



Ministry
of Defence



Type 23 - Power Generation and MCAS Update (PGMU) – Motor Generators

CONTRACT SSA/004/02

SCHEDULE A

Statement of Work

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Issue 1.3	17 Feb 14	Incorporates relevant CQ responses from Lot 1
Issue 1.4	27 Feb 14	Acronym description included in 3.4.5d iii.
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1.1. Overview

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1.2.1. This Statement of Work (SOW) refers to Lot 2 (Motor Generators) and is structured as follows:

- INTRODUCTION – This section;
- PROJECT MANAGEMENT which covers programme and planning, risk

management, information management, etc.;

- SUPPLY AND ENGINEERING which covers detailed equipment specification, supply requirements and general engineering and safety aspects;
- INTEGRATED LOGISTIC SUPPORT which covers requirements for support, maintenance, spares provision, etc.;
- TRAINING which covers provision of training requirements and interim training delivery.

1.3. Definitions

1.3.1. Specific definitions used in this SOW:

TERM	DEFINITION
Acquisition Operating Framework (AOF)	The Acquisition Operating Framework (AOF) is the authoritative source of policy and good practice on acquisition for MOD and its' industry partners. It defines how we conduct, govern and control our Defence acquisition processes, to enable delivery to the Armed Forces and value for money for the taxpayer.
Authority Safety Officer	The nominated person within the Authority organisation who has the lead responsibility for Safety Management.
Base Spares	The package of spares held ashore, either in Naval Stores or by the contractor, to support routine maintenance and defect rectification.
Commercial Off The Shelf (COTS)	Equipment that is currently available in the commercial marketplace and for which there are little or no development requirements for use in the Naval marine environment.
Comprehensive Royal Naval Inventory Systems Project (CRISP)	CRISP is the RN Inventory Management System that provides support to the Maritime Environment. The functions provided by CRISP are item introduction and initial provisioning, demand management (issues, returns, receipts), provisioning, procurement, repair & returns management, stock review, liabilities and on-board documentation (OBD).

Consumable	An item of materiel that is consumed or used to destruction, or which is otherwise regarded as consumed on issue. For example: a. No repair policy is required. b. There is no requirement for the item to be assessed by an authorised conditioner when unserviceable. c. When the item is issued for use, no further accounting action is necessary, other than that required locally for management control.
Contingency Support Spares	An individual part, sub-assembly or assembly held in reserve for the unplanned maintenance or repair of systems or equipment
Contractors Safety Manager	The nominated person within the Contractors organisation who has the lead responsibility for Safety Management.
Design Authority Maintenance Schedules (DAMS)	The design authority's recommended preventive and corrective maintenance schedule for the system and/or equipment supplied, by level of maintenance
Diagnostic Test Spares	An individual part, sub-assembly or assembly supplied for the diagnostic test of systems or equipment
Dockyard Authority	Any Dockyard Organisation that is tasked with the management of maintenance or defect rectification on Type 23 Frigates. This could include the T23 COM and SSSA Contractors.
Engines	The Diesel Engine element of the Diesel Generator
Equipment Performance Analysis (EPA)	A detailed causal monitoring based investigation undertaken to identify and analyse the root causes for sub-optimal equipment performance. Normally instigated when equipment availability levels consistently fall below the required thresholds for the particular equipment or platform.
Fleet Spare	A spare equipment (diesel engine or Motor Generator) held to address potential requirement for upkeep by exchange of major equipment
Lubricants and associated products	Lubricants and associated products supplied for the operation and support of PGMU systems as defined in DefStan 01-5
General Purpose Hand Tools	Hand tools required for the maintenance and repair of systems and equipment which are generally applicable to a wide range of applications.
General Purpose Test and Measurement Equipment (GPTME)	Those items of Test and Measuring Equipment (TME) that are common to more than one main equipment or system, or have been introduced into service to support a single equipment but are capable of supporting other equipment. GPTME includes Electrical, Electronic, Mechanical, Optical, Physical and Safety equipments, Commercial Off The Shelf (COTS), Military Off The Shelf (MOTS).
Guarantee Defect	Any defect in equipment once installed as further defined at clause 13.
Hazard Area Certification	The set of Certificates of Safety that are issued by the Naval Authority Group, to and following submission by the Platform Duty Holder, for Hazard Areas such as Stability, Structure, Fire, Escape & Evacuation, Propulsion & Manoeuvring.
HAZOP	Hazard Operability Study

ILS Manager	The nominated person within the Authority or Contractors organisation who has the lead responsibility for Integrated Logistic Support.
In-Service Reliability Demonstration (ISR/D)	A procedure to demonstrate the reliability achieved by equipment against the requirements specified in the contract using production standard equipment under agreed in-service conditions.
In-Service Date (ISD)	The date at which an agreed level of acceptance criteria have been met to declare that PGMU capability has reached initial operating capability on each ship.
Installation Solution (IS)	Means the solution which is required to perform successful integration of the 4 (four) Lots which together form the PGMU Project, including the package of information and drawings, used to undertake the installation and commissioning of the PGMU equipments into the ship
JSC Purple Gate	The entry point to the Authority Joint Support Chain (JSC) as defined in JSP886, Volume 3, Part 3.
Line Replaceable Units (LRU)	An LRU is a modular component of a system that is designed to be replaced quickly at an operating location. An LRU is usually a sealed unit and LRUs are typically assigned logistics control numbers (LCNs) during Supportability Analysis.
Logistic Support Date (LSD)	The date when support is available in range, but not necessarily in scale (all products that are needed by type, but not in quantity) to support the First of Class PGMU ship. For PGMU, the LSD is 3 months prior to SAT(ME) for the First of Class (FOC) ship updated with PGMU.
Logistically Significant Items	Every item in the product that requires support activity, or is involved with the operation of the product. Piece parts and materials used to manufacture items are not normally included. LSI candidates shall not be limited to just those that require maintenance, but shall include support, test and training equipment; consideration will also be given to transportation, storage, packaging and handling, supply support and facilities. It is important when selecting candidate items that all ILS elements are given consideration, not just maintenance. For example items such as radioactive sources which require no maintenance are logistically significant as they are subject to stringent packaging, handling and storage regulations. They may also require control as individually managed items which will impact on supply support considerations.
Logistics Demonstration (Log Demo)	A demonstration or Supportability Assessment, consisting of a physical demonstration and review of documentation and data, to ensure that all support elements are available, to the required specification and in sufficient quantity, to enable PGMU to be supported.
Maintenance Information Management In Computers (MIMIC) 3	MIMIC3 is a Configuration Management (CM) system used to record routine Engineering data and to support CM applications including Reliability Centred Maintenance (RCM) and UMMS.

Major Assembly	Used to define principle equipment grouping which can be considered in a modular sense for installation, significantly those which are of a greater weight or dimension than can be manually lifted into the ship in accordance with GTR Schedule A, Annex B, Section 7.9 but also extending to groups of system components that are installed in a given location. With regards to PGMU, these are principally the Diesel-Generator and Motor-Generator sets, but also other grouped items including but not limited to Local Control Panels, Switchboards, MCAS cabinets and so forth.
New to RN Warship Service	Equipments or materials that have not previously been approved for use on RN Warships. In most cases those that have not undertaken testing for fire characteristics.
Non-Development Software	Any software that has not been developed specifically for the equipment or sub-system within which it is intended to be used. Examples of non-development software includes operating system, graphics libraries, user interfaces, system libraries, databases, networking and communication software, device drivers, and reused supplier developed code. When an existing equipment or sub-system, which is implemented in software, is used for a new purpose its software constitutes non-development software. Non-development software also includes development tools such as compilers, linkers, test tools and analysers.
On-board Spares	The package of spare issued to each ship and carried on board as part of the Consolidated Allowance List (CAL)
OPDEF	Operational Defect. The mechanism used by the RN and the Purchaser to notify the Contractor of a Defect.
PGMU Project	The programme of work to undertake the Power Generation and MCAS Update in Type 23 Frigates
PGMU Solution	The overall package of equipment that is installed to meet the PGMU requirements.
PGMU System Integrator (PGMU SI)	The role to be undertaken on behalf of the Authority to deliver PGMU functionality and to detail and manage the interfaces between the integrated PGMU equipments with the platform services and systems.
PGMU Training Steering Group (TSG)	The PGMU Training Steering Group has been established to direct and assure the training solution on behalf of the Training Line of Development. The team is led by the PGMU team/T23 Requirements Manager, with members from Navy Personnel and Training Groups and HMS Sultan.
Ready for Sea Date (RFSD)	The date during an upkeep period, post Harbour Acceptance Tests and appropriate Safety and Readiness Checks where the ship is declared materially fit to proceed to sea to commence sea trials.

Ready For Training Date (RFTD)	The RFTD is defined as the date by which the following will be available: a. Training facilities. b. Training content. c. Training Equipment. d. Training Equipment Support. e. Trained trainers.
Software Issuing Office	The SIO is the DE&S preferred distribution facility for all software issued to the Fleet and shore establishments. The SIO is located at: The Fleet Information Management Unit (FIMU), Navy Command Headquarters (Portsmouth Hill), QinetiQ, Portsmouth Technology Park, Southwick Road, Cosham, Portsmouth, Hampshire PO6 3RU Tel: 023 9221 2104
Special Purpose Test and Measurement Equipment (SPTME)	Those items of Test and Measuring Equipment (TME) that are specific to PGMU equipment or systems, and are not capable of supporting other equipment. SPTME includes Electrical, Electronic, Mechanical, Optical, Physical and Safety equipments, Commercial Off The Shelf (COTS), Military Off The Shelf (MOTS).
Special to Type Hand Tools	Hand tools required for the maintenance and repair of systems and equipment which are specific to PGMU systems and equipment and not generally applicable to a wide range of applications.
Support and Test Equipment (S&TE)	S&TE includes all tools and equipment required to support the Equipment, and includes, but is not limited to Common User Hand Tools (CUHT), General Purpose Test and Measurement Equipment (GPTME), Special to Type Hand Tools (STHT), Ancillary Support Equipment (ASE), Special To Type Test Equipment (STTE), Automatic Test Systems (ATS), Automatic Test Equipment (ATE), Diagnostic tools and equipment, including laptops or other devices and the associated ancillaries, Identified items of GFE required to support the Items procured as the Contractor's scope of supply.
Support Solutions Envelope (SSE)	The SSE consists of signposts to MOD acquisition policy and a tool providing advice and guidance on how to develop a support solution. The SSE is used to articulate those key areas of Defence Equipment and Support (DE&S) policy which are central to a good support solution and which drive coherence and avoid the known operational problems that arise when equipment is fielded with insufficient and / or incoherent support.
Support Spares	An individual part, sub-assembly or assembly supplied for the maintenance or repair of systems or equipment
Surface Ship Support Alliance (SSSA)	The current commercial arrangements between MoD, BAE Systems and Babcock Marine to provide fleet time and upkeep support to in scope ships including Type 23 Frigates.
Technical Shared Data Environment	A web based package to enable access of information by all relevant parties including Contractors, The Authority and Upkeep Contractors.

Tele-Engineering	Use of a Remote Engineering Support (RES) system for secure collaborative communication between the OEM and onboard maintainers, to enable defect diagnosis and repair, thus reducing the amount of time the contractor is deployed overseas. For PGMU, it is envisaged that 3 UK shore locations will be available to facilitate communication with T23 ships: Portsmouth COM Building, Devonport COM Building, MOD Abbey Wood Ops Cell.
Testing and Tuning Spares	An individual part, sub-assembly or assembly supplied for the testing and/or tuning of systems or equipment
Training Equipment Spares	An individual part, sub-assembly or assembly supplied for the maintenance or repair of training systems or equipment
Trusted Agent	An embarked uniformed technician who has received relevant training and is authorised and empowered to undertake update, maintenance, testing, evaluation, diagnostic and defect repair activities for, or in place of, the Contractor where appropriate in order to organically maximise the availability and sustainability of ships deployed worldwide and reduce the need for Contractor attendance onboard.
Unit Maintenance Management System (UMMS)	UMMS is the Information System enabler for the application of RCM in the maritime environment. It can replace time expired, and interface with, disparate maintenance systems. It allows visibility of the platforms maintenance and stores state, along with the ability to plan work packages.
Whole Life Cost (WLC)	The combined cost of procurement, installation, commissioning, operation, support and disposal of equipment throughout its full service life.
Whole Ship Shock Trial	A trial undertaken simulating a non-contact underwater explosion to measure the shock resilience of the ship as a whole and equipments installed. Likely to be undertaken on the PGMU First of Class.

1.4. References

1.4.1. Documents referenced in this SOW:

ISO 9001-2008 - International Organisation for Standardisation 9001 (BS EN ISO 9001-2008)

AQAP 2105 – NATO Requirements for deliverable Quality Plans

AQAP 2110 – NATO Quality Assurance Requirements for design, development and production

AQAP 2210 – NATO Supplementary Software QA requirements to AQAP-2110

Def-Stan 05-61 Part 1 Issue 5 (2005) – Quality Assurance Procedural Requirements

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Def-Stan 05-57 Issue 5 (2005) – Configuration Management of Defence Materiel

MAP 01-470 - Shock Manual

Def-Stan 59-411 Pt 3 Issue 1 Amd 1 (2008) – Electromagnetic Compatibility

ICNIRP Guidelines – Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields 0 to 300GHz

IEEE 1584 - Guide for performing Arc Flash Hazard Calculations

NFPA-70E - Electrical safety in the workplace

JSP 440 – Defence Manual of Security

AOF – MoD Acquisition Operating Framework

PGMU Safety Strategy Paper – Issue 01 June 2013

Frigates Ship Safety and Environmental Management Plan (SEMP) Issue 4 Aug 2011

JSP 430 – Management of Ship Safety and Environmental Protection

Def-Stan 00-56 Issue 4 (2007) – Safety Management Requirements for Defence systems

NAN 09-2012 – Naval Authority Notice – Software Integrity

JSP 375 – MoD Health and Safety Handbook

British Geological Survey Risk List - Current Supply Risk Index for Chemical Elements or Element Groups 2011

Def-Stan 00-600 – ILS Requirements for MoD Projects

JSP 886 Volume 7 Part 2 – The Defence Logistics Support Chain Manual

BRd 1313 – Maintenance Management in Surface Ships

Montreal Protocol Treaty of 1987

Kyoto Protocol 1997

DEFCON 117 – Supply of documentation for Naval Codification

International Trade in Arms Regulations (ITAR)

International trade Cooperation Treaty (ITCT)

Def-Stan 81-41 Issue 7 (2013) – Packaging of Defence Materiel

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DEFCON 129 – Use of Purchase to Payment (P2P) delivery label form

STANAG 4329 – NATO Standard Barcode Symbolologies – AP-44(A)

DEFCON 16 – Repair and Maintenance Documentation

DEFCON 21 – Retention of Records

MoD Defence System Approach to Training (DSAT) Quality Standard 001:2008

JSP 882, Part 4 – The Defence Manual of Training Management

2. PROJECT MANAGEMENT

2.1. General

- 2.1.1. The Contractor shall demonstrate good Project Management practice in undertaking all activities required under the Contract. The Authority and Contractor shall adopt an open and honest approach at all times and ensure that potential risks to performance, cost and time are exposed at the earliest opportunity to enable them to be addressed to minimise any detrimental impact and maximise the benefit of any potential opportunity.
- 2.1.2. The Authority shall be provided with full access to all plans, programmes and associated documentation at all levels throughout the duration of the Contract.
- 2.1.3. Any proposed changes to all plans are to be agreed with and subsequently provided to the Authority.

