Ministry of Defence

de&S
SHIPS

Type 23 - Power Generation and MCAS Update (PGMU)
Lot 2 – Motor Generators

SSA/004/02

ANNEX D TO SCHEDULE A

TRAINING INFORMATION PAPER

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Summary of Changes

Section, Paragraph etc	Synopsis of Change	Change Request Form Reference

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Background

Technical Training Statement for PGMU ITT

1. The Royal Navy (RN) requires its engineers and technicians to provide the organic capability to safely operate, maintain, diagnose and repair platform equipments and to optimise platform system performance within defined envelopes (and beyond in extremis), using a comprehensive knowledge of reversionary modes and established procedures, in order to sustain the highest levels of Operational Capability (OC). This capability must be available at sea or bases ashore, in worldwide theatres of operation, and in circumstances ranging from peace through crisis to war. RN engineers and technicians should be the focal point of platform equipment support solutions and support partners should recognise the central role of RN engineers and technicians as their organic 'trusted agents[1]', in the delivery of support.[2]

Approach

2. The operator and maintainer target audience onboard T23 is assumed to remain unchanged from the current manning structure. A PGMU Training Resource Estimate was undertaken in Spring 2011, which confirmed the current scope across the Marine Engineering (ME) and MCAS systems and established that training will continue to be required at the Individual, Sub Team, Team and Collective Levels to ensure effective delivery of the PGMU capability into service and through-life. The PGMU Training Steering Group has been established to inform the requirement for Interim Training and provide ongoing direction to achieving an approved Steady State training solution, based on the statement at Paragraph 1. The purpose of this Training Information Paper is to identify the PGMU training audience and equipment needs.

Personnel

3. In order to meet the technical training requirement, RN personnel must be appropriately trained to the level commensurate with their position (rank / rate) within the Department. Engineering capability is divided into 4 pillars: Operate, Maintain, Diagnose and Repair (OMDR)[3]. The matrix below gives the key attributes of 'individual' capability and allows the required level for each rate / rank to be defined for each of the engineering capability pillars (OMDR). A set of core skills and attributes are to be considered when determining the required / achieved level of compliance for each rate / rank. These core skills and attributes are mapped against OMDR pillars in Table 1 below:

Key Attributes	Operate	Maintain	Diagnose	Repair
Optimise system performance	✓	✓	✓	

[1] A trusted agent is defined as an embarked uniformed technician who has successfully completed the relevant training package that has been mutually agreed between the OEM and MoD. These technicians are authorised and empowered to conduct, within agreed boundaries and to the mutual benefit of the MoD and OEM, maintenance, testing, evaluation, diagnostics, defect and warranty repair on behalf of the OEM. This will necessitate access to agreed levels of documentation and equipment to enable these technicians to maximise the availability and sustainability of ships deployed worldwide, with reach back to the OEM for advice and guidance as required. This is to reduce the need for OEM attendance onboard to the lowest level practicable.
[2] Training engineering headmark statement, owned by CSO(E) SS.
[3] RMSO2MEGS, Delivery of the headmark statement through individual Training – Engineering Capability Gap Analysis, dated 21 Jan 13.

Practiced in mechanical and electrical repair techniques				✓
Knowledge of Engineering principles (materials, stress/strain)		✓	✓	✓
Safely operate equipment, systems and plant in all modes of operation	✓		✓	✓
Understand design performance parameters and operating envelopes	✓		✓	
Understand system dependencies	✓		✓	
Administration and management of section, group or department	✓	✓		
Diagnose down to the lowest replaceable unit			✓	
Understanding of the principles of operation			✓	✓
Fault finding methodology and techniques			✓	
System and equipment reconfiguration	✓	✓	✓	
Set to Work and acceptance trials	✓			✓
Interrogation of equipment and system parameters/attributes		✓	✓	✓
Use of internal or external test equipment		✓	✓	✓
Understanding of the Operational context	✓	✓	✓	✓

Table 1 - OMDR Factors Matrix

4. In order to quantify actual and desired capability a scaled measure of compliance with the statement at Paragraph 1 has been devised for each Engineering Capability pillar (OMDR) and defined within the "Compliance Matrix[4]" below; a higher level of capability results in greater focus on the maintainer and decreasing reliance on UK Industry Base and support.

