

1 Module Details	
Module Name	Radar and Sonar Displays Devices
Nominal duration	It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 40 hours.
Module code	NUE176
Discipline code	0703230 Electronic Installation and Maintenance
2 Module purpose	This module will provide the student with the appropriate underpinning knowledge and skills to service radar, sonar and other video/visual displays that utilise RF technologies.
3 Prerequisites	NUE 177 Introduction to Radar or NUE 172 Sonar System Operating Principles
4 Relationship to competency standards	This module provides some of the knowledge and skills underpinning competency in the following standards: National Electrotechnology Industry Standards, Unit NES803 Metals and Engineering Industry Standards, Units 18.51, 18.57A, 18.62A.
5 Content	<ol style="list-style-type: none"> 1. Block diagrams & operating principles of sonar and radar displays <ul style="list-style-type: none"> - CRT - Plasma - LCD - Monochrome - Colour - Touch screen 2. Radar & sonar display terminology 3. Assemblies and components, construction, operation and functions <ul style="list-style-type: none"> • EHT transformers • detectors • video distribution • time base generators • phase locked loops • microprocessors • memory devices • demodulators • focussing/deflection devices • delay lines • bleed resistors • HV generation (review only) 4. Calibration testing and maintenance procedures 5. Fault finding
6 Assessment strategy	

Assessment methods	Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.
Conditions of assessment	Learning and assessment will take place in a classroom/laboratory environment and in a real or simulated radar and sonar installation.
7 Learning Outcome Details	
Learning Outcome 1	Describe the operating principles of typical radar and sonar display devices.
Assessment criteria	<p>1.1 Draw a block diagram of a typical radar or sonar display.</p> <p>1.2 Describe the operating principles of the different types of radar or sonar displays.</p> <p>1.3 Define the following terms in relation to radar and sonar display devices:</p> <ul style="list-style-type: none"> • raster scan display • focussing • deflection • linearity • distortion • pixel • definition • high voltage/high tension • planned position indication (PPI) • refresh rate • touch screens • magnetic field • infra red • plasma display • IFF display • GPS display • NMEA 0183 requirements • Data interchange, sensor and display • RS232 • RS422 • gyro/heading synchronisation • azimuth/elevation references • azimuth change pulse (ACP) • blind spots • bleed resistance • time base generation • phase locked loops • software control • multi function displays • video distribution • LED displays • digital video information processing • moving target indication (MTI) • A and B scope display
Learning Outcome 2	Describe the main circuitry components and controls of the

	different types of radar and sonar display devices.
Assessment criteria	<p>2.1 Describe the power supply and scanning circuitry of different types of radar and sonar display devices.</p> <p>2.2 Describe the controls and their circuit functions of different types of radar and sonar display devices.</p> <p>2.3 Describe a range of software functions in typical radar and sonar display devices and their effect on the display.</p> <p>2.4 Describe interfacing circuitry and protocols used in typical radar and sonar display devices.</p>
Learning Outcome 3	Describe the calibration, test and maintenance procedures for typical radar and sonar display devices.
Assessment criteria	<p>3.1 Describe calibration procedures for typical radar and sonar display devices.</p> <p>3.2 Describe test procedures for typical radar and sonar display devices.</p> <p>3.3 Describe routine maintenance schedules and procedures for typical radar and sonar display devices.</p>
Learning Outcome 4	Describe fault finding procedures on radar and sonar display devices.
Assessment criteria	<p>4.1 Describe typical faults on typical radar and sonar display devices.</p> <p>4.2 List fault finding steps to verify typical faults.</p> <p>4.3 Describe fault finding procedures on typical radar and sonar display devices.</p> <p>4.4 Describe typical built in diagnostics in typical radar and sonar display devices.</p>
8 Delivery of the module	
Delivery strategy	Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective way to achieve this is by the integration of theory and practice where students learn by experimentation and through research and laboratory reports. It is recommended that learning and assessment be facilitated in a holistic manner, which may require a learning outcome sequence other than that indicated in the module.
Resource requirements	<p>Students will need access to modern test equipment suitable for radar and sonar display devices applications, such as:</p> <ul style="list-style-type: none"> • oscilloscopes, analogue and digital • high voltage probes • video display/test pattern generators • insulation testers • frequency counters • logic probes • DC and AC multimeters • E and H field strength meters • spectrum analysers <p>The laboratory used for the teaching of practical aspects of this module will require a small working radar and sonar, or similar and appropriate video generation sources. Whilst measurements may be carried out using low power test sources, the use of a complete system as an item of test</p>

equipment will provide the student with a much greater “real world” experience.

Useful references include

- Skolnik. Introduction to Radar
- Skolnik. Radar Handbook
- Kennedy G. Electronic Communication Systems. McGraw Hill Publishers
- DeFrance J. Communications Electronics Circuits. Rinehart Press
- Bell D. Electronic Instruments and Measurements. Reston Publishing
- Pearsman P. Solid State Industrial Electronics. Reston Publishing
- Dungan F. Electronic Communications Systems Delmar Publishing
- Shradar R. Electronic Communications. McMillan Publishing.
- ITT. Reference Data for Radio Engineers. Sams Publishing
- Acker A. How to speak Radar, Basic Fundamentals and Applications of Radar. Varian Associates
- NAVSEA 0967-LP-000-0120, Electronic Installations and Maintenance - Electric Circuits
- NAVSEA 0967-LP-000-0020, Electronic Installations and Maintenance - Radar

Occupational health and safety requirements

A safe and healthy environment will be provided for students and teachers as well as safety procedures followed with regard to teaching/learning activities.