SEMME3029

Maintaining marine sensor equipment and systems

Overview

This standard identifies the competences you need to carry out planned or corrective maintenance activities on marine sensor equipment and systems, in accordance with approved procedures. You will be required to carry out maintenance activities on a range of sensor equipment, such as surveillance radar, navigational, weather tracking radar, heat sensing systems, obstacle warning systems, infra red systems, weapon associated and RF sensing/jamming devices and passive/active sonars. This will involve checking equipment and cables for signs of damage, removing and replacing faulty units and checking and adjusting equipment to maintain optimal operational performance. You will be expected to apply a range of testing procedures in order to ensure that the equipment is adjusted correctly.

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken and to report any problems with these activities or with the tools and equipment that are used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. You will be expected to work with a minimum of supervision, taking full responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying maintenance procedures to marine sensor equipment and systems. You will understand the maintenance process, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required specification. In addition, you will be expected to report where the outcome identifies the need for further investigation or maintenance work.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment and taking the necessary safeguards to protect the equipment and associated systems. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace

Performance criteria

You must be able to:

1.
work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2.
follow the relevant maintenance schedules to carry out the required work
3. carry out the maintenance activities within the limits of your personal authority
4. carry out the maintenance activities in the specified sequence and in an agreed time scale
5. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule
6. complete relevant documentation in line with organisational procedures, and pass them on to the appropriate person
7. dispose of waste materials in accordance with safe working practices and approved procedures

Knowledge and understanding

You need to know and understand:

1. the health and safety requirements of the area in which the maintenance activity is to take place, and the responsibility they place on you
2. the isolation and lock-off procedure or permit-to-work procedure that applies to the maintenance activities (including electrical isolation, locking off switchgear, removal of fuses, placing maintenance warning notices, proving that isolation has been achieved and secured)
3. the specific health and safety precautions to be applied during the maintenance procedure and their effects on others
4. how to recognise and deal with emergencies and the procedures to be followed (such as methods of safely evacuating and closing down of compartments in the case of fire or other major incident, first aid, fire fighting and resuscitation of personnel)
5. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance process
6. hazards associated with carrying out maintenance activities on marine sensor equipment (such as exposure to live conductors, misuse of tools) and how they can be minimised
7. the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps, anti-static mats, special packaging and handling areas)
8. what constitutes a hazardous voltage and how to recognise victims of electric shock
9. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
10. how to obtain and interpret drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical

electrical symbols, regulations and other documents needed in the maintenance process

11. how to carry out currency/issue checks of the specifications you are working with

12. the maintenance schedules and methods to be followed to comply with company procedures for the maintenance of marine sensor equipment

13. the basic principle of operation of the equipment/circuits being maintained and the purpose of individual components within the circuit

14. the different types of marine sensor equipment, aerials, transmitters, receiver, sonar transducer units and their maintenance requirements

15. the application and use of a range of electrical components (such as module blocks, terminal blocks, multi-pin plugs/sockets, tray-mounted sockets, earth bonding points) and the likely functions that will require checking

16.
the different types of wiring enclosures that are used (to include conduit, trunking, traywork systems and bulkhead penetrations) and what to check during the maintenance activities

17.
methods of checking that components are fit for purpose and the need to replace 'lifed' items (such as motor brushes, seals and gaskets overload protection devices, filters)

18. how to recognise defects in marine sensor equipment (such as under or over performance)

19. the adjustments/corrections/tuning required to maintain the equipment/system at operational standard through full range parameters

20. how to check that the replacement components meet the required specification/operating conditions (such as values, tolerance, current carrying capacity, voltage rating, power rating, ambient temperatures)

21. the various maintenance schedules that are generally used (such as condition based maintenance, scheduled maintenance and total productive maintenance (TPM))

22. the procedure for obtaining consumables to be used during the maintenance activity

23. the appropriate testing procedures to be adopted during the maintenance activity

24. the importance of making 'off-load' checks before proving the equipment with the electrical supply on

25. the importance of ensuring that the equipment is maintained to the prescribed category of cleanliness
26. how to compile maintenance records/logs/reports which satisfy company policy and procedures
27. the problems that can occur whilst carrying out the maintenance activities and how they can be avoided
28. the organisational procedure to be adopted for the safe disposal of waste of all types of materials
29. the extent of your own authority and whom you should report to if you have problems that you cannot resolve

Scope/range related to performance criteria

1.