LEVEL	1	2	3	4	5
OPERATE	Safely operate and monitor equipment in normal modes of operation as directed.	Safely operate in all prescribed modes of operation including reversionary. Conduct reconfiguration of systems / equipment to maintain OC as directed.	Certified to safely operate in all prescribed modes of operation, including reversionary modes. Capability to conducting and directing reconfiguration of systems / equipment to maintain OC.	Supervise safe operation in all modes, including reversionary modes. Capable of optimising systems to the environment and reconfiguring to maintain OC. Advise on operations outside of normal operating parameters using deep understanding of system capabilities and performance.	Authorise operation in all modes, including reversionary. Systems optimised to environment and capability to reconfigure to maintain OC. Understand and manage risk of operations beyond defined envelopes in extremis, based on knowledge and application of scientific / physical constraints, Safety Management (JSP430), Duty Holder responsibilities, applying mitigation to drive risk to ALARP; all cognisant of the operational imperative and context.
MAINTAIN	Capable of Cat A1 and A3 maintenance and Cat A2 under supervision[5].	Capable of all Cat A maintenance.	Planning, resourcing, management and recording of Cat B maintenance tasks. Capable of conducting work in support of Cat C maintenance tasks. Awareness of whole ship implications and operational context.	Oversight and management of maintenance across multiple sections, compilation of Group Level work packages, cognisant of whole ship implications and operational context.	Capable of planning, prioritising and resourcing the execution and deferral of maintenance, mindful of level of material risk within the operational context and the Duty Holder construct. Understanding of cumulative risk associated with managing a system of systems.

[4] RMSO2MEGS, Delivery of the headmark statement through individual Training – Engineering Capability Gap Analysis, dated 21 Jan 13.

Table 2 – Compliance Matrix

[5] BR 1313 Chapter 5 Art 2.1, UMMS Task Categories, Consequences and Jobs.

LEVEL	1	2	3	4	5
DIAGNOSE	Recognise system or equipment malfunction / operation outside of normal operating conditions.	Diagnose common faults through application of engineering principles, using experience, internal and external test equipment and able to articulate findings to support organisations.	Capability to conduct diagnosis to same degree as OEM field engineer[6], recognised by the OEM as their 'trusted agent'. Capability requires OEM expert diagnostic support for 20% of fault diagnosis.	Conduct of system level approach to fault diagnosis, using a combination of onboard knowledge and 'reach back'; advising on the wider implications of diagnosis techniques / methodologies.	Management of system level approach to fault diagnoses, using a combination of onboard knowledge and 'reach back'; mindful of the wider implications of diagnosis techniques / methodologies.
REPAIR	Conduct minor repairs (State 1, 2 and 3) as directed and under supervision using appropriate skill of hand. Assist technician in conducting more complex repairs.	Repair common faults through application of engineering principles, using experience and skill of hand. Contribute to major repairs in support of the OEM's 'trusted agent'.	Certified to conduct self sustaining repairs, recognised by the OEM as their 'trusted agent'. Capability to conduct partial reconditioning and modification and repair short of complete strip, reconditioning and re-assembly. Possesses specialist skill of hand capability / advanced Battle Damage Repair (BDR) techniques	Management, planning and prioritisation of repair activities. Advising on both recognised and innovative repair techniques, using knowledge, experience and application of scientific / physical constraints and awareness of the operational imperative and context.	Planning, resourcing, prioritisation and authorisation of both recognised and innovative repair techniques, based on knowledge, experience and application of scientific / physical constraints, Safety Management (JSP430), Duty Holder responsibilities, applying mitigation to drive risk to ALARP; all cognisant of the operational imperative and context.

Table 2 – Compliance Matrix

[6] Field Engineer – OEM's front line support

5. The required level of capability, as defined in the Compliance Matrix above, for each rank / rate of the Marine Engineering (ME) Department is given below:

6. The Department is organised as in Figure 1 below (equipment responsibilities for each group are detailed in the Technical Equipment Specification (TES)). The training solution is to support the requirements that:

a. The equipment shall not cause any increase to either overall manning levels or numbers of operator / maintainers under any operational state.

b. The equipment shall not have any impact on the rank range of personnel involved in the training, operation, maintenance and support of the capability it replaces.

Fig 1 – T23 Frigate ME Department

7. For each T23, the number of personnel at each rate/ rank that require training as operators (Operate pillar) and maintainers (Maintain, Diagnose and Repair pillars), is given in Tables 4 and 5 below. This training will be required to be delivered to Ship's Staff for both First and Second of Class PGMU-fit vessels as part of the Interim Training Solution.

