- T26-07 (Under Design)
- T26-08 (Under Design)

GPLF (TBC)

- TBC

T45

- DARING (DRNG)
- DAUNTLESS (DTLS)
- DEFENDER (DFND)
- DIAMOND (DMND)
- DRAGON (DRGN)
- DUNCAN (DUNC)

Sandown

- BANGOR (BNGR)
- BLYTH (BLYTH)
- GRIMSBY (GMBY)
- PEMBROKE (PEMB)
- PENZANCE (PENZ)
- RAMSEY (RAMS)
- SHOREHAM (SHOR)

Hunt

- ATHERSTONE (ATHR)
- BROCKLESBY (BROC)
- CATTISTOCK (CATT)
- CHIDDINGFOLD (CHID)
- HURWORTH (HURW)
- LEDBURY (LEDB)
- MIDDLETON (MIDD)
- QUORN (QUOR)



5.2.1 The Royal Navy of 2025 – Part 2

This page shows the names of all the remaining Royal Navy platforms that have a less complex Combat System. Additionally the four letter code shown in brackets is commonly used within the RN when abbreviation is appropriate.

Royal Fleet Auxiliary

AFSH

- FORT AUSTIN (FAU)
- FORT ROSALIE (FTRO)

AO

- WAVE KNIGHT (WVKN)
- WAVE RULER (WVRU)

AOR

- FORT VICTORIA (FTVR)

FRS

- DILIGENCE (DILG)

LSD(A)

- CARDIGAN BAY (CRDG)
- LYME BAY (LYME)
- MOUNTS BAY (MNTS)

ATS/PCRF

- ARGUS (ARGU)

Tide

- TIDESPING
- TIDERACE
- TIDESURGE
- TIDEFORCE

Patrol Boats

River

- MERSEY (MRSY)
- SEVERN (SVRN)
- TYNE (TYNE)
- FORTH
- MEDWAY
- TRENT

OPV(H)

- CLYDE (CLYD)

Scimitar

- SABRE (SBRE)
- SCIMITAR (SCIM)

Archer

- ARCHER
- BITER
- BLAZER
- CHARGER
- EXAMPLE
- EXPLOIT
- EXPLORER
- EXPRESS

- PUNCHER
- RAIDER (RAID)
- RANGER
- SMITER
- TRACKER (TRAC)
- TRUMPETER

OPV Batch 2

- OPV-01
- OPV-02
- OPV-03

Survey Vessels

Ice Patrol Ship

- PROTECTOR (PRTR)

SVHO

- ECHO (ECHO)
- ENTERPRISE (ENTP)

OSV

- SCOTT (SCTT)

In Shore Survey Vessel

- GLEANER (GLEA)

5.3.1 LPD Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a LPD Weapon Engineering Department.



Notes:

Sections Officers also known as DWEO – Deputy WEO, CISE - Communications and Information Systems Engineer
 CCI – Command, Communications and Information Systems
 AWS – Above Water Systems
 WPNS – Weapons

Cdr WE – The Cdr WE is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

Snr WE – The Lt Cdr delegated daily responsibility for running the WE department on behalf of Cdr WE. For daily business the Snr WE is the same as a WEO.

Section Officers - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. A DWEO may be nominated by Establishment List or found from the most experienced of WE section officers borne. The term 'Section Officer' used in succeeding TOR is to be taken to mean both the Section Officer and DWEO. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

WO2 – WO2 (CCI) and WO2 (AWS) are responsible for ensuring that their sub-department equipment is available at the current Notice for Sea and Operational Notice. Typically they lead on managing fleet time maintenance work packages and the installation of A&As.

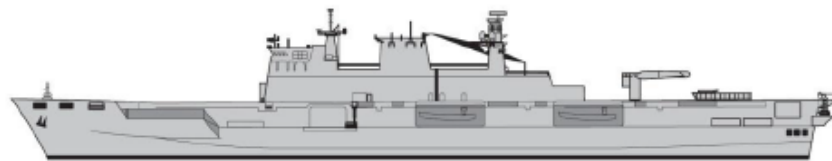
Head of Groups - Heads of Groups are to command, lead and manage their Group to provide an optimised level of OC to the Command. Groups consist of sections which maintain all of the combat system equipment onboard the ship.

Section Heads – The number and composition of sections onboard varies depending on available personnel and their training. The head of sections roles is to ensure that their equipment is available at the current Notice for Sea and Operational Notice. They are the maintainers of the equipment in their sections and are the direct recipient of external support and stores.