2.2. Deliverable Information

- 2.2.1. The Contractor shall prepare, deliver and maintain (as required) the Deliverable Information listed in the relevant Data Requirements List (DRL) set out in Part 3 of Schedule B (Delivery Plan) of the Contract.
- 2.2.2. Where a deliverable in the DRL has a Data Item Definition (DID) number referenced against it, the deliverable shall be provided in accordance with the requirements of the relevant DID.
- 2.2.3. The Contractor is to supply equipment detailed in 3.1.1 in accordance with the delivery schedule contained in Part 2 of Schedule B (Delivery Plan) of the Contract

2.3. Project Management Plan

- 2.3.1. The Authority will maintain the master Project Management Plan (PGMU PMP) for PGMU as a whole. The PMP specific to each lot will feed into this master.
- 2.3.2. The Motor Generator Project Management Plan (MGPMP) shall be supplied by the Contractor, agreed and approved by the Authority at award of Contract, and maintained thereafter by the Contractor. **[DRL P1]**.
- 2.3.3. The MGPMP shall define how the Contract activities shall be managed for all equipment, outlining the processes, procedures and techniques to be used with details of how all activities, plans and programmes will be established, monitored, changed, controlled, integrated and communicated with the Authority.
- 2.3.4. The MGPMP shall adopt a consistent and coherent approach to project management and establish procedures and reporting mechanisms. Implementation of the MGPMP will provide the Authority with confidence in the Contractor's ability to deliver to time, cost and performance in accordance with the Contract and provide

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early visibility of potential issues so that mitigating action can be taken.

2.3.5. The Motor Generator Project Management Plan shall include but not be limited to the following:

- a Organisation, Communication and Relationship Management.
- b Project Control including:
 - i Project Reviews;
 - ii Cardinal Date Programme;
 - iii Contract Performance Measurement;
 - iv Risk Management;
 - v Information Management;
 - vi Supply and Engineering;
 - vii Safety and Environmental Management;
 - viii Quality Management;
 - ix Integrated Logistics Support;
 - x Interface Management;
 - xi Obsolescence Management;
 - xii Tests, Trials and Acceptance;
 - xiii Configuration Management;
 - xiv Security;
 - xv Design Support;
 - xvi Government Furnished Assets (GFA).
- c Procedures for the management of the guarantee defect (warranty) process, detailed in section 4.3, for all equipment that ensure replacement of equipment is provided and/or repairs undertaken in an efficient manner to minimise disruption to ship operations.

2.3.6. The MGPMP shall include the definition of a Project Review report structure used to demonstrate the status of the Contract. The Project Review Report shall include key performance indicators and/or critical success factors. The Contractor shall provide a completed Project Review Report at the Project Reviews or when requested.

2.4. Organisation, Communication and Relationship Management

2.4.1. Authority Organisation

- a. Defence Equipment And Support Project Team (PT). The DE&S PT is responsible for overall project management and delivery of the PGMU capability including the development of the requirement, assurance and approvals. The commercial staff within the PT are responsible for award and ongoing management of the Contract. The PT will provide, in conjunction with NDP, the project overarching project

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oversight.

- b. Navy Command Headquarters (NCHQ). NCHQ fulfil the role of Senior Responsible Owner (SRO) for the project and act as Project Director, including funding line holder, and User community representative. They are also the owner of several Defence Lines of Development (DLODs).
- c. Naval Design Partnering (NDP). The PGMU NDP team is an extension of the DE&S PT and consists of engineers from the Defence Industry who provide the technical authority, undertake the initial system design and oversee the integration aspects of the project. The PGMU NDP team will also set the strategy to enable the functional integration of the PGMU elements;
- d. Design Management Services (DMS). The DE&S has Contracts under the Ships Support Alliance (SSA) with BAE Systems and Babcock Marine for the provision of DMS. The PT will task the DMS to provide the Installation Solution, Safety and Environmental Assessments, updates to the T23 platform datum pack of drawings and ship fit definition.
- e. Type 23 Class Output Management (T23 COM). Under the SSA each class of warship has its own COM team. The T23 COM is made up of BAES, BM and MOD personnel. For the PGMU project the T23 COM shall provide management of all ship-facing activities at the waterfront to maximise operational availability. This includes management of the Upkeep Periods covering PGMU installation. They also provide waterfront Safety and Environmental assurance during installation.
- f. Upkeep Contractor. The Upkeep of T23 warships are undertaken via the SSA contractual arrangements and managed at the waterfront by the T23 COM. PGMU will be installed and commissioned during Upkeep.
- g. PGMU System Integrator (PGMU SI). The role to be undertaken on behalf of the Authority to deliver PGMU functionality and to detail and manage the interfaces between the integrated PGMU equipments with the platform services and systems.

2.4.2. Contractor Organisation

- a. To enable the Authority to maintain a full understanding of the management arrangements and resources that will be employed on the Contract, the MGPM shall contain the contractors relationship management plan to include:
 - i. The company structure and organisation of the Contractor applicable to the Contract;
 - ii. The organisation, roles, responsibilities and resources of the Contractor's team engaged on the Contract;
 - iii. Key Sub-Contractors including company overview, contribution to the Contract, management arrangements and resources;
 - iv. All other stakeholders that contribute to or influence the Contract including a stakeholder identification and analysis that sets out who will be engaged during the programme, when they will be engaged and the influence/contribution they have to the Contract.
- b. The Contractor shall report information at Project Reviews meetings on, but not

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limited to the following:

- i. Key personnel changes;
 - ii. Manpower resources;
 - iii. Subcontractor utilisation and performance;
 - iv. Stakeholder engagement activities, issues and recommended corrective action.
- c. Changes to the organisation and resources that affect performance under the Contract shall be agreed with the Authority.

2.4.3. Communication & Relationships.

- a. The MGPMP shall include a communication and relationship management plan that describes how the interactions between the Authority, Contractor, key Sub-Contractors and other stakeholders are going to be established and managed throughout the Contract. The aim is to provide an effective team, working in an open and professional relationship, communicating in a timely and appropriate manner to deliver the programme to time, cost and performance requirements.

2.5. Project Control

- 2.5.1. Project Control Meetings. During the Contract, project control shall be exercised through a series of reviews, either at meetings or in correspondence. The highest level review meeting is the Project Review meeting (see 2.5.5) to which all other reviews (Risk Review, Safety Review, etc) shall report.
- 2.5.2. Unless agreed otherwise, all Project Review meetings shall be:
- a Held alternately at the Authority's and Contractors premises;
 - b chaired by the Authority;
 - c arranged/coordinated by the Contractor;
 - d Secretariat support provided by the Contractor including the recording of actions in the form of minutes **[DRL P2]**.
- 2.5.3. The Authority shall retain the right to call a meeting with the Contractor on any matter of concern, subject to notice being given to the Contractor.
- 2.5.4. The Authority requires its representative to be invited to attend Contractor's internal meetings, or meetings with Sub-Contractors, relating to any aspect that has potential to affect performance under the Contract (for example, weekly progress meetings).
- 2.5.5. The Authority will hold a combined PGMU Project Review meeting, at least quarterly, to review progress and issues across the five Lots of PGMU. This will encompass the Project Review activities across all five Lots and monitor issues and progress of the PGMU project as a whole. The Contractor shall provide all required information to the Authority in a timely manner and also provide suitably qualified representatives to attend the review at the Authorities premises.
- 2.5.6. Project Review meetings shall be held monthly. For each Project Review meeting, the Contractor shall provide the Authority with a Project Review Report **[DRL P3]** no

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later than 5 working days prior to the Project Review meeting. The Project Review Report shall include but not be limited to the following areas that will form the basis of the Project Review meeting:

- a Organisation, Communication and Relationship Management;
- b Cardinal Date Programme;
- c Contract Performance Measurement;
- d Risk Management;
- e Information Management;
- f Supply and Engineering;
- g Safety and Environmental Management;
- h Quality Management;
- i Integrated Logistics Support;
- j Interface Management;
- k Obsolescence Management;
- l Tests, Trials and Acceptance;
- m Configuration Management;
- n Security;
- o Design Support.

2.5.7. Cardinal Date Programme:

- a The MGPMP shall include the process for the management of the Cardinal Date Programme (CDP) to allow the Authority to gain an understanding of the derivation of the CDP, including any supporting programmes for each equipment set, and how they will be monitored, changed, controlled, integrated and communicated;
- b The MGPMP shall include a baseline CDP;
- c The CDP **[DRL P4]** shall include, but not be limited to all principal activities milestones, reviews and dependencies, embracing design, development, production (including long lead items), tests, trials, inspections, acceptance, safety and environmental management and Integrated Logistic Support;
- d The CDP shall be logical and be of sufficient detail to monitor progress of, and enable management of, the Contract, provide early visibility of potential issues and be used to analyse the impact of decisions and proposed changes on the CDP;
- e The CDP shall be supported by detailed programmes for Contract activities, these shall include, but not limited to:
 - i Material Delivery (including GFA);
 - ii Project Management (including risk, programme, quality and cost activities);
 - iii Design Acceptance Programme;
 - iv Test, Trials and Inspections Programme;

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- v Safety and Environmental Management;
- vi Integrated Logistic Support;
- vii The Contractor shall include three point estimates and identify the critical path on the CDP, and all supporting programmes.
- f The Contractor shall report information at Project Review meetings on, but not limited to the following:
 - i Progress against CDP;
 - ii Key achievements;
 - iii Key forthcoming activities ;
 - iv Potential programme issues and recommended corrective action.

2.5.8. Contract Performance Management

- a The MGPMP shall include the process for the measurement of Contractor performance against the Key Performance Indicators (KPI) detailed in Schedule C the contract.
- b The Contractor shall report information at Project Review meetings on, but not limited to the following:
 - i Performance against KPI;
 - ii Equipment Performance Analysis (EPA) recommendations to investigate areas where equipment availability drops below the indicator point as detailed in the KPI processes within the contract.
 - iii Activities undertaken to improve performance against KPI where required.

2.5.9. Risk Management:

- a Risk management includes the management of both threats and opportunities, excluding specific safety and environmental risks which will be covered by the Safety and Environmental Management process (see Part 2.5.12: Safety and Environmental Management);
- b The MGPMP shall include processes, procedures and techniques in the form of a Risk Management Plan **[DRL P5]** for the management of risk and the recording of risk assessments with descriptions, probability and quantifiable impact (time, cost, performance);
- c The Risk Management Plan shall include, but not be limited to:
 - i Strategy;
 - ii Roles and responsibilities;
 - iii Risks management processes and procedures for:
 - 1) Risk and opportunity identification and allocation of ownership to the Authority, Contractor, Sub Contractors or other stakeholders;
 - 2) Risk analysis, mitigation, planning and control;
 - 3) Risk reviews;

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- 4) Configuration management;
- 5) Reporting.
- iv The structure and management of the Risk Register covering:
 - 1) Analytical tools and computer simulations to be used;
 - 2) Definition of scoring scheme/impact criteria.
- d The Contractor shall provide information on all risks to the Authority throughout the duration of the Contract in the form of a shared Risk Register.
- e The Contractor shall hold a bi-monthly (every two months) Risk Review meeting with the Authority. The Contractor shall provide information on, but not limited to:
 - i Risk management activities undertaken;
 - ii Status of the risk register;
 - iii Key programme risks;
 - iv New risks identified;
 - v Mitigation activities undertaken.
- f Unless agreed otherwise, Risk Review meetings shall be:
 - i Held alternately at the Authority's and Contractors premises in conjunction with the Project Review Meetings;
 - ii Chaired by the Authority;
 - iii Arranged/coordinated by the Contractor;
 - iv Secretariat support provided by the Contractor including the recording of actions in the form of minutes.
- g The Contractor shall construct and maintain a shared Risk Register with the Authority, to include all threats and opportunities relating to, but not be limited to:
 - i Authority activities;
 - ii Contractor activities;
 - iii Sub-Contractor activities;
 - iv Stakeholder activities;
 - v Successful delivery of the programme.
- h The shared Risk Register shall include but not be limited to:
 - i Description of risk and cause;
 - ii Owner;
 - iii Expected time of risk occurrence;
 - iv Probability and impact analysis (time, cost and performance);
 - v Mitigation action;

- vi Contingency action.
- i The Risk Register shall be capable of generating statistical and summary reports of risks for the Risk Review and Project Reviews;
- j The Contractor shall provide the Authority with a bi-monthly export of the Risk Register, in MS Excel format, **[DRL P6]** and deliver a copy of the final Risk Register on completion or termination of the Contract.
- k The statements contained in the Risk Register shall not alter the contractual responsibilities held by either the Contractor or the Authority. Neither should these statements attempt to transfer responsibility or ownership of a risk from one party to another;
- l The Contractor shall report information at the Project Review meetings on, but not limited to the following:
 - i Key risks (top 5);
 - ii An assessment of the overall risk exposure in relation to performance, cost and time.

2.5.10. Information Management

- a Information Management relates to any information on the programme, whether transmitted electronically, hard copy or verbally. The MGPMP shall include processes and mechanisms for sharing information relating to the programme in the form of an Information Management Plan **[DRL P7]**.
- b The Information Management Plan shall include but not be limited to:
 - i The proposed use of a Technical Shared Data Environment accessible by the Contractor for each PGMU Lot and the Authority;
 - ii System and data integrity management to ensure that all electronic systems and information are protected from viruses and malware.
- c The Contractor shall report information at the Project Review meetings on, but not limited to the status of Information Management, issues and recommended corrective action.

