SEMAUT3098

Setting up and testing motorsport vehicle communication systems

Overview

This standard identifies the competences you need to setup, test and adjust motorsport vehicle communication equipment, in accordance with approved procedures. The equipment and systems to be setup and tested may be on a bench or test rig, or fitted to the motorsport vehicle. You will be required to use appropriate drawings, specifications, and test documentation to set up, test and adjust the various items of equipment. You will be expected to use the specified/appropriate techniques to carry out the setting-up and testing procedures in the correct sequence. The equipment to be set up and tested will include very high frequency (VHF), ultra high frequency (UHF) and high frequency (HF) radio, intercom headsets and voice recorders, digital data links and global position indicators.

Your responsibilities will require you to comply with organisational policy and procedures for the setting-up, testing and adjusting activities undertaken, and to report any problems with the activities, components or equipment that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal 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 setting-up and testing techniques and procedures to motorsport vehicle communication equipment and systems. You will understand the communication systems being setup and tested, and their application, and will know about the testing and adjustment techniques, test equipment and methods, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the system functions to the required specification.

You will understand the safety precautions required when carrying out the setting-up and testing operations. 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 all relevant setting up and operating specifications for the products or assets being configured
3. set up the equipment following defined procedures and ensuring that all operating parameters are achieved
4. deal promptly and effectively with problems within your control and report those that cannot be solved
5. check that the configuration is complete and that the equipment operates to specification
6. ensure that work records are completed, stored securely and available to others, as per organisational requirements
7. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. how to obtain and interpret drawings, standards, quality control procedures and test specifications used in the setting up and testing process (including current industry standard and code of practice schematics, symbols and terminology used for communication systems)
6. how to carry out currency/issue checks on the specifications you are working with
7. the correct operating procedures of the system being setup and tested
8. the components to be set up and tested, and their function within the particular communication system
9. how software can potentially affect hardware operations
10. the adjustments/corrections/tuning required to bring the equipment/system to operational standard through full range parameters
11. the quality control procedures to be followed during the setting up and testing operations
12. electrical bonding specifications, and their importance
13. the importance of applying electrostatic discharge (ESD) procedures when working on sensitive equipment or devices
14. the types of test equipment to be used, and their selection for particular types of tests
15. how to calibrate the test equipment to be used; or the organisational procedures for ensuring that the test equipment is maintained and correctly

calibrated
16. how to connect the appropriate test equipment into the circuits/equipment (for the measurement of such things as continuity, voltage checks, signal noise/interference levels, power output, receiver sensitivity and distortion checks)
17. the various testing methods and procedures, as recommended in approved electrical codes of practice, and how to apply them to different operating conditions
18. how to recognise defects (such as under or over performance)
19. the various fault-finding techniques that can be used if the system fails the test
20. how to interpret the test readings obtained, and the significance of the readings gained
21. how to analyse the test results
22. the authorisation procedures for changes to test procedures
23. the importance of ensuring that test equipment is used only for its intended purpose and within its specified range and limits
24. potential problems or errors that could occur, and which may affect the test results, and how they can be avoided
25. the environmental control and company operating procedures relating to the testing activities
26. procedures to be followed on completion of the tests
27. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
28. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Carry out all of the following during the setting-up and testing activities:

1.1 obtain clearance to work on the system, and observe all relevant isolation and safety procedures
1.2 use the correct issue of the agreed setting-up and testing procedures and quality documentation
1.3 adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.4 provide safe access and working arrangements for the work area, and ensure that any appropriate environmental conditions can be met
1.5 check that all tools and test equipment to be used is in a safe, tested and usable condition and within current calibration dates
1.6 carry out the setting-up and testing activities using safe and approved techniques and procedures
1.7 where appropriate, apply electrostatic discharge (ESD) protection procedures
1.8 ensure that the testing equipment is operated within its specification range
1.9 ensure that the vehicle and surrounding structures are maintained free from damage and foreign objects
1.10 return all tools and equipment to the correct location on completion of the activities
1.11 leave the vehicle in a clean and safe condition (where appropriate)

2.

Test motorsport vehicle communication equipment in one of the following types of motorsport vehicle:

2.1 single seater
2.2 kart
2.3 rallying
2.4 historic
2.5 sports car
2.6 other specific approved competition vehicle

3.

Setup and test two of the following motorsport vehicle communication systems:

3.1 VHF radio
3.2 intercom
3.3 global positioning system (GPS)
3.4 HF radio
3.5 visual recording systems (cameras)
3.6 event position indicating system
3.7 UHF radio

3.8 digital data link

4.

Test eight of the following motorsport vehicle communication system components:

4.1 aerials
4.2 transmitter units
4.3 control units
4.4 GPS units
4.5 receiver units
4.6 switches
4.7 intercom units
4.8 cables
4.9 headsets
4.10 indicator units
4.11 plugs and sockets
4.12 power supply
4.13 video units

5.

Carry out tests and adjustments using a range of tools and equipment, to include seven of the following:

5.1 dedicated test equipment
5.2 oscilloscope
5.3 headset
5.4 modulation analyser
5.5 multimeter
5.6 torque spanners
5.7 RF signal generator
5.8 wattmeter
5.9 computer/test software
5.10 voltage simulators
5.11 voltage wave standing ratio (VWSR)
5.12 bonding tester

6.

Use appropriate equipment to carry out eight of the following types of test:

6.1 power output
6.2 bonding tests
6.3 continuity checks
6.4 signal checks
6.5 distortion/interference/electrical noise checks
6.6 operational checks
6.7 receiver sensitivity
6.8 voltage wave standing ratio (VWSR) checks
6.9 resistance
6.10 other specific tests

7.

Deal with two of the following levels of complexity during the setting-up and testing

activities:

7.1 systems with no faults
7.2 systems with faults
7.3 systems with intermittent faults

8.

Use four of the following fault-finding techniques during the setting-up and testing activities:

8.1 six point
8.2 function testing
8.3 injection and sampling
8.4 half-split
8.5 equipment self-diagnostics
8.6 unit substitution
8.7 input-to-output
8.8 emergent problem sequence

9.

Check tested motorsport vehicle communication equipment complies with one of the following:

9.1
race associations
9.2
current industry standards, codes of practice and procedures
9.3 vehicle manufacturers specification
9.4 customer standards and requirements
9.5 team/company standards and procedures
9.6 specific vehicle requirements

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