Description

The Ocean Class Landing Platform Helicopter is an Amphibious Assault Ship designed to deliver Royal Marines ashore primarily by helicopters but also by using her four Landing Craft Vehicle Personnel (LCVP) craft. On operations the LPD would deploy as part of a task group with frigate and destroyer escorts.



Combat System Equipment Overview

The LPH Combat System is based on a variant of the DNA(2) Command Management System hosted in a Shared Computing Environment (SCE). The Combat Management System is networked to the platforms Radar 996 medium range radar, UAT ESM system and data link system via a Combat System Highway.

The ships command and communication system is optimised to allow the ship to control the assault of Royal Marines ashore whilst possibly commanding a Task Group. The LPH has an extensive communications suite to allow it to fulfil its primary roles.

Additionally the LPH is able to defend itself through a Phalanx Close in Weapon System, ship launched counter-measures and the surface ship torpedo defence system (S2170).

The LPH can operate with all RN helicopters, including those of the Commando Helicopter Force. This includes: Merlin, Lynx, Apache and Chinook.

For more information visit <http://www.royalnavy.mod.uk/>.

Combat System Equipments

Above Water Sensors

- RADAR 997
- RADAR 1007
- RADAR RRB
- LFC
- RADAR 1008
- IFF
- EOSS

Under Water Sensors

- S2170

Weapons

- PHALANX
- CRGS 20MM GUN
- CRGS BUFFERED MTS
- CRGS MINIGUN
- CRGS SALUTE
- GPMG
- LIGHT CALIBRE GUN

Electronic Surveillance

- UAT

Electronic Defence

- SEAGNAT
- ADR

Communications

- 1207
- 2QCB
- 2QCD
- 4KMA
- BEDERAL
- BOWMAN
- DAMA-SURFACE
- DLPS
- GMDSS
- ICS25
- INMARSAT
- LINK 11
- LINK 16
- SCOT 5

Information Systems

- CSH RJL
- DII Maritime Deployed
- RNCSS
- JOCS SG
- STONEGHOST
- CENTRIXS
- RICE 10

Combat Management System

- DNA(2)

Aviation Facilities

- GPI

G&TR and Navigation

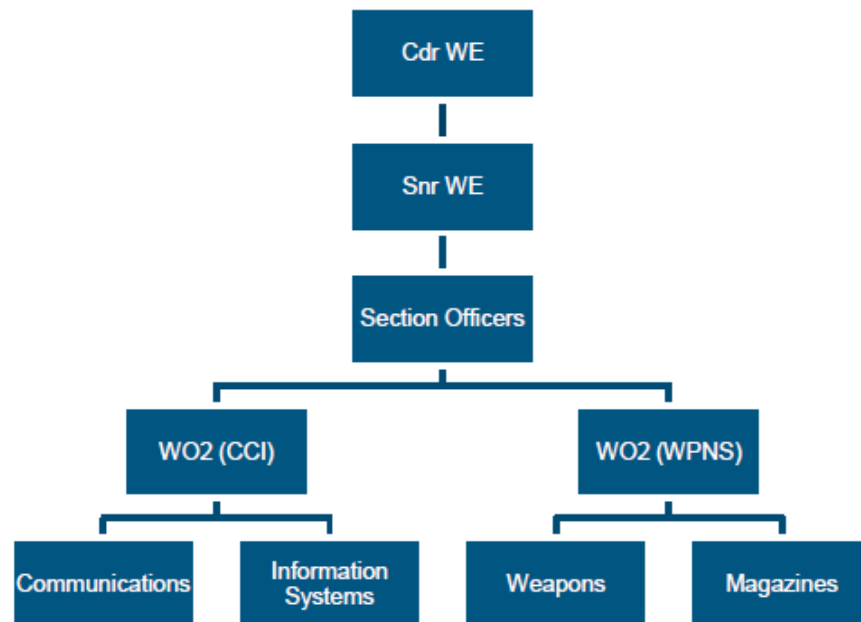
- W-AIS
- WECDIS
- GYRO MK 39

Training

- ONBOARD TRAINERS

5.4.1 LPH Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a LPH Weapon Engineering Department.



Notes:

Sections Officers also known as DWEO – Deputy WEO, WSO – Weapon Section Officer

CCI – Command, Communications and Information Systems

WPNS – Weapons

Cdr WE – The Cdr WE is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

Snr WE – The Lt Cdr delegated daily responsibility for running the WE department on behalf of Cdr WE. For daily business the Snr WE is the same as a WEO.