2.5.11. Supply and Engineering

- a The requirements for the management of Supply & Engineering are detailed in Part 3 : Supply and Engineering;
- b The Contractor shall report information at the Project Review meetings on, but not limited to, Supply, Engineering and Acceptance activities and progress, issues and recommended corrective action.

2.5.12. Safety and Environmental Management

- a The requirements for Safety and Environmental Management are detailed in Part 3.8: Safety and Environmental Management;
- b The Contractor shall report information at the Project Review meetings on, but not limited to, Safety and Environmental Management, issues recommended corrective action.

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2.5.13. Quality Management

- a The Contractor shall report information at the Project Review meetings on, but not limited to Quality Management (including audits and deficiency reports), issues and recommended corrective action;
- b The Contractor is responsible for ensuring that the quality of the work performed and of the articles and materials supplied by him and all his Sub-Contractors conform to the requirements of the Contract;
- c The Contractor shall maintain a quality management system and continually improve its effectiveness in accordance with the terms and conditions of the Contract, ISO 9001-2008 and the AQAP 2000 series, notably AQAP 2105, AQAP 2110 and AQAP 2210 and all amendments.
- d In meeting the above, the Contractor shall provide the Authority with a Quality Plan within three months of the Commencement Date **[DRL P8]**;
- e For the AQAP series, the following interpretations apply:
 - i Where the Contract refers to the “Authority”, the AQAP series refers to the “Acquirer”;
 - ii Where the Contract refers to the “Contractor”, the AQAP series refers to the “Supplier”;
 - iii Where the Contract refers to the “Sub-Contractor”, the AQAP series refers to the “Sub-supplier”;
 - iv Where the Contract refers to the “Quality Management Plan”, the AQAP series refers to the “Quality Plan”.
- f The Contractor shall maintain the Contractor's Quality Plan throughout the duration of the Contract; changes shall be agreed with the Authority;
- g The Quality Plan shall set out the quality strategy, practices, resources and sequence of activities relevant to the Contract and shall provide assurance to the Authority that:
 - i The Contract requirements and conditions have been reviewed;
 - ii Effective quality planning has taken place;
 - iii Identified risk areas are being addressed;
 - iv The Contractor has indicated how the quality of products and/or processes, including critical ones (as stated in the contract) shall be assured; and
 - v Those specific elements of the Contractor's quality system that are to be applied to the Contract are appropriate.
- h To satisfy the above requirements, the Quality Plan shall meet the requirements as detailed in AQAP 2105, and shall include:
 - i Strategy for Quality Assurance defining the Contractors commitment to complying with the quality system requirements as relating to this Contract;
 - ii Procedures that detail how the Quality Management System shall be used to deliver the equipment and which supplement the requirements for

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- acceptance;
- iii Arrangements for Quality Management review meetings to be held every 3 months;
- iv Procedures for achieving Certification and Classification;
- v Company organisation, competencies and resources;
- vi Supply base codes of practice, interfaces and standards policy;
- vii Configuration control;
- i The Contractor shall implement procedures for configuration control to ensure commonality of equipment and its integration on each ship across the ship class;
- j The Contractor shall implement procedures for the custody and maintenance of the design and ship fit configuration data for a period until the end of the guarantee period of the last ship;
- k The Contractor shall implement procedures for the management of concessions in accordance with Def-Stan 05-61 Part 1 issue 5;
- l The Quality Plan shall include procedures for ensuring configuration control requirements are clearly defined, achievable and compliant with the Contract;
- m The Contractor shall ensure that its strategy for configuration control is adequately developed, implemented and documented and clearly understood by all members of the Contractor's design and production team and including relevant areas of the supply chain;
- n Configuration control shall be the means by which the Contractor administers control of the product for form, fit and function throughout the design and production phases of each equipment and shall include the following interrelated processes to achieve that objective:
 - i Management and planning;
 - ii Identification and documentation;
 - iii Change management;
 - iv Status management;
 - v Audits.

- o For configuration control, the Quality Plan shall include procedures and processes for, but not be limited to:
 - i Standardisation;
 - ii Quality;
 - iii Reliability and Maintainability;
 - iv Traceability;
 - v Testability;
 - vi Interchangeability;
 - vii Interoperability;
 - viii Supportability.

2.5.14. Integrated Logistics Support

- a The requirements for the management of Integrated Logistics Support are detailed in Part 4 : Integrated Logistics Support;
- b The Contractor shall report information at the Project Review meetings on, but not limited to, the status of ILS, issues and recommended corrective action.

2.5.15. Interface/Integration Management

- a The requirements for the management of Equipment to Equipment and Equipment to Ship interfaces are detailed in Part 3.7: Interface Control and Monitoring of this document.
- b Integration of the separate elements of the capability into the wider platform and its systems is essential to the success of to the project. Due to the involvement of multiple suppliers this represents several of the key risks to PGMU functionality not being achieved. In order to achieve timely delivery of PGMU capability to all platforms, in accordance with the PGMU PMP, it is essential that multiple suppliers work together in an efficient manner.
- c From prior knowledge, backed up by the PQQ responses, the Authority recognises that Industry has extensive experience of working closely with other companies to achieve integration of equipment to deliver a coherent capability and are therefore best placed to manage the Integration Management process on behalf of the Authority.
- d The Supplier of Lot 5 shall undertake the PGMU System Integrator (PGMU SI) role by using its detailed processes to facilitate and expedite the exchange of data and manage any design change between the providers of the 4 equipment lots.
- e Integration shall be achieved through the adoption of a formal interface definition, management and control process determined by the PGMU SI and by the progressive test schedule described further in Section 3.5.
- f With respect to integration management the Contractor shall:
 - i attend all monthly Interface Management meetings and provide equipment

- parameters and further interface information as required by the PGMU SI for the purposes of system modelling and to ensure that the elements of PGMU work together and that PGMU as a system integrates into the platform;
- ii share all interface data with the Suppliers of the other Lots in a timely manner to ensure that functional integration is enabled in accordance with the timescales in the [PGMU PMP];
 - iii attend meetings, as required, with the PGMU SI and suppliers of Lots 1, 4 and the Electrical Distribution System in order to facilitate the development of the equipment and ensure that functional integration is enabled.
- g Given its prominence, Integration will also be on the agenda of Design Reviews, routine Progress Meetings and Integrated Test, Evaluation and Acceptance Working Group (ITEA WG) meetings giving multiple occasions for open communication between Suppliers of the Lots that are combining to deliver the PGMU capability.
- h There are two aspects of integration that the Interface Management process will address:
- i Intra-PGMU Integration - concerns the interfaces between the 4 PGMU elements; and, PGMU/Platform Integration that involves the interfaces between PGMU equipment and the ship and its auxiliary systems and support services as illustrated in Figure 2. For Intra-PGMU Integration the Contractor shall:
 - 1) request from and provide interface data to the Authority and to the Suppliers of Lots 1, 4 and the Electrical Distribution System as required to ensure the functional performance of PGMU and also to the PGMU SI..
 - 2) be responsible for the compatibility of the physical, functional and data interfaces between the equipment in the Lots it is providing where two or more lots are being supplied. In this event, details of the physical, functional and data interfaces in this SOW at paragraph 3.7.1 are still to be supplied to the Authority.
 - ii PGMU/Platform Integration - The PGMU Installation Solution (IS) will be produced by DMS using initial design information from the NDP and interface data of the new equipment being purchased. The Contractor shall provide data regarding the interfaces between PGMU equipment and the auxiliary systems and support services of the ship to DMS contractors as required under 3.7.1 and specified in the Interface Data Requirements List (IDRL) to enable IS production.



Figure 2 – PGMU Interface Boundary Diagram

2.5.16. Obsolescence Management

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- a The requirements for the management of obsolescence are detailed in Part 4, para 4.7.21 Integrated Logistic Support and is to be defined in the Contractor's Obsolescence Management Plan;
- b In general terms, this obsolescence management approach will comprise a controlled set of activities that:
 - i Actively monitors the Articles to identify obsolescence;
 - ii Generates a proposed solution to an obsolescence issue;
 - iii Implements the solution.
- c The Contractor shall report information at the Project Review meetings on, but not limited to, the status of equipment obsolescence issues and recommended corrective action.

2.5.17. Tests, Trials and Acceptance

- a Progressive Verification and Acceptance of PGMU capability will be undertaken. This commences during the design phase and continues through to the In-Service Date (ISD). In chronological order, the elements of the progressive acceptance process for PGMU, as a minimum, are: Critical Design Review (CDR), Factory Acceptance Test, Installation Inspection and Harbour and Sea Acceptance trials (HAT(ME)/SAT(ME));
- b The verification and acceptance process is further detailed in Part 3.5 : Commissioning, Tests, Trials and Acceptance and Part 4: Integrated Logistic Support. Further information is also provided in the draft Integrated Test, Evaluation and Acceptance Plan (ITEAP);
- c The Contractor shall support this process through the undertaking of required acceptance events to include but not limited to:
 - i Critical Design Review;
 - ii Factory Acceptance Test.
- d The Contractor shall provide support required to the Installation Contractor at upkeep related events to include but not limited to:
 - i Installation Inspections;
 - ii Commissioning and STW;
 - iii Harbour Acceptance Trials;
 - iv Sea Acceptance Trials.
- e The contractor shall provide the proposed methods of verification for each of the Technical Equipment Specification (TES) and applicable General Technical Requirements (GTR) requirements in the form of a spreadsheet [DRL P9]. The contractor shall select acceptance methods that demonstrate compliance to the requirements in the most cost effective manner. The ITEA WG will integrate the proposed verification tests for Lot 2 into the PGMU Verification and Validation Requirements Matrix (VVRM) and formally accept the methods proposed by the

contractor. The contractor shall note that the proposals are subject to changes deemed necessary to provide the body of evidence required by the Acceptance Authority. Changes shall be agreed between the contractor and the ITEA WG during the development of the VVRM.

- f The Contractor shall report information at the Project Review meetings on, but not limited to, equipment test and acceptance issues and recommended corrective action.
- g The Contractor shall provide any test data that is required for the production of IS to DMS as required.

2.5.18. Configuration Management

- a The Contractor is to maintain a detailed approach to Configuration Management, in accordance with Def Stan 05-57, which is to be defined in the Contractor's Configuration Management Plan **[DRL P10]**;
- b The Contractor shall report information at the Project Review meetings on, but not limited to, the status of Configuration Management issues and recommended corrective action;
- c The Contractor is to include requirements for the Configuration Management specific to ILS, detailed in Part 4: Integrated Logistic Support in the Configuration Management Plan.

2.5.19. Design Support

- a Installation design information in the form of Installation Solution (IS) will be produced by a combination of the NDP and DMS. This process will rely heavily on the timely flow of mature design and interface information from the Contractor, therefore the Contractor shall provide this information as required and in accordance with the contract.
- b Interface information requirements are discussed in 2.5.15 and Part 3 of the SOW and detailed in the Interface Data Requirements List.
- c The contractor shall provide all required information, as detailed in the Interface Data Requirements List, to NDP and DMS and also provide suitably qualified representatives to attended DMS led Installation Solution design reviews. This should include as a minimum for the First Of Class fit:
 - i Initial Design Review;
 - ii A minimum of two Interim Design Reviews;
 - iii Final Design Reviews.
- d The requirement for attendance at DMS design reviews for follow on ships will be driven by any change to equipment supply and/or interface information.

2.5.20. Government Furnished Assets (GFA)

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- a The Contractor shall state his requirements for Government Furnished Assets (GFA) in the tender response. Namely, Government Furnished Equipment (GFE)/ Government Furnished Information (GFI)/ Government Furnished Staff (GFS)/Government Furnished Facilities (GFF)
- b The Contractor shall provide and maintain a Government Furnished Assets (GFA) Log for the duration of the contract period. **[DRL P11]**.
- c The integration of the equipment, systems and Government Furnished Assets (GFA) into the equipment/platform shall be undertaken in accordance with the process detailed at 2.5.15.
- d The Government Furnished Assets (GFA) should not be modified in any way without the permission of the Authority.

3. SUPPLY AND ENGINEERING

3.1. Scope of Supply

3.1.1. The Contractor shall supply:

- a The equipments as specified in the Motor Generator Technical Equipment Specification (MG TES), at Annex A to this SOW, for each of the T23 ships to receive the PGMU system.
- b 1 piece of operator Training Equipment to meet the training requirements set out in Part 5 and summarised as follows:
 - i Automatic Voltage Regulator
- c 2 sets of Fleet Spares (Capital Spares) equipment as summarised:
 - i Motor Generator.
- d Spares as detailed in Part 4 and summarised as follows:
 - i On-board spares (per ship);
 - ii Base Spares.
 - iii Reprovisioning of On-board and Base Spares
- e Support and Test Equipment (S&TE) as detailed in Part 4.

3.1.2. Equipment Delivery Schedule.

- a The Contractor is to supply equipment, spares and S&TE detailed in 3.1.1 in accordance with the delivery schedule contained in Part 3 of Schedule B of the Contract.

3.2. Technical Equipment Specification

- 3.2.1. The Technical Equipment Specification (TES) for the Motor Generator (Lot 2) element of the PGMU system is at Annex A to this SOW and defines the technical requirements and performance specification for Articles to be supplied under this Contract.
- 3.2.2. All Articles delivered under this contract shall comply with the requirements identified in the MG TES.
- 3.2.3. The MG TES defines the requirements for the update of the existing T23 Motor Generators and associated ancillary equipment.

3.3. General Technical Requirements.

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- 3.3.1. The General Technical Requirements (GTR) specifies requirements with widespread applicability to Type 23 PGMU Equipment and is at Annex B to this SOW.
- 3.3.2. All Articles delivered under this contract should comply with the requirements identified in the GTR.
- 3.3.3. The GTR underpins the MG TES document; in the event of any inconsistency requirements specified in the relevant TES for the equipment shall take precedence over requirements in the GTR.

3.4. Specialist Engineering

3.4.1. Operating Conditions

- a All Equipment supplied under the contract shall be capable of withstanding and/or operating in the range of environments stated in the GTR as defined with respect to climate and ship motions.
- b Where the performance of Equipment supplied under the contract is affected by external temperature conditions the Contractor shall provide a detailed report that characterises the performance degradation of their equipment as stated in the GTR **[DRL E1]**.