Table 4 – PGMU Operators (Operate pillar)

Table 5 – PGMU Maintainers (Maintain, Diagnose and Repair pillars)

8. The personnel listed in Table 6 will require training to provide awareness of general system capabilities and limits and to understand T23 electrical generation/distribution and propulsion capabilities and limits. This training will be required to be delivered to T23 Ship's Staff of both First and Second of Class PGMU-fit as part of the Interim Training Solution.

Table 6 – Non-engineering personnel

9. In addition to the specific ME training courses, the following current training courses receive a half day ME Acquaint/Overview of the Normal/Reversionary modes of operation of the ME Plant and its limitations, so will require a PGMU overview as part of the 'Platform Specific section':

10. HMS Sultan Training Instructors require a comprehensive understanding of the training equipment to enable future steady state training delivery. There is a requirement for personnel (non- rate/rank specific) to be trained under the Interim Training Solution, as detailed in Table 7 below.

Equipment	Number of current Instructors for each course	Level of Capability[7]
Diesel Engine (Prime Mover)	2 per course delivery	4
AVR	1 per course delivery	4
LV breakers	1 per course delivery	4
MCAS	2 per course delivery	4
Ship Control Console (SCC) Simulator	2 per course delivery	4

Table 7 – HMS Sultan Staff

11 Flag Officer Sea Training (FOST) staff/sea-riders require training for 6 personnel to enable individual and team training assessment, these personnel are to be trained to meet a Level of Capability of 5 for "Operate" and 2 personnel will require training to Level 4 for "Diagnose" and "Repair," in accordance with the Compliance Matrix at Table 2.

Training Equipment

12. The appropriate training to meet the requirement at paragraph 1 can only be delivered if it is supported by the correct training equipment and materials.

[7] In accordance with Compliance Matrix (Table 2).

13. The current and anticipated minimum future training equipment fit in HMS Sultan is in Table 8 below. The level/scope of future equipment necessary to deliver the training requirements will be agreed between the MoD and relevant contractor as part of the overall training solution.

Table 8 - T23 Training Assets (HMS Sultan)

14. There is a requirement for update/replacement of the current training assets, as specified in the PGMU Technical Equipment Specification, in addition to the provision of any new equipment as required (e.g. diagnostic equipment, laptops) to enable the PGMU training solution. Installation of this equipment must be planned and managed in consultation with the appropriate installation authority in HMS Sultan.

15. Any training solution must make it possible to accommodate both legacy and new training during the transition period between the two systems.

16. The Annexes to this paper contain examples of Formal Training Statements currently in use for T23 training delivery at HMS Sultan. It must be noted that these are legacy documents and are provided as an example only; they should not be the subject of any queries as part of the ITT clarification process. All technical training is being reviewed against the headmark statement at Paragraph 1 to ensure future provision will meet the latest requirements of the Royal Navy rather than be a duplicate of the training conducted to date, which may have shortfalls.

Annex A (Example for reference only): Petty Officer Engineering Technician (ME) Generation Section Head Courses ME287, ME287A, ME287B & ME287C, FORMAL TRAINING STATEMENT.

THE DEFENCE SCHOOL OF MARINE ENGINEERING

Petty Officer Engineering Technician (ME) Generation Section Head Courses

FORMAL TRAINING STATEMENT

ME287 Series - Formal Training Statement (FTS)

Amendment Sheet

Version N°	Change N°	Date	Page	Remarks	HRTSG Informed
00	00	Sep 08	All	New Course	√
	01	Aug 10	TPS 4	Deltic Diesel Engine added	√
	02	Oct 11	TPS 3	Wartsilla Diesel engine added	√
01	00	Dec 12	All	Routine course review. T42 entries removed	

Annex B (Example for reference only): Petty Officer Engineering Technician (ME) Controls & Distribution Section Head Courses, FORMAL TRAINING STATEMENT

THE DEFENCE SCHOOL OF MARINE ENGINEERING

Petty Officer
Engineering Technician (ME)

FORMAL TRAINING

STATEMENT

ME286 Series - Formal Training Statement (FTS)

Amendment Sheet

Version N°	Change N°	Date	Page	Remarks	HRTSG Informed
00	00	Sep 08	All	New Course	√
	01	Feb 10		Tyco T2000 fire detection added	√
01	00	Dec 12	All	Routine course review. T42 entries removed	

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