Section Officers - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. A DWEO may be nominated by Establishment List or found from the most experienced of WE section officers borne. The term 'Section Officer' used in succeeding TOR is to be taken to mean both the Section Officer and DWEO. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

WO2 – WO2 (CCI) and WO2 (AWS) are responsible for ensuring that their sub-department equipment is available at the current Notice for Sea and Operational Notice. Typically they lead on managing fleet time maintenance work packages and the installation of A&As.

Head of Groups - Heads of Groups are to command, lead and manage their Group to provide an optimised level of OC to the Command. Groups consist of sections which maintain all of the combat system equipment onboard the ship.

Section Heads – The number and composition of sections onboard varies depending on available personnel and their training. The head of sections roles is to ensure that their equipment is available at the current Notice for Sea and Operational Notice. They are the maintainers of the equipment in their sections and are the direct recipient of external support and stores.



Description

The Duke Class Type 23 Frigate is the core of the RN's front-line fleet. Originally designed as anti-submarine platforms, the T23 is a versatile platform capable of supporting a wide range of tasks around the world. These platforms can deploy as singleton units or as part of a larger Task Group.



Combat System Equipment Overview

The T23 Combat System is based around a DNA(2) Combat Management System which is networked by a Combat System Highway. The Combat System is built around its multiple weapons and sensor systems. For Anti-Air Warfare the T23 is fitted with the GWS26 Vertical Launch Sea Wolf system. To target the Sea Wolf system the Radar 996 medium range radar provides an air and surface picture of the area. To hunt for submarines all T23s are fitted with a hull mounted sonar and 8 are fitted with the towed Low Frequency Active Sonar (LFAS) S2087 system. In support of Anti-Surface Warfare the T23 has the GWS60 Harpoon Anti-Ship Missile as well as a 4.5" Medium Calibre Gun for Naval Fire Support (NFS) missions. Additionally the T23 has an adequate communications system to allow it to operate independently of a Task Group or as part of one.

The T23 can operate with all RN helicopters. This includes: Merlin and Lynx.

For more information visit <http://www.royalnavy.mod.uk/>.

Combat System Equipments

Above Water Sensors

- RADAR 996 (TBRB RADAR 997)
- RADAR 1007(TBRB NNR)
- RADAR 1008
- RRB
- IFF 1018/19
- GFCs GPEOD
- IEOSA

Under Water Sensors

- S2050
- S2087
- S2170

Weapons

- SEA WOLF (TBRB SEA CEPTOR)
- CRGS 30MM GUN ASCG
- CRGS MINIGUN
- GFCs GSA8
- MCG MOD1 GUN
- HARPOON
- MTLs

Electronic Surveillance

- UAT
- T23 CESM

Electronic Defence

- SEAGNAT (TBRB DAS-SS)
- ADR
- DLF(3)

Communications

- 1202
- 1207
- 2QCB
- 2QCD
- 4KMA
- BOWMAN
- GMDSS
- ICS6
- LINK 11
- LINK 16
- SCOT 5

Information Systems

- DII Maritime Deployed
- RNCSS
- JOCS SG
- STONEGHOST
- CENTRIXS

Combat Management System

- DNA2

Aviation Facilities

- GPI

Shared and Enabling Infrastructure

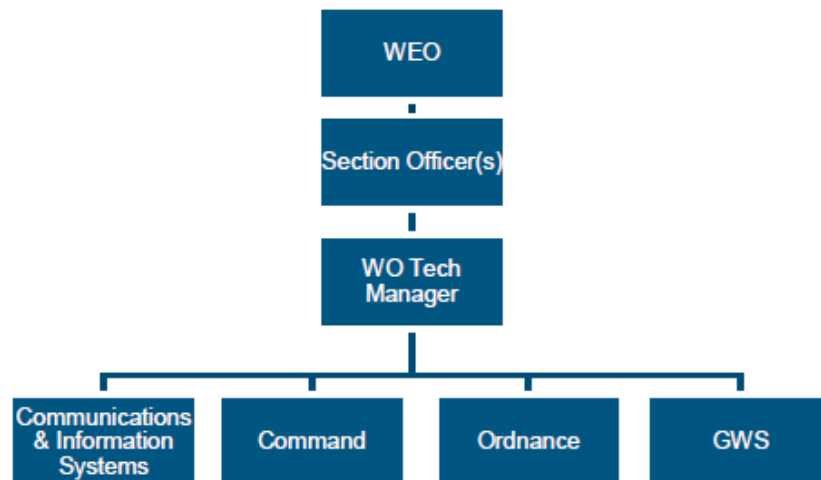
- SCE
- SNI

G&TR and Navigation

- W-AIS
- WECDIS
- QYF (TBRB NAVFIX)
- NAVTALK
- GYRO NCS1
- PDM

5.5.1 T23 Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a T23 Weapon Engineering Department.



Notes:

WEO – Weapon Engineering Officer
 Sections Officers also known as DWEO – Deputy WEO, CISE - Communications and Information Systems Engineer, WSO – Weapon Section Officer.
 CCI – Command, Communications and Information Systems
 WPNS – Weapons
 GWS – Guided Weapon Systems

WEO – The WEO is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

Section Officers - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. A DWEO may be nominated by Establishment List or found from the most experienced of WE section officers borne. The term ‘Section Officer’ used in succeeding TOR is to be taken to mean both the Section Officer and DWEO. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

WO – Typically leads on managing fleet time maintenance work packages and the installation of A&As. Conducts much of the day to day departmental administration and coordination.

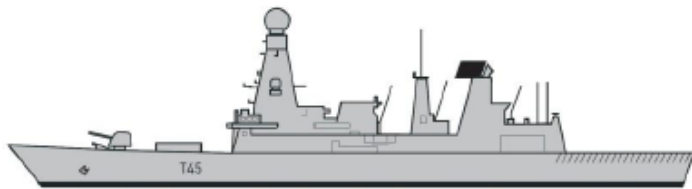
Head of Groups - Heads of Groups are to command, lead and manage their Group to provide an optimised level of OC to the Command. Groups consist of sections which maintain all of the combat system equipment onboard the ship.

Section Heads – The number and composition of sections onboard varies depending on available personnel and their training. The head of sections roles is to ensure that their equipment is available at the current Notice for Sea and Operational Notice. They are the maintainers of the equipment in their sections and are the direct recipient of external support and stores.



Description

The Daring Class Type 45 Destroyer is an Anti-Air Warfare Destroyer and comprises part of the backbone of the RN. As well as providing Area Air Defence against hostile aircraft the T45 can also conduct more general purpose missions globally. These platforms can deploy as singleton units or as part of a larger Task Group.



Combat System Equipment Overview

The T45 Combat System is based around a CMS1 Combat Management System which is networked to the platforms weapons and sensors via a Data Transfer System (DTS). The principle weapon system of the T45 is the GWS45 Sea Viper System. The Sea Viper system uses Aster missiles to destroy air targets that have been detected by the Long Range Radar (Radar 1046) and the Multifunction Radar (MFR) (Radar 1045). The MFR is a rotating phased array that can target multiple targets, control missiles in flight whilst providing situational awareness to the Command, all simultaneously. The T45 is also fitted with a 4.5" Medium Calibre Gun for Naval Fire Support and a Phalanx Close In Weapon System (CIWS) for point defence. Additionally the T45 has an adequate communications system to allow it to operate independently of a Task Group or part of one.

The T45 can operate with all RN helicopters. This includes: Merlin and Lynx.

For more information visit <http://www.royalnavy.mod.uk/>.

Combat System Equipments

Above Water Sensors

- RADAR 1045
- RADAR 1046
- IFF 1018/19
- RADAR 1047
- RADAR 1048
- RADAR RRB
- EOSP 45
- EOGCS 45
- QPD 45

Under Water Sensors

- S2091 MFS 45
- S2170

Weapons

- SEA VIPER
- PHALANX
- MCG MOD1 GUN
- GSA9 45
- EOGCS 45
- CRGS 30MM GUN SCG
- CRGS MINIGUN

- GPMG
- AIR WPNS HANDLING 45

Electronic Surveillance

- UAT, RESM
- BCF (TBRB SHAMAN)

Electronic Defence

- SEAGNAT (TBRB DAS-SS)
- ADR
- DLF(3)