3.4.2. Shock

- a Shock requirements are defined in the GTR. The Contractor shall provide appropriate documentary evidence that the Equipment supplied under the contract meets these requirements. The Contractor shall prepare, deliver and maintain an Equipment Shock Qualification Plan to define processes for qualifying equipment **[DRL E2]**.
- b The Contractor shall supply documentary evidence in the form of the Equipment Shock Qualification List **[DRL E3]**, Equipment Shock Qualification Report **[DRL E4]** and supporting documents to confirm that all equipment is shock qualified and suitable for use onboard the Ship
- c For shock performance specification, the Contractor shall assume that all equipment within the scope of PGMU is Class 2 equipment (Functions essential to support the primary functions of the ship).
- d The Contractor shall provide Equipment which shall function without degradation in performance when subjected to the shock motions at the foundation (i.e. Ship structure) described in MAP 01-470 and defined in the GTR document.

3.4.3. Signature Requirements

- a Noise and Vibration
 - i The Contractor shall provide appropriate documentary evidence that the Equipment supplied under the contract meets the requirements set out at the signature management section of the GTR.
 - ii The Contractor shall prepare, deliver and maintain a Noise and Vibration Control Document **[DRL E5]** which shall identify, where appropriate, proposals to reduce the noise and vibration levels from the Equipment and supporting systems.

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- iii The Contractor shall prepare, deliver and maintain a Noise and Vibration Measurement & Analysis report **[DRL E6]** that documents the results of measurements of noise and vibration as detailed in the TES and GTR. Where equipment is solidly mounted, the Contractor shall include the dynamic stiffness of the test foundation in the report.
 - iv Where significant modifications to the existing machinery foundation are required to meet the requirements for Broadband and Narrowband Vibration limits, as detailed in the GTR, the Contractor shall identify the extent of any reasonable modifications to the foundations to meet the defined limits for both.
 - v The Contractor shall ensure that all equipment is mounted to comply with the shock requirements as detailed in the GTR. Machinery mounting arrangements shall be designed to avoid the coincidence of system resonances with major equipment excitation frequencies.
 - vi The Contractor shall ensure that major equipment excitation frequencies are not coincident with any foundation structural resonances.
 - vii The Contractor shall provide an updated Noise and Vibration Measurement & Analysis Report **[DRL E6]**, post Factory Acceptance Test (FAT), which presents the dynamic and acoustic analysis performed in pursuit of this requirement and demonstrates compliance of the design with the presented limits.
 - viii The Contractor shall prepare, deliver and maintain a Mounting System Design Description.**[DRL E7]**
- b Other Signatures
- i The Contractor shall ensure that all equipment complies with the requirements, as detailed in the GTR, including Magnetic and other signatures deemed to be influenced by the Equipment.

3.4.4. Software

a Software Management

- i The Contractor shall ensure that all software developed under the contract for the T23 PGMU Project, whether this is a new development or a modification to existing software, is developed and documented in a controlled manner, and such control facilitates its effective long term support.
- ii The Contractor shall therefore prepare, deliver and maintain a Software Integration Plan for Non-Development Software for all software integrated and used for the conduct of any acceptance event or design proving event **[DRL E8]**.
- iii Where minor modifications are required to Non-Development Software or where totally new software is required, in order to meet the Requirements, the Contractor shall prepare, deliver and maintain a Software Management Plan for New and Modified Software Development **[DRL E9]**.

b Software Version Description

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- i The Authority recognises that several versions of the software associated with the Articles may be required throughout the duration of the Contract. The Authority is reliant on an understanding of the material state of any software, whether it is the final or an interim release, that is delivered in connection with the Work.
 - ii Notwithstanding the requirements identified in the Configuration Management section of this document, the Contractor shall prepare, deliver and maintain a Software Version Description for any software delivery. **[DRL E10]**
- c Detailed Software Documentation
 - i The Contractor shall prepare, deliver and maintain a Software Design Specification for all software provided throughout the contract. **[DRL E11]**.
- d Program Assembly Information Document
 - i The Contractor shall prepare, deliver and maintain a Program Assembly Information Document for any Software delivery. **[DRL E12]**
 - ii For the avoidance of doubt, where the software delivery is not intended for distribution via the Software Issuing Office (for example, software delivered for use during the Authority's integration or trials activities), the Contractor shall agree any changes to the content of the Program Assembly Information Document that may be necessary to support the activity in question.

3.4.5. EMC

- a The contractor shall prepare, deliver and maintain an Electromagnetic Compatibility Control Plan **[DRL E13]**. The document may be prepared in accordance with the Contractor's own conventions and format but must include the following information:
 - i Title Page(s) to include Document Title, Document Number, Document Issue, Date of Issue, Contract Number, Revision date, Company Identifier, System Identifier, Security Classification, Author, Authoriser and Approver, Document History and Table of Contents.
 - ii Introduction to include statements on Purpose, Scope, Requirement and Glossary of Terms
 - iii Overview to consist of a brief description of the objectives of the EMC Control Plan.
- b The EMC Control Plan shall address management of the following:
 - i Organisation for EMC Control
 - ii Resources including support from other Contractor and/or specialist facilities
 - iii Responsibilities
 - iv EMC Process, schedule and test schedule
 - v Summary of detailed EMC requirements and standards imposed on the design and production

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- vi Description of the equipment or subsystem
- vii EMC defect resolution procedures.
- c The EMC Control Plan shall include a functional description of the EMC design and implementation process using a flow diagram.
- d The EMC Control Plan shall describe the specific design techniques and procedures used to meet the EMC requirement, including:
 - i EMC mechanical design, including the following:
 - 1) Screened cabinet design guidelines
 - 2) Screening techniques to be used
 - ii Electrical wiring design, including cable types or characteristics, cable routing, cable separation, grounding philosophy, and cable shielding types and termination methods.
 - iii Fibre optic installation for EMC including WGBCO (Wave Guide Beyond Cut Off).
 - iv Electrical and electronic circuit design, including the following:
 - 1) Filtering techniques, technical reasons for selecting types of filters, and associated filter characteristics, including attenuation and line-to-ground capacitance values of AC and DC power line filters
 - 2) Part location and separation for reducing EMI
 - 3) Location, shielding, and isolation of critical circuits.
 - v Developmental Testing. Specification of testing to be performed during development (such as evaluations of breadboards, prototypes, and engineering models).
- e The EMC Control Plan shall describe the EMC Qualification Methodology that shall include:
 - i A detailed list of the proposed qualification testing planned by the Contractor to demonstrate that the items, equipment, subsystems or systems under test/trial conform to the EMC mandated specifications and the UK/EU legal requirements including:
 - ii Legacy equipment in service before 20/07/2009 – existing naval or commercial standards
 - iii New military equipment – Def Stan 59-411 Pt 3 Issue 1, Amd 1 (2008) Sea Service Below Decks Limits.
 - iv All equipment brought into service after 20/09/2011 whether military or civilian – The essential requirements of directive 2004/108/EU or alternative directive (e.g. marine equipment directive).
 - v Details of proposed certification shall be listed.
- f The Contractor shall supply an EMC Test Plan **[DRL E14]** to include

- i a detailed schedule of the proposed qualification tests planned by the Contractor up to Factory Acceptance Test (FAT);
 - ii a definition of the qualification evidence;
 - iii sub contractor and notified body support.
- g The Contractor shall supply an EMC Test Report **[DRL E15]** to be produced on completion of testing and including:
 - i Equipment under test serial numbers and software versions where applicable.
 - ii Confirmation that test procedures complied with the EMC Test Plan or listed deviations with justifications.
 - iii Test results indicating pass/fail and limits.
 - iv Dates of start and completion of tests.

3.4.6. EMF

- a The contractor shall advise the Authority in writing if any Equipment supplied under the Contract emits an electromagnetic field that exceeds the International Commission for Non Ionising Radiological Protection “Occupational limits” (as explained in ICNIRP Guidelines, Guidelines for Limiting Exposure to Time Varying Electric, Magnetic and Electromagnetic Fields, 0 to 300GHZ) and if so, shall predict the extent that this electromagnetic radiation hazard extends beyond the boundaries of their equipment.
- b The Contractor shall compile and deliver a report on an Electromagnetic Field Strength Prediction Study. **[DRL E16]**.

3.4.7. Materials

- a The contractor shall provide documentary evidence of compliance with the Material Selection criteria defined in the GTR.
- b The Contractor shall prepare, deliver and maintain a Materials List **[DRL E17]** for review and confirmation by the Authority to include, where necessary, a justification statement for the use of materials that do not comply with the Material Selection criteria defined in the GTR.
- c The Authority will review the Materials List and advise on which items are considered New to RN Warship Service. For such materials the Contractor shall liaise directly with the Authority to fulfil the necessary requirements defined in the GTR.
- d The Contractor shall confirm that the equipment supplied under the contract contains only lead-tin solder through the use of suitable and independently-auditable techniques. Where the use of lead-free solders is unavoidable the Contractor shall provide a Lead-Free Solder Verification Report **[DRL E18]** to verify the performance of the equipment to the expected equipment end of life.

3.4.8. Arc Flash

- a The Contractor shall carry out an Arc Flash Hazard incident energy calculation in accordance with IEEE 1584 (Guide for performing Arc Flash Hazard Calculations)

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for contractor supplied equipment which has not already been designated an Arc Flash Risk Category in accordance with NFPA-70E 'Electrical safety in the workplace' by the Authority.

- b The Contractor shall designate an Arc Flash Risk Category in accordance with NFPA-70E 'Electrical safety in the workplace', to contractor supplied equipment which has not already been designated an Arc Flash Risk Category by the Authority.
- c The Contractor shall identify measures to be applied by him to the contractor supplied equipment to mitigate adequately the associated Arc Flash Hazard. This shall include a cost-benefit analysis for the supply and fit of Arc Flash detection and protection equipment.
- d The Contractor shall compile and supply an Arc Flash Hazard Risk Assessment and Mitigation report **[DRL E19]** based on the outputs from the Arc Flash Hazard incident energy calculation, Arc Flash Risk Category identification and Arc Flash Mitigation activities for each of the applicable supplied equipment.

3.4.9. Security

- a The Contractor shall ensure that the MG Control Equipment along with any associated MCAS Equipment and connections achieve Security Accreditation in accordance with JSP 440 as described in the GTR document.
- b The Contractor shall supply a Risk Management Accreditation Document Set (RMADS) in support of the Equipment suitability in accordance with JSP 440 as described above.**[DRL E20]**
- c The Contractor shall ensure that the frequency and format of accounting records are detailed in their submission (RMADS).

3.5. Commissioning, Test, Trials and Acceptance

3.5.1. Commissioning , Test and Trials:

- a General. A series of tests and trials will be conducted to progressively build up confidence and evidence that the solution will deliver the capability required. There will be tests of the equipment being purchased in each Lot which equate to PGMU sub-system tests. The intention is that Lots/sub-systems will be combined for system-wide testing before installation, to be confirmed by the Integrated Test, Evaluation and Acceptance Working Group (ITEA WG). This includes a test of the integration of the MG set with the DG set, procured in Lot 1, prior to ship installation.
- b The T23 Requirements Manager (RM) chairs the ITEA WG which will develop a detailed Integrated Test, Evaluation and Acceptance Plan (ITEAP) during the Assessment Phase and Demonstration & Manufacture (D&M) Phase of the project. The extant draft ITEAP is at Annex E to this SOW. The Contractor shall attend ITEA WG meetings and be proactive in planning and conducting the ITEA process to ensure that evidence is gathered to show compliance with requirements in the most cost effective manner. It can be assumed that ITEA WG meetings will be held monthly from the Effective Date of the contract until the second ship fitted with PGMU has been accepted into service. The minimum list of tests follows, and the ITEA WG will add to or otherwise amend the list as required

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- i Critical Design Review (CDR). The Contractor shall arrange a CDR at which the evidence that the MG set will meet the requirements in this SOW, TES and GTR will be presented to the Authority. The required outcomes of the CDR are to be agreed with the Authority at least 2 weeks before the date of the review;
- ii Factory Acceptance Test (FAT). The Contractor shall support a FAT and propose the scope of the test based on the information contained within the TES and other requirements documents provided in this SOW.
- iii DG/MG Functional Test. The Contractor shall support a test to demonstrate the combined functionality of the DG and MG sets. The test objectives are:
 - 1) To provide mitigation against risks associated with system dynamic transient performance, specifically in terms of the performance of the DG excitation system during Motor Generator starting, with reference to achieving the QPS requirements (tbd);
 - 2) To provide an opportunity to optimise both the DG excitation system and the Motor starting system settings in support of the dynamic performance requirements as specified in the DG TES documentation;

The Contractor shall liaise with the provider of Lot 1, the PGMU SI and with the Authority, through the ITEA WG, to plan this test. For clarity, this functional test may be achieved through computer modelling techniques (provided the models are demonstrably valid) and does not specifically constrain the testing approach to physical functional testing. The Authority will task the PGMU SI to develop models to support the project acceptance work and the Lot 2 Contractor is tasked with supporting him at paragraph 2.5.15.f of the SOW;
- iv PGMU System Integration Test. The Contractor shall participate in the planning and conduct of a PGMU system integration test to demonstrate the combined functionality of the main elements of PGMU. The details of this system-wide test will be developed by the Authority with the Contractor through the ITEA WG.
- v Installation Inspections (II). The Contractor shall liaise with all relevant agencies to plan and conduct II. The MG sets will be installed by the Upkeep Contractor and the MG set Contractor shall certify that installation has been completed satisfactorily before Setting to Work commences. The ITEA WG will clarify roles and responsibilities;
- vi Setting to Work (STW). The Contractor shall liaise with all relevant agencies to plan and conduct STW. For the First of Class (FOC) installation in each dockyard the Contractor shall lead the STW activity with assistance from Ship Staff and the Upkeep Contractor Commissioning Engineers. For follow on installations the Upkeep Contractor Commissioning Engineers will lead the STW activity and the Contractor shall support and attend STW. The ITEA WG will clarify roles and responsibilities;
- vii Harbour Acceptance Trials (HAT) Mechanical Engineering (ME). The Contractor shall liaise with all relevant agencies to plan and conduct HAT(ME). The Maritime Capability Trials and Acceptance (MCTA) will lead the HAT(ME) and the Contractor shall support and attend HAT(ME) trials. The ITEA WG will clarify roles and responsibilities;
- viii Sea Acceptance Trials (SAT) Mechanical Engineering (ME). The Contractor shall liaise with all relevant agencies to plan and conduct SAT(ME). The

