

THE MARINE ENGINEERING ARTIFICER

THE JOB

Approximately 40 percent of all apprentices become Marine Engineering Artificers (MEA). A simple way of understanding the job of the MEA is first to realise that a warship must float, move, and fight in order to fulfil its role; the MEA looks after the 'floating' and the 'moving', whilst the Weapons Engineering Artificer and the Air Engineering Artificer look after their respective weapons systems.

THE SYSTEMS

Floating and moving is far more complicated than it seems. The myriad of systems, for which the Marine Engineering Department carries responsibility, includes the main propulsion, gearboxes and controllable pitch propellers, power generation and distribution, refrigeration and air conditioning, steering gear and stabilizers, fuel and hydraulic systems, and all hotel services. Hotel services include hot and cold fresh water, ventilation, galleys, laundry and firemain. Finally, we must not forget the hull, which must be maintained both watertight and gastight, and in a nuclear submarine with its masts, periscopes and openings, the hull must be capable of diving below 1000ft or more, where the pressure is about 500 lb/in².

THE EQUIPMENT

The prime movers in a modern ship are gas turbines (Olympus and Tyne) and diesels (Paxman) for power generation. The Leander class frigate represents the last class of ship with boilers and steam turbines for its main propulsion. Almost the entire range of marine engineering equipment is now electro-mechanical, the electrical facility producing ease of remote control and monitoring, and the subsequent reduction in the need for large numbers of watchkeepers.

SUB SPECIALISATION:- MECHANICAL (ML) AND ELECTRICAL (EL)

The production and distribution of electrical power, and the extensive use made of electrical components in ME systems, make it necessary for all MEAs to have electrical training. The mechanical sub specialisation spend 1 term at HMS COLLINGWOOD to acquire this knowledge and the electrical sub specialisation (about 1/3 of all MEAs) spend 2½ terms at COLLINGWOOD.

THE OPERATOR MAINTAINER

In the surface ship the MEA both operates and maintains the equipment in his charge. A large part of the MEAs training is therefore devoted to gaining the necessary qualifications for plant operation. Details of these certificates are given in the job descriptions in the annex to this handout.

SECTION RESPONSIBILITY

The whole of the ME department is divided into sections, ie., engine room section, air conditioning and refrigeration section etc. Each section is controlled by one of the 1st Class MEAs in the department, and he will be regarded as the expert for the machinery as well as being responsible for the employment, training, and advancement of all the personnel who work in his section.

WATCHKEEPING

The fully qualified 1st Class MEA is responsible for controlling his watchkeepers in preparing the main engines and other machinery ready for sea, and has responsibility for all the running and standby machinery in his department when the ship is at sea.

SUMMARY

It can be seen that the 1st Class MEA's knowledge and experience is the culmination of a long training in engineering, man management and leadership. He has extensive responsibility for both men and equipment, and should derive considerable job satisfaction from exercising it.

ANNEX A: Job Description - MEA (ML)

ANNEX B: Job Description - MEA (EL)

ANNEX A: Job Description – MEA (ML)

SCOPE OF TRAINING AND EMPLOYMENT

Technician Apprentice Training

Candidates who are selected for their aptitude and proven academic ability, serve a formal four year Technician apprenticeship, followed by one year "journeyman's time" as a 3rd class Artificer.

a. Academic Training

Instruction in Mathematics, English, Physics, Mechanics, Applied Heat, Mechanical and Electrical Engineering Science, Electro-technology, Electronics, Electrical Measurements, Mechanical and Electrical Engineering Drawing and Workshop Technology.

b. Skill Training

Practical workshop instruction in the use of tools applied to bench fitting, stripping, refurbishing and refitting mechanical and electrical components, turning, measuring and marking off, fitting and care of abrasive-wheels, drilling and grinding drills, milling, grinding, boring, shaping, sheet metal work, gas and electric welding, boatwork (building and repairs), pipeworking, GRP work and electrical fitting.

c. Technical Training

Theoretical and practical technical instruction on hull construction and maintenance, the construction, operation and maintenance of upperdeck and underwater fittings, propulsion and auxiliary machinery, 440V 60Hz electrical power generation and distribution systems.

d. General Training

Practical and theoretical instruction in general aspects including leadership, physical education, and initiative training.

e. Sea Training

Four months consolidating academic and technical training by working, under supervision, on mechanical and electrical marine systems.

f. Specialist Training

Further training in craft skills - fitting, turning and allied trades; further technical training on hull, underwater fittings, diesel engines and pneumatic controls; application training on the maintenance of hull structure and fittings, propulsion and auxiliary machinery, electrical generators and power distribution.

Artificer 3rd Class Training

Successful completion of the apprenticeship qualifies for award of a Diploma of the Technician Education Council and after having gained an Auxiliary Machinery Certificate candidates are advanced to Marine Engineering Artificer 3rd Class.

At sea, he is employed partly as an operator and partly as a maintainer. He is under training for a Boiler Room Watchkeeping Certificate and is employed under supervision, as a maintainer mainly on mechanical aspects of marine steam, diesel or gas turbine propulsion and auxiliary machinery, electrical generation and distribution, hull and fittings, air conditioning, refrigeration, distilling plant and hydraulic machinery.