Communications FICS

- BOWMAN
- DAMA-SURFACE
- LINK 11 (TBRB LINK 22)
- LINK 16
- SCOT 5

Information Systems

- DII Maritime Deployed

- RNCSS
- JOCS SG
- STONEGHOST
- CENTRIXS

Combat Management System

- CMS1 45
- DATA TRANSFER SYS 45

Environmental

- METOC
- S2090
- S2117

Aviation Facilities

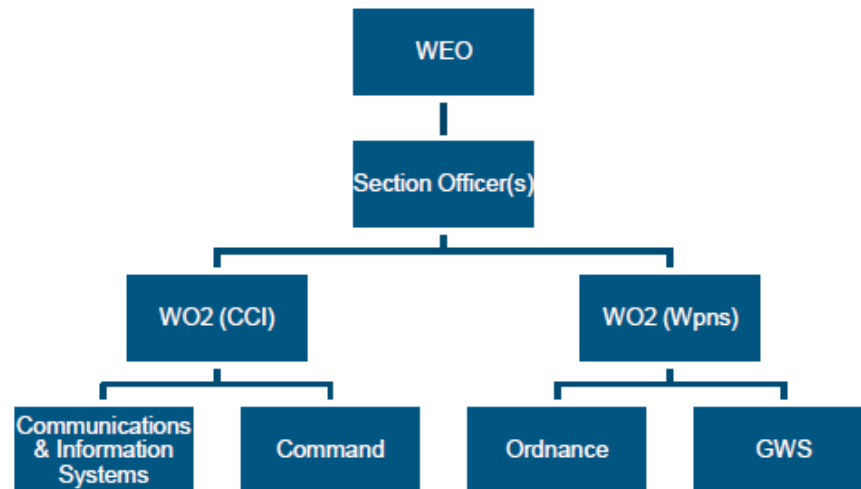
- GPI MK3 45
- HELO HANDLING

G&TR and Navigation

- NAVAIDS 45
- ECHO SOUNDERS
- GYRO COMPASS

5.6.1 T45 Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a T45 Weapon Engineering Department.



Notes:

WEO – Weapon Engineering Officer
 Sections Officers also known as DWEO – Deputy WEO, CISE - Communications and Information Systems Engineer, WSO – Weapon Section Officer.
 CCI – Command, Communications and Information Systems
 WPNS – Weapons
 GWS – Guided Weapon Systems

WEO – The WEO is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

Section Officers - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. A DWEO may be nominated by Establishment List or found from the most experienced of WE section officers borne. The term ‘Section Officer’ used in succeeding TOR is to be taken to mean both the Section Officer and DWEO. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

WO2 – WO2 (CCI) and WO2 (Wpns) are responsible for ensuring that their sub-department equipment is available at the current Notice for Sea and Operational Notice. Typically they lead on managing fleet time maintenance work packages and the installation of A&As.

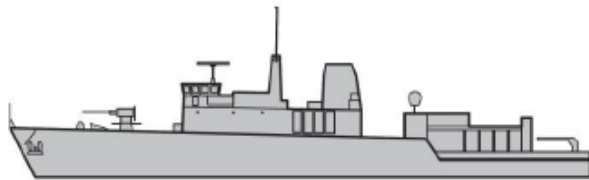
Head of Groups - Heads of Groups are to command, lead and manage their Group to provide an optimised level of OC to the Command. Groups consist of sections which maintain all of the combat system equipment onboard the ship.

Section Heads – The number and composition of sections onboard varies depending on available personnel and their training. The head of sections roles is to ensure that their equipment is available at the current Notice for Sea and Operational Notice. They are the maintainers of the equipment in their sections and are the direct recipient of external support and stores.



Description

The Hunt Class Mine Countermeasures Vessel (MCMV) uses a high definition mine hunting sonar to hunt for mines and lost explosives. Once a mine is discovered it can then be destroyed by the platform's mine clearance divers or the Seafox mine-disposal system. These platforms typically operate in groups to clear channels of mines ahead of Task Groups.



Combat System Equipment Overview

The Hunt Combat System is based around the NAUTIS 3 Combat Management System and is designed to operate with the Mine Hunting Sonar S2193. Additionally each Hunt is fitted with a 30mm gun and small arms to provide a limited Anti-Air and Anti-Surface Warfare capability.

For more information visit <http://www.royalnavy.mod.uk/>.

Combat System Equipments

Above Water Sensors

- IFF 1019
- RADAR 1007 (TBRB NNR)

Under Water Sensors

- MH SONAR

Weapons

- CRGS 30MM GUN
- CRGS BUFFERED MTS
- CRGS MINIGUN
- GPMG

Communications

- 1202
- 1207
- 1CLF
- 2QCB
- 2QCD
- 4KMA
- BEDERAL
- INMARSAT

Information Systems

- DII Maritime Deployed

Combat Management System

- NAUTIS 3

G&TR and Navigation

- W-AIS
- WECDIS
- QYF

5.7.1 Hunt Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a Hunt Weapon Engineering Department.



Notes:

WEO – Weapon Engineering Officer
 DWEO – Deputy WEO

WEO – The WEO is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

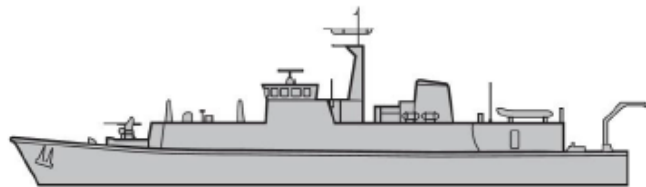
DWEO - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

Engineering Technicians– Due to the size of the platform equipments are not broken down by section as the WEO and DWEO maintain the equipment with the support of a team of Engineering Technicians.