- MCTA team will lead the SAT(ME) and the Contractor shall support and attend SAT(ME) trials. The ITEA WG will clarify roles and responsibilities;
- ix Magnetic/Noise Ranging. The Authority will conduct magnetic and noise ranging pre and post-refit. The acceptance criteria are that the post update performance is no worse than the current capability, which will be set by the appropriate Acceptance Authority during the development of the ITEAP;
 - x Vibration Trials. The MG set is a major contributor to the underwater radiated noise produced by the Type 23: a characteristic that is strictly controlled. The MG TES contains a table of broadband and narrow band vibration limits. The Contractor shall demonstrate conformance to these limits as part of the FAT;
 - xi Shock Trials.
 - 1) The MG sets and equipment are required to conform to the standards defined in the GTR document for Shock requirements. Continued operation following a shock event is key to all PGMU equipment thus the Contractor shall supply Shock Qualification evidence to support claims made in the ESQ.
 - 2) It is expected that the Authority will undertake a whole ship Shock Trial on the first ship installed with PGMU as a minimum. The Contractor shall support the Authority in developing the scope of this trial and analysis of results with respect to their equipment.
- c ILS. The requirements for ILS testing are as detailed in Part 4: Integrated Logistic Support.
- 3.5.2. Test Forms. For the tests that are contractor-led (CDR, FAT, DG/MG integration test and First of Class STW), the Contractor shall produce test forms **[DRL E21]** and obtain Authority approval, via the ITEA WG, a minimum of 2 weeks before the tests are conducted. Draft test forms will be developed by the ITEA WG specifically for each test undertaken in the acceptance process. The Contractor shall support the ITEA process and is to contribute to the development of all test forms where his equipment is involved. The draft test forms will then be developed by the Upkeep Contractor into platform specific forms applicable to the individual ship receiving PGMU. The Contractor shall liaise with the Upkeep Contractor during this development.
- 3.5.3. Acceptance:
- a General. Acceptance will be carried out progressively and in accordance with the guidance in the MOD's Acquisition Operating Framework. The list of acceptance events at paragraph 3.5.1 is the minimum required to gather acceptance evidence. With Contractor membership, the ITEA WG will plan and execute the detailed route to acceptance, which is a dynamic process, affected by risks and constrained by time and resources. The Contractor shall work closely with the supplier of Lot 5 who is performing the System Integrator (SI) role, ensuring that the different elements of PGMU combine effectively to deliver the functionality described in the requirements documents;
 - b Verification and Validation Requirements Matrix (VVRM). The VVRM will be developed as an Annex of the ITEAP. It will contain the acceptance criteria for each requirement in the TES, GTR, SRD and URD. The Contractor shall propose acceptance test methods to demonstrate compliance with the requirements in the

most cost effective manner, as previously directed at 2.5.17.e and through participation in the ITEA WG. The VVRM will be used to monitor acceptance progress and after each test event that he is responsible for, the Contractor shall provide evidence in test reports [DRL E22] in a format that clearly attributes evidence to TES and GTR requirements, SRs and URs as applicable.

- c Schedule. The detailed ITEA schedule will be developed by the ITEA WG with input from the Contractor during the D&M phases of the PGMU project. An outline schedule for guidance is at Annex C of the draft ITEAP.

3.6. Certification

3.6.1. Classification Society Approval.

- a The Type 23 is in class for structure and carries the following notations: 100A1, NS2, Frigate, SA1, Air. The Contractor shall identify any potential impact on structural classification at the earliest opportunity to enable the Authority to address via the plan approval process.
- b The Type 23 is not in class for machinery and hence equipment does not need to carry Lloyd's Register of Shipping (LR) notation however, where proposed new equipment bears an existing notation or generally conforms to classification society regulations this should be indicated to the Authority.
- c Throughout the contract it is expected that third party design assurance will be undertaken by LR. The Contractor shall provide any required equipment information required by LR in pursuit of this assurance.

3.6.2. Contractor Supplied Certification.

- a The Contractor shall supply the following certification in accordance with the requirements of the TES:
 - i Factory Acceptance Test Certificate [covered under DRL E22]

3.6.3. Naval Authority Certification

- a Throughout the installation of PGMU into each ship the Authority will, in accordance with the requirements of JSP 430 Part 3, prepare submissions to the Naval Authority Group for the issue of specific Hazard Area Certificates of Safety for Propulsion and Manoeuvring, Fire, Escape & Evacuation, Stability and Structural Strength.
- b The Contractor is to provide any required specific equipment information to the Authority to enable the development of the submissions.

3.7. Interface Control and Monitoring

3.7.1. Interface with other Equipment and Systems.

- a The Contractor shall participate in the Interface Management process as described at paragraph 2.5.15. The Contractor shall provide the interface data as detailed in the Interface Data Requirements List (IDRL) [DRL E24]. This data shall detail all interface connections.
- b The IDRL shall include but is not limited to the following:

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- i Weight Constraints and Monitoring.
 - 1) The Contractor shall submit data as part of the Interface Data Requirements List detailing each major assembly within the overall equipment solution. Data for each assembly shall detail Weight and CoG figures.
- ii Space Constraints.
 - 1) The Contractor's equipment solution should conform to the space constraints as indicated in the TES and GTR.
 - 2) The Contractor shall submit, as part of the IDRL, general arrangement drawings, in electronic CAD format, giving clear and complete indication of the space requirement for the equipment and component packages including maintenance envelopes.
 - 3) The Contractor shall submit dimensional data for each major assembly within the overall equipment solution. Data for each assembly shall include extreme dimensions.
- iii Wild Heat.
 - 1) The Contractor shall inform the Authority of the wild heat output from their proposed equipment solution(s).

3.8. Safety and Environmental Management

3.8.1. General Obligations.

- a Where this section refers to "safety", this shall be taken to read "safety and environmental protection" and "software safety".
- b The Authority has an obligation to ensure that the Type 23 Ships are demonstrably safe, and that the risks resulting from hazards have been reduced to As Low As Reasonably Practicable (ALARP). For PGMU this will be achieved via the construction of an explicit safety argument and a progressive system of safety assurance as detailed in the Authority's Safety Strategy and documented through the Equipment and Platform Safety Cases.
- c The Safety Case shall demonstrate that suitable measures have been taken to ensure that the risks to the safety of personnel, the ship and its equipment and the environment are As Low As Reasonably Practicable (ALARP), and that the impacts upon the environment have been minimised wherever possible and practicable.
- d The Contractor shall enter into dialogue with the Authority to ensure full understanding of the Authority's requirement for both the Safety and Environmental Management, and that the Equipment Safety Case conforms to the Frigates Ship Safety and Environmental Management Plan (SEMP).
- e The Contractor shall inform the Authority in writing where any new safety issue or hazard throughout the life cycle of their product (including disposal) is identified. This requirement is independent of the Contract and will continue beyond the life of the contract.

3.8.2. Safety and Environmental Management Plan.

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- a The Contractor shall prepare, deliver and maintain a Safety and Environmental Management Plan (SEMP) [DRL E25] which covers all activities within the Contract including Software Safety Management and is in accordance with Def-Stan 00-56.
- b The Contractor's SEMP shall be presented at the initial Safety Review Meeting and then at subsequent reviews as the Contractor's Safety Case matures.
- c The Contractor's SEMP shall describe the management organisation of the Contractor specific to the management of safety and environmental issues and development of the Contractor's Equipment Safety Case. Personnel and interfaces to be highlighted in the safety management organisation should include :
 - i Nominated Contractor's Safety Manager - responsible for compiling documentation, organisation, and managing the Safety and Environmental Management Programme.
 - ii Key technical specialists.
 - iii Description of Safety and Environmental organisation with terms of reference for members and SQEP credentials including responsibilities and resources.
 - iv Link to Authority Safety Officer.
 - v Links to other organisations (Classification Society (LRS) and others as appropriate).
 - vi Links to Sub-Contractors.
- d The Contractor's SEMP shall include the ship and major equipment description with Safety and Environmental context.
- e The Contractor's SEMP shall define the Safety and Environmental Requirements, Objectives, Targets and Acceptance plan.
- f The Contractor's SEMP shall detail the methodology set in place used to identify and classify hazards. Specifically all procedures, methodology and documentation must be described.
- g The Contractor's SEMP shall describe the scope of the HAZOP Study detailing the types of HAZOP Study and the areas of the design to which they are to be applied to the ship.
- h The Contractor's SEMP shall include the SEMP programme.
- i The Contractor's SEMP shall include a register of all safety and environmentally related assumptions.
- j The Contractor shall ensure that all subcontractors develop, update and implement appropriate plans (commensurate with the scope of work for each subcontractor) that results in the delivery of an integrated and cost-effective approach to the safety and environmental aspects of the contract.
- k The Contractor shall ensure that all Contractor and Subcontractor activities are in accordance with the Safety and Environmental Management Plan.

3.8.3. Hazard Log.

- a The Contractor shall develop, provide and maintain a Hazard Log **[DRL E26]** to capture all safety and environmental risks identified in the course of developing the Safety Case. The Hazard Log shall use the D Ships Risk Classification Matrix (Figure 3) and shall capture each hazard recording information required for the conduct of the HAZOP Study) including but not limited to:
 - i Unique reference number
 - ii Ship System / Procedure / Zone
 - iii Title
 - iv Description
 - v Mitigation
 - vi Frequency, Consequence / Severity and Risk Classification.
 - vii Administrative details of how and when the hazard was raised.
 - viii Administrative details of how and when the hazard was accepted.
 - ix Contain features to enable hazards to be managed to be ALARP and accepted;
- b The Hazard Log shall permit a user to interrogate the hazards to extract Statistics, including by Risk Classification.

3.8.4. Equipment Safety Case.

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- a The Contractor shall develop and maintain and refine an Equipment Safety Case through the full lifecycle of the Contract.
 - b Where appropriate, the Contractor shall ensure that any related Safety Cases already in existence are utilised and integrated into the Safety Case.
 - c The Contractor shall prepare, deliver and maintain Equipment Safety Case Reports (SCR) **[DRL E27]** in accordance with the Authority's safety regulations, namely Def- Stan 00-56 and JSP 430, which shall describe the equipment, the safety analysis completed and the significant hazards that have been identified and how these hazards have been dealt with. Software Integrity is also to be managed in accordance with the requirements of NAN 09-2012
 - d The draft SCR shall be presented at the initial Safety Review Meeting and then at subsequent reviews as the Contractor's Safety Case matures.
 - e The SCR shall be presented in a manner that clearly articulates the claims, arguments and evidence demonstrating the Safety Case. The depth of argument and evidence shall be proportionate to the risk posed by the hazard and its complexity. SCR Format shall consist of the following three "core areas";
 - i Design Disclosure: It shall include, as a minimum;
 - 1) General Arrangement drawing and description of the Equipment
 - 2) An understanding of the margin between the safe operating envelope and the actual safety limits, including justifications that the equipment design philosophy is understood and the material state is consistent with the design solution.
 - 3) References to all documentation relating to safety and environmental management that will form part of the overall Contractor's Safety Case
 - 4) Scheme of Compliment in order to safely operate the equipment, minimum skills required and associated Training Needs Analysis.
 - 5) Copies of the certificates as required
 - ii Risk Management. It shall include as a minimum;
 - 1) Reference the Hazard Log and its current issue status.
 - 2) A summary of all Cat A and B Hazards and the worst 20 Cat C Hazards and a summary of hazard statistics including number by hazard class and how many are awaiting classification or resolution;
 - 3) Emergency and Contingency Arrangements. to consider all credible events where risk controls may fail
- 3.8.5. Control of Substances Hazardous to Health (COSHH).
- a The Contractors shall carry out COSHH risk assessments, in accordance with JSP375 and the requirements of the GTR, of materials and substances used in the manufacture or operation of the equipment or that form part of the equipment itself.
 - b The assessments should be used as part of equipment development and for the Contractors use during any potential commissioning, trials, maintenance, repair and overhaul.

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- c The Contractor shall provide and maintain COSHH risk assessments in the form of a COSHH Register throughout the duration of the contract. **[DRL E28]**
- d Use of Batteries
 - i The unmanaged use of Li-ion batteries presents a safety risk onboard ship. Any use of batteries with a capacity of greater than 96 Wh is to be avoided.
 - ii Any requirement for the use of batteries with a power requirement in excess of 96Wh is to be agreed with the Authority.
 - iii The contractor shall supply a comprehensive list of installed batteries in the form of a Battery Register **[DRL E29]** detailing: capacity, type, voltage, location, charging arrangements, and vents.

3.8.6. Environmental Management.

- a The Contractor shall prepare, deliver and maintain a Contractor's Environmental Statement **[DRLE30]** that considers the full lifecycle of the Equipment, in accordance with the Project Orientated Environmental Management System (POEMS) methodology. This shall cover, but not be limited to, the following:
 - i Any Environmental Impact Assessments (EIA) related to the equipment and supporting documentation and evidence of mitigation or impact reduction measures that have been taken.
 - ii An Environmental Risks Log, taken as an output of those items in Hazard Log which are identified as Environmental Risks.
 - iii An Environmental Legislation Log together with acceptance or conformance criteria and evidence of compliance. This could be incorporated into a common matrix with safety related legislation.
 - iv An actions and outstanding issues log, showing all actions remaining at hand over.
 - v Inventory of Hazardous Materials (IHM) for the equipment to be provided under the contract.
- b The Equipment should not use materials specified in the EU critical raw materials list or in the British Geological Survey Risk List as described in the GTR. Should these materials be required then the Contractor shall prepare, deliver and maintain a Use of Critical Raw Materials Report detailing its use and justification.

3.8.7. Sustainable Procurement

- a The PGMU requirement set includes requirements and constraints that are consistent with the MOD's mandated policy of sustainable procurement. Pertinent examples are energy efficiency targets and adherence to environmental legislation. By fulfilling the technical requirements and the obligations on the Contractor in section 3.8, the Contractor will be participating in the MOD's sustainable procurement processes.
- b The Contractor shall show that sustainable development risks and opportunities have been considered. The Contractor shall provide evidence of this in their proposal and shall subsequently adhere to the principles of sustainable procurement described in the MOD's Acquisition Operating Framework.