Carry out **all** of the following during the maintenance of the marine sensor equipment:

1.1 undertake the maintenance activities to cause minimal disruption to normal working
1.2 use the correct issue of structure/vessel/craft system drawings and maintenance documentation
1.3 adhere to risk assessment, COSHH and other relevant safety standards
1.4 obtain clearance to work on the system, and observe the power isolation and safety procedures
1.5 provide safe access and working arrangements for the maintenance area
1.6 carry out the maintenance activities, using appropriate techniques and procedures
1.7 re-connect and return the system to service on completion of activities
1.8 functionally test and adjust equipment to the prescribed level as specified
1.9 leave the work area in the prescribed category of cleanliness

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1.

Carry out maintenance activities on **four** of the following types of marine sensor equipment:

1.1 surveillance radar
1.2 passive sonar
1.3 infra-red
1.4 weather tracking radar
1.5 bathy thermograph
1.6 navigational
1.7 obstacle warning systems
1.8 echo sounder
1.9 heat seeking system
1.10 weapon associated radars
1.11 electronic warfare (EW) passive/active systems
1.12 active sonar

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1.

Carry out maintenance activities on **four** of the following marine sensor system components:

1.1 scanners
1.2 aerials

1.3 transmitters
1.4 sonar transducers
1.5 receivers
1.6 processors
1.7 microwave generators
1.8 power supply units (PSU)
1.9 intermediate frequency unit (IFU)
1.10 waveguides

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Carry out **all** of the following maintenance activities, as applicable to the sensor equipment being maintained:

1.1 visual examination of the condition and security of wiring enclosures (such as conduit, trunking, traywork)
1.2 removing excessive dirt and dust from panels
1.3 making visual checks of equipment and cables
1.4 checking the integrity of all connections
1.5 monitoring the condition of switches/contactors
1.6 inspecting and cleaning sensors
1.7 making sensory checks (such as sight, sound, smell)
1.8 measuring and adjusting moving part clearance
1.9 ensuring that spring tensions function as specified
1.10 replacing damaged or defective connectors
1.11 replacing 'lifed' items (such as filters, fuses)
1.12 re-soldering dry joints and connections
1.13 servicing back-up battery systems
1.14 tuning and adjusting components
1.15 taking timing checks of release mechanisms
1.16 checking and adjusting shock mountings
1.17 making 'off-load' checks before powering up
1.18 testing and reviewing the system function
1.19 removing and replacing damaged or faulty units/components
1.20 replacing damaged or missing locking and retaining devices (cable ties, clips, proprietary fasteners)
1.21 recording the results of the maintenance, and reporting any defects found

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Carry out **five** of the following checks on the maintained system:

1.1 earth bonding tests
1.2 serviceability checks
1.3 insulation checks
1.4 continuity checks
1.5
power output

1.6
distant object test
1.7 signal injection tests
1.8 receiver sensitivity
1.9 applying a dummy load
1.10 voltage standing wave ratio (VSWR) checks

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1.

Ensure that the maintained sensor equipment meets **all** of the following:

1.1 all components and sub-assemblies are fit for purpose
1.2 all connections are safe and sound
1.3 equipment static checks, after maintenance, meet specification
1.4 all potential defects are identified, recorded and reported for future action

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1.

Maintain marine sensor equipment, in compliance with **one** of the following standards:

1.1 BS or ISO standards and procedures
1.2 customer (contractual) standards and requirements
1.3 company standards and procedures
1.4 specific equipment requirements/manufacturer's data
1.5 recognised compliance agency/body's standards
1.6 other accepted international standards

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1.

Complete the relevant documentation in line with organisational procedures, including **one** from the following and pass it to the appropriate people:

1.1 job cards
1.2 system log
1.3 maintenance logs or reports
1.4 work authorisation documents
1.5 vessel wiring documentation
1.6 other specific reporting method

Behaviours

Behaviours:

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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Developed by	Enginuity
Version Number	3
Date Approved	28 Feb 2019
Indicative Review Date	28 Feb 2021
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	SEMME3029
Relevant Occupations	Marine Engineering Trades
Suite	Marine Engineering Suite 3
Keywords	engineering; marine; maintain; sensor; equipment; system; surveillance; weather; obstacle; sonar; echo; infrared