Description

The Sandown Class Single Role Minehunter (SRMH) uses a high definition mine hunting sonar to hunt for mines and lost explosives. Once a mine is discovered it can then be destroyed by the platforms mine clearance divers or the Seafox mine-disposal system. These platforms typically operate in groups to clear channels of mines or ahead of Task Groups.



Combat System Equipment Overview

The Sandown Combat System is based around the NAUTIS 4 Combat Management System is designed to operate with the Mine Hunting Sonar S2093. Additionally each Hunt is fitted with a 30mm gun and small arms to provide a limited Anti-Air and Anti-Surface Warfare capability.

For more information visit <http://www.royalnavy.mod.uk/>.

Combat System Equipments

Above Water Sensors

- IFF 1019
- RADAR 1007 (TBRB NNR)

Under Water Sensors

- MH SONAR

Weapons

- CRGS 30MM GUN
- CRGS BUFFERED MTS
- CRGS MINIGUN
- GPMG

Communications

- 1202
- 1207
- 1CLF
- 2QCB
- 2QCD
- 4KMA
- BEDERAL
- INMARSAT

Information Systems

- DII Maritime Deployed

Combat Management System

- NAUTIS 4

G&TR and Navigation

- W-AIS
- WECDIS
- QYF

5.8.1

Sandown Typical Ships Company



As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a Sandown Weapon Engineering Department.



Notes:

WEO – Weapon Engineering Officer
DWEO – Deputy WEO

WEO – The WEO is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

DWEO - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

Engineering Technicians– Due to the size of the platform equipments are not broken down by section as the WEO and DWEO maintain the equipment with the support of a team of Engineering Technicians.



Description

The Queen Elizabeth Class (QEC) Aircraft Carrier will replace the CVS and LPH Classes. Initially the QEC class will only operate helicopters before the introduction of the F35 Lightning II Joint Combat Aircraft in 2020. The QEC platforms have been designed to operate at the heart of a Task Group.



Combat System Equipment Overview

The QEC Combat System is based around a CMS1 Combat Management System networked to the Internal Networks Electronic (INE) network. The INE is an integrated network that connects all of the platform's systems together from planning tools to combat and machinery systems. The principle weapon system will be the embarked Tailored Air Group (TAG) which has driven the communications and information systems.

The QEC's Combat System is optimised to allow the ship to provide a command and control role whilst also providing Air Traffic Management to embarked and cohort aircraft. It has an extensive communications suite to allow it to fulfil its primary roles.

Additionally, the QEC is able to defend itself through Phalanx Close in Weapon Systems. The QEC will operate all RN helicopters and fast jets, including those of the Commando Helicopter Force. This includes: F35B, Merlin, Wildcat, Apache and Chinook.

For more information visit <http://www.royalnavy.mod.uk/>.

Information Owner: MCS QEC Combat System Manager

Combat System Equipments

Above Water Sensors

- RADAR 997
- RADAR 1046
- PAR
- E/F-band NAVR
- I-band NAVR
- IFF
- EOS

Weapons

- PHALANX
- CRGS 30MM GUN ASCG

Communications

- BOWMAN
- EHFMS - Extremely High Frequency Military SATCOM
- HFC - High Frequency Communications
- LINK 22
- NEST
- SCOT 5
- SHFMS - Super High

Frequency Military

- SATCOM
- VUER - VHF/UHF Emergency Radios
- VULC - VHF/UHF/L-band Communications
- TC2V - Tactical C2 Voice
- WCS - Wireless Communications System

Information Systems

- DII Maritime Deployed
- CCS - Coalition Collaborative System
- INE - Internal Network Electronics

Combat Management System

- CMS

Aviation Facilities

- DF - Direction Finder
- GPC - Glide Path Camera

- HRDF
- JCAMS - Joint Combat Aircraft Management System
- JPALS - Joint Precision Landing System
- TACAN - Tactical Air Navigation