3.8.8. Safety and Environmental Meetings and Audits.

- a Meetings.
 - i The Contractor shall hold a bi-monthly (every two months) Safety Review meeting with the Authority. It can be assumed that Safety meetings will be held every two months from the Effective Date of the contract until the second ship fitted with PGMU has been accepted into service. Safety meetings should generally be held in conjunction with Project Review meetings. The Safety Review meeting shall focus on the Hazard Log but also provide information on, but not limited to:
 - 1) Equipment Safety Case development.
 - 2) Control of Substances Hazardous to Health (COSHH) issues.
 - 3) Environmental Management issues.
 - 4) Sustainable Procurement.
 - 5) Safety Certification impact.
 - ii Unless agreed otherwise the Safety Review meetings shall be:
 - 1) Held alternately at the Authority's and Contractors premises in conjunction with the Project Review Meetings;
 - 2) chaired by the Authority;
 - 3) arranged/coordinated by the Contractor
 - 4) Secretariat support provided by the Contractor including the recording of actions in the form of minutes **[DRL E31]**.
 - iii The Authority may require the Contractor's attendance at its own safety and environmental meetings. These may cover both safety and environmental issues associated only with the Contractors Articles, or safety and environmental issues associated with PGMU as a whole.
 - iv The Contractor shall invite the Authority to attend any internal safety meetings he intends to hold (for example, a hazard identification or safety committee meeting).
- b Audits

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- i The Authority may choose to conduct one or more safety and environmental audits of the Contractor's safety and environmental material. These audits may be conducted by the Authority, or by an independent safety auditor that has been appointed by the Authority.
- ii The Authority will give the Contractor at least 10 working days notice of his intent to conduct an audit.
- iii The Contractor shall support the audits, and provide that information necessary to conduct the audit (such as, but not limited to, formal records of all hazard and risk assessment meetings).
- iv Unless agreed otherwise, safety and environmental audits shall be:
 - 1) conducted by the Authority (or the independent safety auditor)
 - 2) held at the Contractor's premises
 - 3) recorded by the Contractor in the form of Minutes **[DRL E32]**, and
 - 4) all Action Items arising from a Meeting shall be recorded by the Contractor.
- v The Contractor shall identify and implement at his cost timely remedial actions to address any Observations or Critical Deficiency raised by the Authority during the audit.

3.8.9. PGMU Safety Assessment

- a As part of the development and approval of the Installation Solution for PGMU, as a whole system, DMS will lead a safety assessment in order to ensure that:
 - i individual Equipment Safety Cases, for each Lot, are understood and incorporated into a PGMU Safety Case.
 - ii To understand the impact of individual equipment failures in the context of operational scenarios and the Type 23 operating profile.
 - iii all hazards associated with the installation and operation of PGMU in Type 23 platforms have been identified, assessed and categorised.
 - iv mitigation actions identified and implemented to ensure hazards are ALARP and that installation can proceed.
- b The contractor shall provide all required information, as detailed in the Interface Data Requirements List, to the Authority and DMS and also provide suitably qualified representatives to attended DMS led Safety Assessment meetings. This should include as a minimum for the First Of Class fit:
 - i Initial Safety Assessment;
 - ii A minimum of two Interim Safety Reviews;
 - iii Final Safety Reviews.
- c The requirement for attendance at Safety Reviews for follow on ships will be driven by any change to equipment supply and/or interface information.

4. INTEGRATED LOGISTIC SUPPORT

4.1. Introduction

- 4.1.1. The principles of ILS, as defined in Def Stan 00-600 (Integrated Logistic Support Requirements for MOD Projects) shall be applied to all aspects of the PGMU programme.
- 4.1.2. PGMU is expected to consist of a high proportion of Commercial Off The Shelf (COTS) equipment which limits the opportunity for support considerations to influence design, however where design freedom exists, ILS shall be used to ensure support is considered during the design process. Where no design freedom exists, ILS will be used to evaluate the supportability of the systems proposed.
- 4.1.3. The ILS Plan sets out the overall support strategy for PGMU. The key outcomes of the ILS requirement are:
 - a To achieve a cost effective ILS programme appropriate to existing systems and COTS based technology;
 - b To achieve and sustain availability of PGMU at minimum Whole Life Cost (WLC);
 - c To achieve the Logistic Support Date (LSD) for PGMU on time and to cost;
 - d To establish a robust framework for the long term in-service management of PGMU that is underpinned by the required Supportability Analysis.

4.2. Support Solution

- 4.2.1. The Lot 2 Support Solution shall comply with the requirements of the Authority's Acquisition Operating Framework (AOF) and Support Solutions Envelope (SSE).
- 4.2.2. The Contractor shall:
 - a Provide a Guarantee Defects Period for Lot 2 supplied Equipment for each T23 ship installed with the PGMU solution in accordance with Figure 4 and as detailed in Clause 13 of the Terms and Conditions.;
 - b Provide Interim Contractor Logistic Support (CLS) in accordance with Figure 4 and as detailed at paragraph 4.4 below, and;
 - c Provide Option for a further 5 years Contractor Logistic Support (CLS) support as detailed in paragraph 4.5, and clause 20.3 of the Terms and Conditions, and;
 - d Undertake Integrated Logistic Support (ILS) Activities as detailed in 4.7.

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**Figure 4 - CLS and Guarantee Defect Periods**

- 4.2.3. In the event of any inconsistency between the scope of Guarantee Defects Period and Interim or further CLS, the Guarantee Defects Period requirements specified in Clause 13 of the Terms and Conditions apply.

4.3. Guarantee Defects

- 4.3.1. This is detailed in Clause 13 (Guarantee Defects Period) of the Special Conditions of Contract,

4.4. Interim Contractor Logistics Support

- 4.4.1. The Interim Contractor Logistic Support (CLS) period shall commence at SAT(ME) of the first T23 ship to be installed with the PGMU equipment and shall be effective for a period of 30 months.
- 4.4.2. The Contractor shall undertake support tasks, as defined at paragraph 4.6 below and at Annex C, except where defects are covered by the Guarantee Defect process as Clause 13 (Guarantee Defects Period) of the Contract.

4.5. Contractor Logistics Support

- 4.5.1. The Contract contains an Option clause 20.3 for the Contractor to provide a further 5 years CLS.
- 4.5.2. If the Option is exercised in accordance with the Contract the Option period of CLS shall commence immediately following completion of the Interim CLS period and shall end 5 years after the date of commencement (see Figure 4).
- 4.5.3. If the Option is exercised the Contractor shall undertake support tasks, as defined at paragraph 4.6 below and at Annex C, except where defects are covered by the Guarantee Defect process as defined in Clause 13 (Guarantee Defects Period) of the Contract Terms and Conditions.

4.6. Support Tasks

- 4.6.1. The tasks which shall be undertaken during the Guarantee Defects Period and during CLS are broken down as follows:

Task 1 - Repair/overhaul of Motor and Alternator

Task 2 - Provision of facilities for repair/overhaul, test and storage of equipment and associated spares

Task 3 - Equipment commissioning

Task 4 – Supply of sub-assemblies, components and associated spares

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Task 5 – Repair/overhaul of sub-assemblies, components and associated spares

Task 6 – Technical support

4.6.2. Not all tasks are appropriate for all equipment supplied under the Contract. Table 1 below shows which tasks shall be undertaken for individual equipments or types of equipment. This methodology shall be applied unless the Contractor's Supportability Analysis recommends a deviation from the tasks proposed. Following Authority agreement the Contract Change Procedure at Clause 21 of the Contract shall be used to amend the requirement.

4.6.3. For any equipment supplied under the Contract which falls into Serial 12 in Table 1. The Contractor shall propose to the Authority the support tasks, from those listed in 4.6.1, which shall apply to the identified equipments. Following Authority agreement the approved Contract Change Procedure shall be used to amend the scope of the contract.

Serial	Item	Applicable Interim Support Tasks
1.	Marine grade electric asynchronous induction motor	Tasks 1 to 6 inclusive
2.	Marine grade brushless cylindrical wound AC Alternator	Tasks 1 to 6 inclusive
3.	Resilient mounts (Motor)	Task 4
4.	Resilient mounts (Alternator)	Task 4
5.	Common MG base plate	Task 4
6.	Seawater cooling heat exchanger for normal cooling operations	Tasks 2, 4, 5 and 6
7.	Air cooling flaps for emergency cooling operations	Tasks 2, 4, 5 and 6
8.	Automatic Voltage Regulator (to be contained within the AVR Interface Unit);	Tasks 2, 4, 5 and 6
9.	Condition monitoring sensors	Tasks 2, 4, 5 and 6
10.	Support & Test Equipment	Tasks 2, 4, 5 and 6
11.	Training Equipment	Tasks 2, 4, 5 and 6

12.	All equipment not covered above	Tasks to be agreed
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Table 1 – Support Task Applicability

4.7. ILS Activities

4.7.1. ILS Management

a General

- i The Contractor shall provide an Integrated Support Plan (ISP) for the management and execution of the ILS Programme which shall conform to JSP 886, Volume 7, Part 2, Annex B, PD0001-01. **[DRL S1]**
- ii The Contractor shall state within the ISP the Company policy on ILS and describe how it proposes to implement the policy.
- iii The Contractor shall assign an ILS Manager for the PGMU programme.
- iv The Contractor shall include the Terms of Reference (TORs) for the Contractor's ILS Manager within the ISP.
- v The ILS Manager shall have full responsibility and accountability for performance of all ILS requirements for the PGMU system.
- vi The ILS Manager shall be provided with resources within the Contractor's company necessary to manage the Contractor's ILS programme.
- vii Where the Contractor proposes to use Sub-Contractors the ISP will include management of the Sub-Contractors' ILS activities.
- viii The proposed method of management of equipment suppliers shall be stated.

b Organisation

- i The Company's ILS organisational structure shall be described covering each speciality within ILS.
- ii An organisational diagram shall be produced, identifying the relationship between ILS and other disciplines within the overall organisation.
- iii CVs of the contractor's ILS Manager, Supportability Analysis (SA) Manager and other key ILS personnel shall be included within the ISP provided.

c ILS Programme Management

- i The Contractor shall establish and provide an ILS project milestone plan within the ISP.
- ii The Contractor shall propose an ILS delivery schedule within the ISP, which details all ILS deliverables.

d Logistic Support Committee (LSC) Meetings

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- i The Contractor shall support LSC meetings with the Authority in accordance with Def Stan 00-600 and JSP886. The Contractor shall produce the meeting agenda (to be agreed with the MILSM) and the meeting minutes within 10 working days of each meeting. The output of the activities shall meet the requirements of JSP 886, Volume 7, Part 2, Annex B, PD 0003-01. The first LSC meeting shall be held within 30 days of effective date. Subsequent LSC meetings will be held at bi-monthly intervals up to the LSD, with the venue alternating between the Authority and Contractor's premises. **[DRL S2]**
- e In-Service Logistic Support Committee (ISLSC)
 - i The Contractor shall support ISLSC meetings with the Authority in accordance with Def Stan 00-600 and JSP886. The Contractor shall produce the meeting agenda (to be agreed with the MILSM) and the meeting minutes within 10 working days of each meeting. The output of the activities shall meet the requirements of JSP 886, Volume 7, Part 2, Annex B, PD 0003-01. ISLSC meetings will be held at quarterly intervals after the LSD for the duration of the contract, with the venue alternating between the Authority and Contractor's premises. **[DRL S3]**
- f Supportability Case
 - i The Contractor shall demonstrate the supportability status of the equipment and the adequacy of the support solution through the delivery of Supportability Case Reports (SCRs) 5 working days prior to each LSC meeting. **[DRL S4]**
 - ii The SCRs shall provide sufficiently detailed evidence to assure that the support requirements contained in this SoW are being addressed.
 - iii The SCRs shall detail the mitigation or the management approach to all support risks and issues.
 - iv The SCRs shall be constructed in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 4002-01.
 - v All supportability disciplines in scope for this project, e.g. HFI, Training, R&M etc shall be addressed in the SCRs.
- g Risk
 - i The Contractor shall identify and integrate ILS risk activities with the overall Project risk activities.
 - ii The Contractor shall incorporate Support Solution risks into the Project Risk Register.
- h Standardisation

- i The contractor shall define the methodology whereby standardisation of supportability aspects are exploited, and risks identified.

4.7.2. Configuration Management

- a The contractor shall detail, within the ISP, how configuration management for ILS data shall be achieved as part of the project configuration management process.
- b All elements (Logistically Significant Items) that require configuration management to enable support of the capability shall be identified.

4.7.3. Supportability Analysis (SA)

- a SA Management
 - i The Contractor shall state the Company approach to SA giving a short description of how SA is implemented within the organisation.
 - ii The Contractor shall nominate an SA manager for the Project.
 - iii The Contractor shall develop an SA strategy.
 - iv The Contractor shall submit a Supportability Analysis Plan (SAP) in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0002-01. **[DRL S5]**
 - v The Contractor shall state how he will ensure that Sub-Contractors practice the discipline of ILS/SA.
- b SA Scheduling
 - i A programme plan shall be generated as part of the SAP, which identifies the SA activities, their interface within the overall Project plan and the critical path to achievement of the stated objectives.
 - ii The plan shall also identify deliverable milestones.
- c SA Tailoring
 - i SA activities shall be tailored to meet the contract requirements.
 - ii The size, complexity and proposed acquisition strategy of the Project shall be taken into consideration in determining the SA tailoring to be applied.
- d SA activities
 - i The Contractor shall undertake the following SA activities within the SA programme:
 - 1) A Task analysis shall be conducted.
 - 2) Post Production Support Analysis shall be conducted.
 - 3) Supportability, Test, Evaluation and Verification shall be carried out.