Artificer 2nd Class

Having gained experience, a Boiler Room Watchkeeping Certificate and a Switchboard Operating Certificate, and passed a qualifying examination, he is advanced to Marine Engineering Artificer 2nd Class. He continues to be employed as an operator and maintainer, mainly on mechanical equipments and systems.

Artificer 1st Class

On passing a qualifying examination for the award of a Unit Watchkeeping Certificate, and successfully completing the course at the Royal Naval Leadership School, candidates are advanced to Marine Engineering Artificer 1st Class.

Employment at sea includes the control, operation and maintenance of mechanical and electrical aspects of marine propulsion and auxiliary machinery and their associated control systems, electrical generation and distribution, and maintenance of ships and hull fittings. He is also responsible for the instruction and supervision of watchkeeping and maintenance personnel and is the Marine Engineering Department specialist in mechanical fault diagnosis and rectification.

Chief Marine Engineering Artificer

Promoted by recommendation, passing a professional qualifying examination (Charge Certificate) and successful completion of the Chief MEA's Career Course.

He is a highly experienced technician who takes sole charge of both mechanical and electrical aspects of the propulsion Machinery up to 50,000 SHP, and auxiliary machinery including electrical generation and power distribution, and maintenance of the ship's hull and fittings. He is responsible for the mechanical and electrical planned maintenance, repair of defects and the associated administration. Qualified to deputise for the Marine Engineer Officer in his absence.

Fleet Chief Marine Engineering Artificer

Promoted by selection from Chief Marine Engineering Artificers on merit, ability and education qualifications.

The most senior technician in his category, directly responsible to the Marine Engineer Officer for the management of large maintenance sections within a ship. He has had management and administrative training and can undertake higher administrative and management responsibilities in shore establishments.

CERTIFICATES

a. Auxiliary Machinery

Competent to start, stop and run various types of auxiliary machinery and their systems eg evaporators and distilling plant, electric generating machinery (turbo and ICE), air conditioning, refrigeration plant, air compressors (HP and LP), steering gear, hull and/or fire pumps and is qualified as a switchboard watchkeeper.

b. Boiler-room Watchkeeping

Competent to take charge of a boiler-room containing high pressure water tube boilers and all associated machinery in the boiler-room under all steaming conditions.

c. Switchboard Operating

Competent to operate the main switchboard, synchronise, parallel and transfer load between electrical generators under all operating conditions.

d. Unit Watchkeeping

Competent to take charge of a watch, and the operation of a complete propulsion and auxiliary machinery unit up to 50,000 SHP including starting, stopping and manoeuvring.

e. Charge

Competent to take sole charge of the propulsion machinery up to 50,000 SHP, and auxiliary machinery, the planned maintenance and repair of defects including the associated administration.

TRADE UNION/PROFESSIONAL ASSOCIATION RECOGNITION

a. Marine Engineering Artificers are eligible for fully skilled membership of the Engineering section of the Amalgamated Union of Engineering Workers, but applicants must be at least 25 years of age when applying.

b. Marine Engineering Artificers 2nd Class who have served one year in that rate or above are eligible for nomination by a professional Institute for registration as a Technician (CEI).

c. Marine Engineering Artificers 1st Class who have served four years in that rate or above are eligible in respect of training and experience for nomination by a professional Institute for registration as a Technician Engineer (CEI) but require proof of an appropriate academic qualification.

SCOPE OF TRAINING AND EMPLOYMENT

Technical Apprentice Training

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a. Academic Training

Instruction in Mathematics, English, Physics, Mechanics, Applied Heat, Mechanical and Electrical Engineering Science, Electro-Technology, Electronics, Electrical Measurement, Mechanical and Electrical Engineering Drawing and Workshop Technology.

b. Skill Training

Practical workshop instruction in the use of tools as applied to bench fitting, stripping, refurbishing and refitting mechanical and electrical components, turning, measuring and marking off, fitting and care of abrasive wheels, drilling and grinding drills, milling, grinding, boring, shaping, sheet metalwork, gas and electric welding, pipeworking, GRP work and electrical fitting.

c. Technical Training

Theoretical and practical technical instruction on the construction, operation and maintenance of upperdeck fittings, propulsion and auxiliary machinery, 440V 60Hz electrical power generation, conversion and distribution systems.

d. General Training

Practical and theoretical instruction in general aspects including leadership, physical education and initiative training.

e. Sea Training

Four months consolidating academic and technical training by working, under supervision, on electrical and mechanical marine systems.

f. Specialist Training

Further technical training in power generation, conversion and distribution, electronic control systems, electrical machines and equipments; application training in maintenance and defect diagnosis on marine electrical equipments and systems.

Artificer 3rd Class Training

Successful completion of the apprenticeship qualifies for award of a Diploma of the Technician Education Council and after having gained an Auxiliary Machinery Certificate candidates are advanced to Marine Engineering Artificer 3rd Class.

At sea, he is employed partly as an operator and partly as a maintainer mainly on electrical aspects of marine steam, diesel, or gas turbine propulsion and auxiliary machinery, electrical generation and distribution, air conditioning and refrigeration, distilling plant and hydraulic machinery.

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