Mission

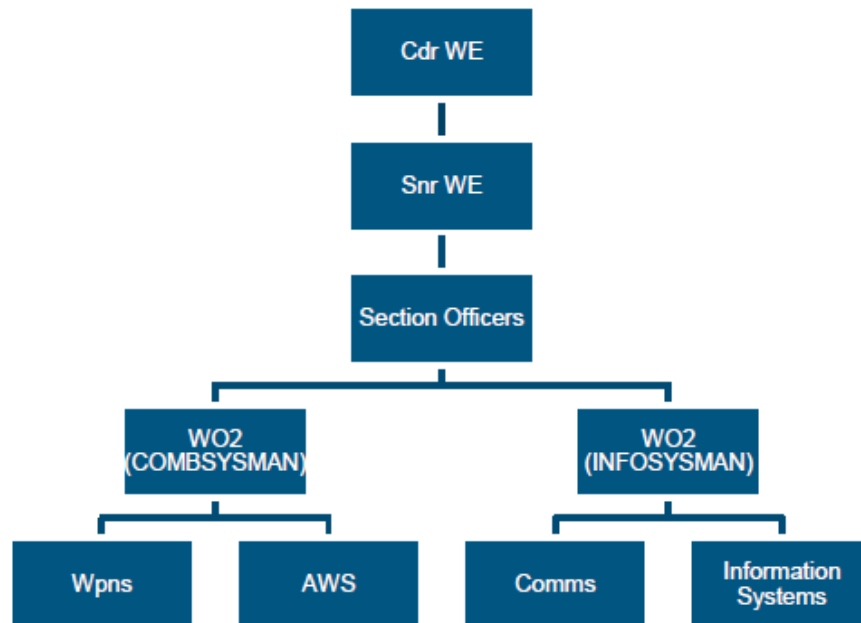
- OPA - Operational Planning Application
- IAEF - Imagery Analysis & Exploitation Facilities
- TA - Targeting Applications

G&TR and Navigation

- INBS - Integrated Navigation Bridge System
- W-AIS
- METOC

5.9.1 QEC Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a QEC Weapon Engineering Department.



Notes:

Sections Officers also known as CSO – Combat System Officer, FSO – Flag Systems Officer
 COMBSYSMAN – Combat System Manager
 INFOSYSMAN – Information System Manager
 AWS – Above Water Systems
 WPNS – Weapons

Cdr WE – The Cdr WE is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

Snr WE – The Lt Cdr delegated daily responsibility for running the WE department on behalf of Cdr WE. For daily business the Snr WE is the same as a WEO.

Section Officers - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. A DWEO may be nominated by Establishment List or found from the most experienced of WE section officers borne. The term ‘Section Officer’ used in succeeding TOR is to be taken to mean both the Section Officer and DWEO. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

WO2 – WO2 (DCSE) and WO2 (DFISE) are responsible for ensuring that their sub-department equipment is available at the current Notice for Sea and Operational Notice. Typically they lead on managing fleet time maintenance work packages and the installation of A&As.

Head of Groups - Heads of Groups are to command, lead and manage their Group to provide an optimised level of OC to the Command. Groups consist of sections which maintain all of the combat system equipment onboard the ship.

Section Heads – The number and composition of sections onboard varies depending on available personnel and their training. The head of sections roles is to ensure that their equipment is available at the current Notice for Sea and Operational Notice. They are the maintainers of the equipment in their sections and are the direct recipient of external support and stores.



Description

The Type 26 Global Combat Ship will be introduced to replace the existing T23 frigates in their anti-submarine role. There are 8 T26 platforms planned for service, 8 equipped as Anti-Submarine Frigates, these platforms will deploy as singleton units or as part of a larger Task Group. The design and build of a new separate class of lighter, flexible general purpose frigates will be delivered in the 2030s.



Combat System Equipment Overview

The T26 Combat System will be based on a Shared Computing Environment (SCE) making use of COTS blade servers running virtual versions of existing systems such as DNA(2). The platform will have a single Shared Network Infrastructure (SNI) linking all weapons, sensors and information systems together. For Anti-Air Warfare the T26 will be fitted with the Future Local Area Air Defence system, Sea Ceptor. To target the Sea Ceptor system the Radar 997 3D Air Surveillance radar will provide an air and surface picture. To hunt for submarines all T26s will be fitted with a hull mounted sonar and 8 will be fitted with the towed Low Frequency Active Sonar (LFAS) S2087 system. In support of Anti-Surface Warfare the T26 will have the GWS60 Harpoon Anti-Ship Missile as well as a 5" Medium Calibre Gun for Naval Fire Support (NFS) missions. The T26 will operate with all RN helicopters. This includes: Merlin and Wildcat.

For more information visit <http://www.royalnavy.mod.uk/>.