4.7.4. Maintenance

- a Maintenance Management:
 - i A Maintenance Plan for the development of the system maintenance concept shall be included as a subset of the ISP. **[DRL S6]**
 - ii Using the results of the SA, the given maintenance concept shall be developed into a System Maintenance Plan and Maintenance period statements, which shall encompass the total system, training equipment and its Support and Test Equipment (S&TE). The required maintenance shall fit within the current RN norms for maintenance periods and the maintainability requirements specified in the System Requirements Document (SRD).
 - iii The Plan shall identify all the preventive and corrective system maintenance tasks to be performed and their resource requirements.
 - iv The manpower required to implement the plan at each level shall be quantified by grade and trade group.
 - v The plan shall identify the requirement for its periodic review.
- b Maintenance Aims:
 - i The product shall be designed for an overall reduction of the maintenance task.
 - ii Allow fault diagnosis and permit equipment exchange of faulty Line Replaceable Units (LRUs) by service personnel without Contractor support
 - iii Ensure the requirement for preventive maintenance during operational periods is compatible with the allowable equipment downtime.
- c Maintenance
 - i A product Maintenance Policy shall be prepared.
 - ii A Maintenance Period Statement shall be produced that identifies:
 - 1) Periods of non-operational time to which equipment will be subject;
 - 2) Conditions in which equipment are to be maintained during each type of period;
 - 3) The consequential requirements for power supplies and services;
 - iii The contractor shall identify the maintenance required for specific environments
- d Failure Modes, Effects and Criticality Analysis (FMECA)
 - i The contractor shall complete a Failure Modes Effects and Criticality Analysis (FMECA), identify and record Failure Definitions and produce a Criticality Matrix. **[DRL S7]**
- e Reliability Centred Maintenance (RCM)
 - i The Contractor shall conduct and deliver a Reliability Centred Maintenance (RCM) analysis, in accordance with the Authority's RCM Toolkit (to be

- issued after effective date). The output of any RCM analysis already performed should be included with the Tender response. **[DRL S8]**
- ii The Contractor shall state how the RCM data obtained can be verified/validated.
 - iii The Contractor shall state his point of contact for RCM.
 - iv The Contractor shall work with the Authority UMMS Team to produce Maintenance Task Instructions as necessary during the course of the contract.
- f Level Of Repair Analysis (LORA)
- i The Contractor shall conduct a LORA, taking into account the preferred maintenance concept provided in the Authority ILS Plan, including the requirement to maximise use of on-board RN maintenance personnel. **[DRL S9]**
- g Use of Reliability And Maintainability Data
- i The Maintenance Policy shall take into account the system R&M data. If necessary the Maintenance Policy shall be reviewed in order to achieve the R&M targets.
- h Maintenance Envelopes & System/Equipment Routes
- i The contractor shall ensure that the equipment used for maintenance is usable in the space available.
 - ii The Contractor shall specify which equipment needs to be removed in order to carry out surveys, refurbishment or replacement of lifed items or as a consequence of work in the wake of other activities.
 - iii Lifting arrangements for replaceable items of equipment shall be identified.
- i Maintenance Schedules
- i Design Authority Maintenance Schedules (DAMS) shall be prepared by the Contractor based on the outputs of the Contractor's supportability analysis (including RCM, LORA and FMECA). The Contractor shall collate all Design Authority Maintenance Schedules, incorporate common maintenance items and present a system/equipment set of DAMS. **[DRL S10]**
 - ii MOD comments shall be incorporated into the Design Authority Maintenance Schedules.
- j Information Package
- i The Contractor shall ensure that Maintenance plans are generated for all supplied equipment.
 - ii The Contractor shall collate all Maintenance plans and ensure that the equipment being procured conforms to the Maintenance policy requirements.

- iii The Maintenance plan shall be a through life plan which identifies all planned and corrective maintenance.
- k Unit Maintenance Management System (UMMS)
 - i The Unit Maintenance Management System (UMMS) shall be used by the Authority to hold information relating to the planned maintenance activities that need to be undertaken. The UMMS information shall consist of the maintenance schedules proposed by the equipment Contractor and the common maintenance schedules produced by the Authority. The scheduling of maintenance periods and the amalgamation of the maintainer and operator functions shall be taken into consideration by the Contractor.
 - ii The Contractor shall produce the maintenance solution using the Authority's WinUMMS software application, available at nil cost provided a Non Disclosure Agreement (NDA) is agreed with the holder of the IPR for UMMS (IFS Defence). Maintenance Tasks shall be written in accordance with BRd 1313 Maintenance Management In Surface Ships and supplied with the maintenance solution in MS Word format using the template supplied by the Authority
- l Navy Specific Maintenance Clauses
 - i A product information package shall be developed as detailed in the ILS Plan. **[DRL S11]**
 - ii A technical datum pack shall be developed as detailed in the ILS Plan **[DRL S12]**
 - iii Configuration control of the datum pack shall be detailed in the Contractor's Configuration Management Plan.

4.7.5. Support Information Management Systems

- a The contractor shall develop and provide a Logistic Information Management Plan in accordance with Def Stan 00-600 and JSP886, Volume 5. **[DRL S13]**
- b Logistics Information Repository
 - i The Contractor shall ensure that all data generated as a result of performing SA is entered into a Logistic Information Repository which shall be delivered to the Authority. **[DRL S14]**
 - ii Sub-Contractors who are contracted to supply equipment or systems for integration into the platform shall also supply to the Contractor all support data and whole life cost data for inclusion in the Logistic Information Repository.
 - iii The Contractor shall ensure that all support data for equipment is provided by the equipment suppliers, Sub-Contractors, and for GFA, by the MOD Project Manager.

4.7.6. Project Hardware Requirements

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- a The Authority currently uses UMMS, MIMIC3 and CRISP systems. The Contractor shall state how his systems will interface to the Authority's current and future systems/applications, noting that the stated systems may evolve or be replaced during the PGMU in service life.

4.7.7. Design Influence

- a The Contractor ILS Manager (CILSM) shall participate in all major design reviews.
- b Consideration shall be given by the contractor, when undertaking design activities, to reducing the requirements for support.

4.7.8. Reliability & Maintainability (R&M) Interface

- a Management
 - i The Contractor shall develop and provide an R&M Programme Plan.
[DRL S15]
 - ii The Contractor's R&M Programme Plan shall be the single planning and controlling document for all R&M activities.
 - iii The Contractor shall, through his R&M Programme Plan, demonstrate his commitment, understanding and approach to R&M, placing emphasis on how his proposed R&M programme fits into the overall programme.
 - iv The Contractor shall submit an updated R&M Programme Plan for review should a significant change occur to the programme which warrants formal update.
 - v The Contractor shall ensure that R&M (including the latest issue of the R&M Case) is a standard agenda item at Project Management Meetings, LSC meetings and Design Reviews.
 - vi The Contractor shall undertake an R&M Programme in order to satisfy the Authority's R&M requirements.
 - vii The Contractor shall assign an R&M Manager, suitably qualified and experienced, who shall be responsible for all R&M aspects of the PGMU programme.
 - viii The Contractor shall define the interface between the CILSM and the Contractor's R&M Manager.
 - ix The Contractor shall state how the consistency between the R&M and ILS programmes will be maintained.
 - x Integration procedures between SA and R&M shall be developed and documented in the ISP and R&M Plan.
 - xi The Contractor shall state in the R&M Plan, who will advise on the impact of R&M activities, describing how and when this will be done.
 - xii The Contractor shall attend the Authority's R&M Project Panel Meetings when invited, to report on his R&M activities and the progressive assurance of R&M.
- b Reports

- i The Contractor shall provide R&M Case Reports **[DRL S16]** as detailed in the Authority ILS Plan, including the submission of any existing R&M data. As a minimum this shall include
 - 1) The Inherent Availability of the equipment to be supplied.
 - 2) Mean Time Between Failure (MTBF) for the equipment to be supplied..
 - 3) The Mean Time To Repair (MTTR) for the equipment to be supplied.
- ii The Contractor shall, for his R&M Case Report and its evidence, allow for Authority review and audits.
- iii The supplier should indicate whether Accelerated Reliability Tests (ART) have been carried out or shall detail provision for these to be conducted.

4.7.9. Supply Support

- a The spares, tools and test equipment required to meet the defined Maintenance policies shall be analysed and defined. The use of existing T23 and ready codified equipment, tools and spares should be maximised. The following shall be taken into account:
 - i Spares, Tools and Test equipment to support trials prior to the Logistic Support date (LSD)
 - ii Testing and Tuning Spares
 - iii On board Spares
 - iv Support Spares
 - v Diagnostic Test Spares
 - vi Contingency Support Spares
 - vii Training Equipment Spares
 - viii Consumables
 - ix Lubricants and associated products
- b The proposed lubricants and associated products shall comply in all respects with the Montreal Protocol Treaty of 1987 and the Kyoto Protocol 1997.
- c Supply Management
 - i The Contractor shall develop and deliver a Supply Support Plan in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 3002-01. **[DRL S17]**
 - ii The Contractor shall develop and deliver a Supply Support schedule as part of the Supply Support Plan.
- d Provisioning Data
 - i The Contractor shall provide an Initial Provisioning List (IPL) in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 3003-03. **[DRL S18]**
 - ii The Contractor shall collate the provisioning data supplied by equipment suppliers and produce a rationalised list.

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- iii The Contractor shall identify the recommended initial spares required to support the equipment supplied for an initial period of 2 years from the Ready for Sea Date (RFSD) in accordance with DEFCON 82. **[DRL S19]**
 - iv The Contractor shall identify long lead time items and deliver a Long Lead Time Item (LLTI) list. **[DRL S20]**
 - v The Contractor shall specify unique in-store maintenance instructions for all spares.
 - vi The Contractor shall prepare a Contract Repair Statement (CRS) for items which cannot be repaired or maintained by MOD sources. **[DRL S21]**
 - vii The CRS shall be presented in the Contractor's Maintenance Plan.
 - viii The Contractor shall state any requirements for a bonded store.
 - ix The Contractor shall state the IPR conditions for each item.
 - x A Reprovisioning Plan shall be produced in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 3006-01. **[DRL S22]**
- e Provisioning Technical Documentation
 - i The Contractor shall supply Provisioning technical documentation to support justification of spares selection. **[DRL S23]** This will include (where appropriate):
 - ii Illustrated Parts Listing in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 3005-01;
 - iii Provisioning Schedules;
 - iv Manufacturers recommendations;
 - v R&M data (where available);
 - vi Outline descriptions.
- f NATO Codification
 - i The Contractor shall undertake NATO Codification action through the UK National Codification Bureau (UK NCB) and ensure that all Items that will enter the Authority Joint Support Chain (JSC) shall be NATO Codified.
 - ii The Contractor shall provide the data for NATO Codification required in accordance with DEFCON 117 and JSP 886, Volume 7, Part 2, Annex B, PD 3004-01 for any items of equipment or spares that will enter the JSC and are not already codified. **[DRL S24]**
- g Spares Delivery
 - i The Contractor shall deliver the required spares, consumables, lubricants and associated products to the Authority in accordance with the equipment delivery schedule.
- h In service Supply Support
 - i In service CLS supply support instructions shall be produced in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 3007-01. **[DRL S25]**

- ii The Contractor shall submit details of the organisation that would be established to meet the identified CLS requirement. The size of the organisation in terms of resource numbers is to be defined.
- iii The Contractor shall provide a listing of spares types and provide a schedule of maximum response times within the supply support instructions.
- iv The Contractor shall propose the compensation arrangements that could apply should the agreed response time not be achieved.
- v The Contractor shall include a brief description of the following within the CLS supply support instructions:
 - 1) How demands from deployed systems/equipments will be accommodated?
 - 2) What procedures will be established for supply of spares by air freight if required.
- i International Agreements
 - i The Contractor shall identify, within the ISP, any items that are subject to International Trade in Arms Regulations (ITAR)
 - ii The contractor shall detail procedures, within the ISP, to be used for managing items subject to ITAR.
 - iii The Contractor shall identify, within the ISP, any items that are subject to International trade Cooperation Treaty (ITCT)
 - iv The contractor shall detail procedures, within the ISP, to be used for managing items subject to ITCT.
 - v The Contractor shall identify, within the ISP, any items that are subject to Import Duty Wavier (IDW).
 - vi The contractor shall detail procedures, within the ISP, to be used for managing items subject to IDW.

4.7.10. General Purpose hand tools

- a The Contractor shall collate all General Purpose hand tools requirements and rationalise the requirements, to ensure that adequate hand tools are available to support the system.
- b The Contractor shall identify and deliver a list of General Purpose hand tools required. **[DRL S26]**

4.7.11. Special To Type Hand tools (STH)

- a STH are designed specifically for use with particular equipment. Such tools are to be introduced only where essential and with the consent of the Authority. STH shall be provided with the equipment and, preferably, are to be securely stowed within the equipment close to the point of use.
- b The Contractor shall justify the need for STH.

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- c Tools shall be selected in the first instance from existing General Purpose hand tools listings.
- d The Contractor shall identify and deliver a list of STH required. **[DRL S27]**
- e STH Delivery
 - i The Contractor shall deliver the required STH to the Authority in accordance with the equipment delivery schedule.

4.7.12. Support & Test Equipment

- a A Support and Test Equipment (S&TE) Plan shall be developed and delivered in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0004-01. **[DRL S28]**
- b All S&TE required to diagnose defects on and maintain the equipment shall be identified and linked to the maintenance task requirements.
- c S&TE Delivery
 - i The Contractor shall deliver the required S&TE, in accordance with the S&TE Plan, to the Authority in accordance with the equipment delivery schedule.
- d General Purpose Test and Measurement Equipment
 - i General purpose test and measurement equipment (GPTME) shall be selected in the first instance from existing listings.
 - ii The contractor shall collate all general purpose test and measurement equipment requirements and rationalise the requirements, to ensure that adequate test equipment is available to support the system.
 - iii The Contractor shall identify and deliver a list of suitable general purpose test and measurement equipment required to support the system. **[DRL S29]**
- e GPTME Delivery
 - i The Contractor shall deliver the required GPTME to the Authority in accordance with the equipment delivery schedule.
- f Special Purpose Test and Measurement Equipment
 - i The Contractor shall justify the need for any Special Purpose Test and Measurement Equipment (SPTME)
 - ii The Contractor shall identify and deliver a list of new SPTME required to support the system. **[DRL S30]**
- g SPTME Delivery
 - i The Contractor shall deliver the required SPTME to the Authority in accordance with the equipment delivery schedule.

h Support of Support Equipment

- i The required Technical Information for the use, calibration, maintenance, transportation and storage of S&TE shall be included as part of the Technical Documentation suite.

4.7.13. Facilities

a Policy

- i Existing facilities shall be used to the maximum extent possible.

b Analysis

- i The Contractor shall develop and deliver a Facilities Plan in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0004-01. **[DRL S31]**
- ii The Contractor shall analyse and state the requirements for the use of existing facilities.
- iii The Contractor shall state any new requirements in relation to existing facilities.

c New/Modified Facilities

- i The Contractor shall define any requirements for new or modified Facilities.
- ii These should be specified in outline as early as possible to allow minimisation if possible, or planning for future requirements or budgets to be undertaken.
- iii The need for new/modified facilities shall be justified and agreed with the Authority.

d Training Installations

- i Where required and agreed with the Authority, Facilities shall be established, or adapted, for training of operators and maintainers.

4.7.14. Human Factors

a Management

- i The Contractor shall develop and deliver an Human Factors Integration Plan that forms an element of the overall ISP in accordance with JSP 886, Volume 7, Part 08-09 and JSP 886, Volume 7, Part 2, Annex B, PD 0004-01. **[DRL S32]**
- ii The plan shall demonstrate how the inputs from, and outputs to, Human Factors are to be managed.
- iii The contractor shall comply with the requirements of JSP912.

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- iv The Contractor shall identify top level Human Factors requirements and establish a common schedule for the interface with ILS tasks with the Human Factors Manager.
- b Interface with ILS
 - i The Contractor shall develop integration procedures to ensure compatibility between the HF and ILS activities
 - ii The Contractors policy for ensuring compatibility of HF and ILS data shall be defined.