Information Owner: MCS T26 Combat System Manager

Combat System Equipments

Above Water Sensors

- RADAR 997
- NNR
- IFF
- IEOSA
- EOSP

Under Water Sensors

- S2050
- S2087
- S2170
- S2090
- S2117

Weapons

- SEA CEPTOR
- CRGS 30MM GUN ASCG
- Maritime Indirect Fire Support
- GSA9 45
- HARPOON
- CRGS MINIGUN

Electronic Surveillance

- UAT
- CESM

Electronic Defence

- DLF(3)
- DAS-SS
- ADR

Communications

- BOWMAN
- LINK 11 (TBRB LINK 22)
- LINK 16
- STDL
- HF Comms - T26
- V/UHF Comms - T26*
- SF Antennas - T26
- SCOT 5
- Internal Voice Comms - T26
- DII Maritime Deployed

Information Systems

Combat Management System

- DNA2

Environmental

- METOC

Shared and Enabling Infrastructure

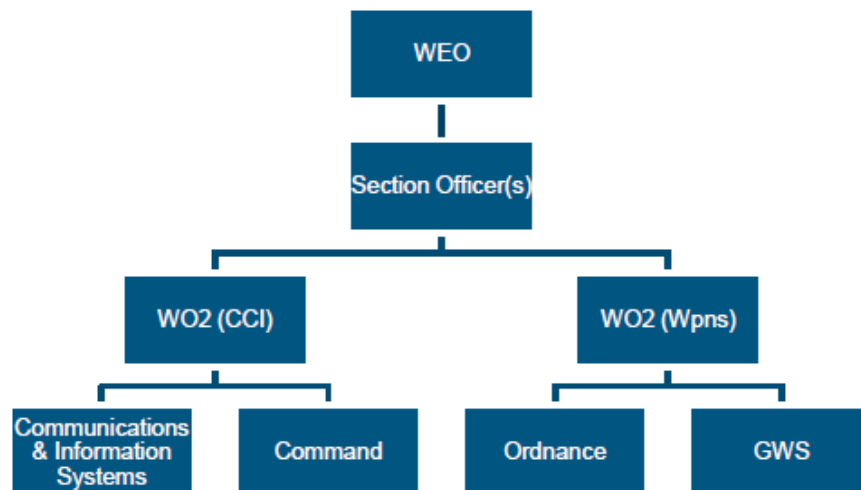
- Shared Computing Environment
- Shared Network Infrastructure
- Common Console
- Shared Network Services

Navigation

- INBS
- INBS - W-AIS
- INBS - WECDIS
- INBS - NAVFIX
- INBS - NCS 1 Replacement
- INBS - EM Log

5.10.1 Expected T26 Typical Ships Company

As explained in BR300 (Weapon Engineering Manual (Surface Ships)) “It is not possible to lay down an absolute and ideal method for organising an engineering department; this will vary between classes of ships and depend upon the qualifications and experience of the personnel”. As such below is an indicative structure for a T26 Weapon Engineering Department.



Notes:

WEO – Weapon Engineering Officer
 Sections Officers also known as DWEO – Deputy WEO, CISE - Communications and Information Systems Engineer, WSO – Weapon Section Officer.
 CCI – Command, Communications and Information Systems
 WPNS – Weapons
 GWS – Guided Weapon Systems

WEO – The WEO is the Head of Department (HOD) for the Weapon Engineering (WE) Department. Their primary purpose is to support the Command Aim by achieving the highest levels of Operational Capability within the WE Department. This is done by leading and directing the Weapon Engineering Department in the Operation Maintenance, Diagnosis and Repair (OMDR) of the equipment listed as his/her responsibility, optimising the performance of systems and equipments and through appropriate integration and interoperability within a Task group.

Section Officers - Section Officers have general responsibilities for personnel, systems and equipment in their sub-departments. A DWEO may be nominated by Establishment List or found from the most experienced of WE section officers borne. The term ‘Section Officer’ used in succeeding TOR is to be taken to mean both the Section Officer and DWEO. Typically they lead on raising OPDEF signals and arranging support for Category B and above OPDEFs as well as leading on onboard Shiphaz controls.

WO2 – WO2 (CCI) and WO2 (Wpns) are responsible for ensuring that their sub-department equipment is available at the current Notice for Sea and Operational Notice. Typically they lead on managing fleet time maintenance work packages and the installation of A&As.

Head of Groups - Heads of Groups are to command, lead and manage their Group to provide an optimised level of OC to the Command. Groups consist of sections which maintain all of the combat system equipment onboard the ship.

Section Heads – The number and composition of sections onboard varies depending on available personnel and their training. The head of sections roles is to ensure that their equipment is available at the current Notice for Sea and Operational Notice. They are the maintainers of the equipment in their sections and are the direct recipient of external support and stores.