4.7.15. Technical Documentation Management Plan

- a Technical Documentation (TD) is the information necessary to operate, service, repair and support PGMU throughout its life. TD contains information covering the technical description, operating instructions, provisioning, maintenance, repair, support, and disposal of defence materiel. All Contractor TD activities undertaken as part of this procurement programme shall comply with JSP 886 Vol 7 (ILS) part 8.05 (Technical Documentation) which details the policies and requirements for the preparation, distribution and maintenance of Technical Documentation for the MOD and Armed Forces.
- b The Contractor shall develop and deliver a Technical Documentation Management Plan (TDMP) in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 2001-01. **[DRL S33]**
- c The Contractor shall propose a technical information production and delivery schedule to be agreed with the MOD ILSM.
- d The Contractor shall state the Guaranteed Defect period and IPR conditions applicable to the technical documentation and information supplied.
 - i The Contractor shall produce Technical Documentation in electronic format as Electronic Technical Documentation (ETD).
 - ii The Contractor shall provide Technical Documentation covering all equipment supplied to support, maintain, train and provide technical support from the first usage, allowing it to be operated, managed, maintained and disposed of effectively, efficiently and safely.
- e Validation
 - i The Contractor shall specify how a Technical Information configuration audit will be integrated into the configuration management plan.
 - ii The Contractor shall incorporate comments from MOD staff on the supplied technical documentation and information.
 - iii The Contractor shall present validation certificates to MOD to facilitate acceptance of each technical document supplied. **[DRL S34]**
- f Publication and Maintenance
 - i Processes for maintaining the Technical Documentation/Information suite shall be identified within the TDMP.

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- ii Processes for publishing the Technical Information / Documentation suite to end users shall be identified within the TDMP.
 - iii Processes for incorporating feedback from end users to facilitate updates of Technical Documentation/Information shall be identified.
- g Publication Delivery
- i The final deliverable TD should be the most cost-effective solution consistent with the constraints of existing support policy.
 - ii The Contractor shall deliver the following TD:
 - 1) Books of Reference (BR) in electronic (pdf) format. **[DRL S35]** Digital BRs are to be produced and delivered in PDF format and meet the following requirements:
 - a. The production version to be used is Adobe Acrobat 9 or later. Output files saved at version 7 (1.6)
 - b. Content to conform to DEF Stan 02-40 Parts1-4 & JSP 182
 - 2) Marine Engineering Guides (MEG) updates for on board distribution by Marine Engineer Officers (MEO). These guides are intended to be used in conjunction with the relevant BR and Operating Instructions. **[DRL S36]**

4.7.16. Packaging, Handling, Storage and Transportation

- a Management
- i The Contractor shall develop and deliver a Packaging, Handling, Storage and Transportation (PHS&T) plan in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0004-01 and the ILSP. **[DRL S38]**
- b Packaging
- i The contractor will be required to identify suitable levels of packaging, in conjunction with the Defence Packaging Group.
 - ii Packaging shall be designed and manufactured in compliance with Def Stan 81-41 in order to meet the requirements of Military Level Packaging (MLP).
 - iii Packaging development data shall be produced in accordance with the PHS&T plan.
 - iv The Contractor shall label Spares in accordance with DEFCON 129J.
 - v The Contractor shall bar-code spares in accordance with STANAG 4329.
- c Handling
- i The Contractor shall identify and deliver a list of Special handling equipment required to support the supplied equipment. **[DRL S39]**
 - ii The Contractor shall identify and specify any Special handling requirements for the equipment supplied.

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- iii Maintenance and calibration requirements for special handling equipment shall be included in the Contractor's Maintenance Plan.
 - iv The forward and reverse supply chain shall be analysed and the demarcation of responsibilities between contractor and the authority formalised.
 - v The Contractor shall define in-store Care and Maintenance procedures within the PHS&T Plan.
 - vi The Contractor shall state the storage requirements for the equipment prior to delivery and installation within the PHS&T Plan.
 - vii The Contractor shall ensure that stowage racks/containers are provided for built-in spares that cannot be stowed/housed within the parent equipment, but are required to be contained near to the equipment in order to meet the required Mean Time to repair (MTTR).
- d Transportation
- i A transportability summary shall be incorporated in the PHS&T plan.
 - ii Equipment being capable of being replaced outside UK areas shall be capable of being transported by air, in un-pressurised compartments, without sustaining damage or prejudicing safety.

4.7.17. Disposal Planning

- a The Contractor shall develop and deliver a Disposal plan in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0004-01. **[DRL S40]**
- b The Contractor shall supply a list of hazardous materials used within the equipment within the Disposal Plan
- c The Contractor shall supply a list of recyclable materials used within the equipment and its packaging within the Disposal Plan.
- d A disposal strategy, which conforms to current UK safety and environmental legislation, shall be produced and incorporated within the Disposal Plan.
- e The Contractor shall update disposal planning in light of changes to legislation, operational environment and/or modification to the system.
- f The Contractor shall reduce the use of hazardous substances within the system and support equipment to the minimum possible.

4.7.18. Software Support

- a The Contractor shall develop and deliver a Software Support Plan in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0005-01. **[DRL S41]**
- b The Contractor's Software Support capability shall support all software used in any part of the system.
- c Where the term "software support" is used it shall be taken to mean all the software, hardware, firmware, personnel and other resources required to correct a deficiency or design error, incorporate an enhancement, or respond to a hardware change/update.
- d The Contractor's Software Support capability shall be subject to, and integrated with, the project Configuration Management programme.

- e The System design shall enable authorised software updates to be incorporated on-board ship without compromising the software integrity of the System.

4.7.19. Transfer to In Service Support

- a The Contractor shall develop and deliver an In Service Support Plan. **[DRL S42]**
- b In Service Support arrangements will be defined and agreed with the MOD ILSM.
- c The Contractor shall develop and deliver a Post Design Support (PDS) Plan detailing the Contractor's approach and management of PDS services. **[DRL S43]**

4.7.20. ILS Test and Evaluation

- a The Contractor shall develop and deliver a Supportability Test Evaluation and Verification (STEV) Plan. **[DRL S44]**
- b The plan shall identify the test and evaluation services/facilities required.
- c The test and evaluation plan shall be integrated into the overall Project test and trials programme.
- d Supportability demonstrations shall be undertaken concurrently with maintainability demonstrations as part of a Logistics Demonstration (Log Demo).
- e The Contractor shall initially select candidate items for test during the Log Demo.
- f The Contractor shall submit the Candidate Items List (CIL) to the MILSM, as part of the STEV Plan, who will then select the items to be demonstrated.
- g The MILSM reserves the right to select any other item. The Contractor shall acknowledge this right.
- h Formal review of supportability and related supportability design contract requirements shall be an integral part of each system and sub-system programme.
- i The Contractor shall support an In Service Reliability Demonstration (ISRD), as described in the ILSP, should the Authority decide that such a demonstration is required.

4.7.21. Obsolescence Management

- a The Contractor shall develop and deliver an Obsolescence Management Plan (OMP) in accordance with the Authority ILS Plan. **[DRL S45]**
- b The Contractor shall deliver an updated OMP prior to the end of the interim support period which addresses obsolescence for the equipment supplied under the Contract for the following 5 year period. **[DRL S45]** The OMP delivered at this point shall address the assessment of obsolescence risks, issues and recommended mitigation strategies.
- c The Obsolescence Management Standard to be used shall be identified in the OMP and agreed by the MOD ILSM.
- d Based on a risk assessment, all services and items including spares, S&TE, their components and constituent parts shall be identified and recorded on an obsolescence management database.
- e A system shall be established to update the OMP and manage obsolescence through life.

- f The Contractor shall inform the Authority of any arising current or future obsolescence concerns regarding materials within the planned period of use of the equipment supplied under the contract.
- g The Contractor shall undertake Obsolescence mitigation investigations.
- h Resolution of Obsolescence
 - i The Contractor shall agree the mitigation strategy for obsolescence issues in conjunction with the Authority..
 - ii The Contractor shall identify a route to counter obsolescence and implement the agreed obsolescence mitigation plan. Mitigation strategies may include, but are not limited to:
 - 1) Recovery (and repair) of additional parts from stored (removed) equipment
 - 2) Supply alternative part with equivalent fit-form-function
 - 3) Modify the equipment to accept an alternative part
 - 4) Lifetime buy of current part
 - 5) Re-establishment of manufacture against original drawings
 - 6) Modification of the equipment performance requirements to remove the requirement
- i Software Obsolescence Management Plan. The Contractor shall develop and deliver a Software Obsolescence Management Plan (SOMP) in accordance with the Authority ILS Plan. **[DRL S46]**
- j The Contractor shall deliver an updated SOMP prior to the end of the interim support period which addresses obsolescence for the Software supplied under the Contract for the following 5 year period. **[DRL S46]** The SOMP delivered at this point shall address the assessment of obsolescence risks, issues and recommended mitigation strategies.
- k The Contractor shall inform the Authority of any arising current or future obsolescence concerns regarding Software within the planned period of use of the equipment supplied under the contract.
- l The Contractor shall undertake Software obsolescence mitigation investigations.
- m Resolution of Software Obsolescence
 - i The Contractor shall agree the mitigation strategy for Software obsolescence issues in conjunction with the Authority..
 - ii The Contractor shall identify a route to counter Software obsolescence and implement the agreed obsolescence mitigation plan.

4.7.22. Whole Life Costs (WLC)

- a The Contractor shall define the Company philosophy with respect to WLC. The contractor shall describe his understanding of the rationale of the design to life cost philosophy and outline his programme for minimising design and support costs.
- b The Contractor shall develop and deliver a Whole Life Costs (WLC) Plan in accordance with the Authority ILS Plan. **[DRL S47]**

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4.7.23. Safety

- a The Contractor's ILS Manager shall provide inputs into the Equipment and Project Safety Cases.
- b The interface between the ILS/SA team and the safety programme shall be identified within the Contractor's ISP.

4.7.24. Intellectual Property Rights (IPR)

- a The Contractor shall identify and report IPR Issues with information for the identification of support tasks and resources.
- b In accordance with DEFCON 16 & 21 the MOD are required to retain IPR control of data required in the pursuit of Operation, Repair, Maintenance, Dismantling and destroying the System at all times.
- c In the event of conflict between DEFCON 16 and the Technical Publications Clause 32 of the Contract then the Technical Publications Clause shall prevail.

5. TRAINING

5.1. General

5.1.1. The implementation of new T23 motor generators will require an update to existing T23 Marine Engineering training, delivered at HMS SULTAN. The PGMU Training Steering Group (TSG) has been established to direct and assure the training solution on behalf of the Training Line of Development. The TSG has approved a PGMU Training Information Paper(TIP), included at Annex D to this SOW, to inform the following:

- a The scope for Interim Training delivery;
- b The audience and associated skill set for training;
- c The training objectives and equipment.

5.2. Management

5.2.1. The Contractor shall adhere to the requirements of MOD's Defence System Approach to Training (DSAT) Quality Standard 001:2008, JSP 822, Part 4 – The Defence Manual of Training Management and The Defence Training Support Manuals.

5.2.2. The Contractor shall attend TSG meetings as required to enable design and delivery of Interim Training.

5.2.3. The Contractor shall produce and deliver a Training and Training Equipment (T&TE) Plan, as an annex to the main Integrated Support Plan in accordance with JSP 886, Volume 7, Part 2, Annex B, PD 0004-01. **[DRL T1]**

5.2.4. The Contractor shall establish a training activities master schedule, to be included within the Training and Training Equipment Plan, and agreed with the Authority.

5.2.5. The Contractor shall confirm and agree objectives and performance levels for each Training course with the Authority, based on levels of engineering capability as specified in the TIP. **[DRL T2]**

5.2.6. Training course length shall be kept to the minimum length needed to achieve the required level of performance, as agreed with the Authority.

5.2.7. The Contractor shall identify and manage Training risks as part of the overall PGMU risk management activity.

5.3. Courseware

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5.3.1. The Contractor shall develop and deliver all Training material, to be coherent with the wider PGMU support solution, in time for the Ready for Training date (RFTD).
[DRL T3]

5.3.2. The Training needs, as understood by the Contractor, to generate the knowledge and skills necessary to operate and maintain the equipment, shall be included in the T&TE Plan and covered by the training material. Where possible, this shall be referenced against existing Type 23 training documents for current equipment and shall maximise the re-use of any appropriate and relevant existing training, including learning content, training media, delivery infrastructures and support facilities.

5.4. Requirements

5.4.1. The Contractor shall deliver Interim Training to enable scheduled PGMU system/equipment acceptance, trials, and First and Second of Class PGMU training requirements to be met, as described in the TIP. The audience for this shall include, but not be limited to, Training Instructors, Ships Company, FOST Staff, Test and Trials Personnel and others as identified in the TIP or by the Authority.

5.4.2. The Contractor shall deliver training to Training Instructors to enable the Authority to deliver PGMU training as part of future steady-state training.

5.4.3. The Contractor shall provide electronic versions of all training manuals, guides and documentation. **[DRL T3]** This shall be made available in MS-Office format, without copyright or IPR restrictions that would preclude its use in training materials produced by, or on behalf of, the Authority.

5.4.4. The Contractor shall provide details of the impact on all training support material and facilities resulting from Contractor update/development of PGMU equipment types.

5.4.5. The Contractor shall deliver training to Authority course designers if required.

5.5. Equipment and Training Aids

5.5.1. The Contractor shall define and update/supply Motor Generator training equipment to support the delivery of the full scope of T23 marine engineering training, as detailed in the PGMU TIP. This shall include but not be limited to, supply of equipment detailed in para 3.1.1.b.

5.5.2. The Contractor shall engage with the TSG to provide input to the design of PGMU training facilities at HMS SULTAN to ensure optimum fitness for purpose.

- 5.5.3. The Contractor shall liaise with all relevant agencies to plan and conduct required STW.

5.6. Training Conduct

- 5.6.1. The Contractor shall deliver training to Authority course designers if required.
- 5.6.2. The Contractor shall provide alternative training facilities if the contracted training equipment is not available for use at HMS SULTAN for the Ready For Training Date.

ANNEXES

ANNEX A to SCHEDULE A - Lot 2 SOW

Technical Equipment Specification (TES) for the Motor Generator

ANNEX B to SCHEDULE A - Lot 2 SOW

General Technical Requirements

ANNEX C to SCHEDULE A - Lot 2 SOW

ILS Definitions of Tasks

ANNEX D to SCHEDULE A - Lot 2 SOW

Training Information Paper

ANNEX E to SCHEDULE A - Lot 2 SOW

Integrated Test, Evaluation and Acceptance Plan (ITEAP) - Draft

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