

1 Module Details	
Module Name	Sonar Applications
Nominal duration	It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 40 hours
Module code	NUE174
Discipline code	0703205
2 Module purpose	This module will provide the student with the necessary theoretical and practical skill to assess, measure and maintain sonar applications.
3 Prerequisites	NUE 172 Sonar Systems Operating Principles
4 Relationship to competency standards	This module provides some of the knowledge and skills underpinning competencies in the following standards: National Electrotechnology Industry Standards, Unit NES206c Metals & Engineering Industry Standards, Units MEM 18.57A
5 Content	<ol style="list-style-type: none"> 1. Safety <ul style="list-style-type: none"> • Signs/Symbols <ul style="list-style-type: none"> ▪ High voltage ▪ Ionising radiation hazards • Personnel safety in the vicinity of radiation hazards • Personnel safety in the vicinity of high voltage • Handling and disposal of hazardous materials <ul style="list-style-type: none"> ▪ Polychlorinated Biphenyls (PCB's) ▪ Beryllium ▪ Asbestos ▪ Transformer oils ▪ Changes from phosphors ▪ Quenching gasses ▪ Radioactive materials (valves) 2. Sonar parameters and measurements <ul style="list-style-type: none"> • Characterising parameters <ul style="list-style-type: none"> • Echo/depth sounder • Sonar communication set • Log • Bathy thermograph • Test equipment <ul style="list-style-type: none"> ▪ Calibration • Measurement <ul style="list-style-type: none"> ▪ Measurement errors/affects • Test equipment/operation 3. Sonar Applications <ul style="list-style-type: none"> • Application explanation <ul style="list-style-type: none"> ▪ Echo/depth sounder ▪ Sonar communication sets ▪ Speed log ▪ Bathy thermograph • Block diagrams <ul style="list-style-type: none"> ▪ Receiver

- Transmitter
 - Power
 - T/R switch
 - Timing synchronisation
 - Display
 - Interfacing
 - Launcher
 - Transducer
 - Probe
 - Physical/Operating Parameters
 - Power out/physical size
 - Propagation
 - Current voltage distribution
 - Frequency
 - Impedance
 - Phase relationship
 - Efficiency
 - Cooling
 - Stability
 - Installation
 - Testing
 - Signal flow
 - Adjustments
 - Physical construction
4. Sonar Applications description
- Description of terms
 - Sonar bungs
 - Route survey
 - Side scans
 - Ultrasound
 - Non-destructive testing
 - Dredging
 - Tide systems
 - Navigation
 - Bottom search
 - Fish finding
 - Physical parameters
 - Size
 - Shape
 - Material
 - Operating parameters
 - Power current and voltage distribution
 - Frequency
 - Cooling
 - Efficiency
5. Constraints and Consequences
- Definition of terms
 - Temperature
 - Depth
 - Salinity
 - Noise
 - Description of effects
 - Echo/depth sounder
 - Sonar communication set
 - Speed log
 - Bathy thermograph

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 environment.
7 Learning Outcome Details	
Learning Outcome 1	Outline the risks to personnel from devices & components used in sonar applications.
Assessment criteria	<ol style="list-style-type: none"> 1.1 Describe the safety signs and symbols associated with sonar applications. 1.2 Describe the safety signs and symbols associated with high voltages. 1.3 State the physiological effects of ionising phenomena. 1.4 Describe the potential dangers of handling typical hazardous materials used in sonar applications. 1.5 Describe correct method of handling typical hazardous materials used in sonar applications. 1.6 Describe correct methods for disposing of typical hazardous materials used in sonar applications.
Learning Outcome 2	Describe and measure various parameters associated with sonar applications.
Assessment criteria	<ol style="list-style-type: none"> 2.1 Describe the characterising parameters associated with typical sonar applications. 2.2 Calibrate test equipment to obtain correct readings. 2.3 Describe the effects of measurement errors that can occur when measuring the parameters associated with the items in 2.1. 2.4 Use test equipment to make measurements of parameters for items in 2.1.
Learning Outcome 3	Describe sonar applications.
Assessment criteria	<ol style="list-style-type: none"> 3.1 Describe the following applications. <ul style="list-style-type: none"> • Echo/depth sounder • Sonar communication sets • Log • Bathy thermograph 3.2 Draw block diagrams of the applications in 3.1 with reference where applicable to: <ul style="list-style-type: none"> • Receiver • Transmitter • Power • Transmit/Receive switch • Timing/synchronisation

	<ul style="list-style-type: none"> • Display <ul style="list-style-type: none"> ▪ Paper trace ▪ Chart receiver ▪ Analog ▪ Digital • Interfacing • Launcher • Transducer • Probe <p>3.3 Describe the physical and operating parameters of each of the items in 3.2 with reference, where applicable to:</p> <ul style="list-style-type: none"> • Power out and physical size • Propagation <ul style="list-style-type: none"> ▪ Size ▪ Shape ▪ Material • Current and voltage distribution • Frequency • Impedance charts • Phase relationship • Efficiency • Cooling • Stability • Installation • Testing • Signal flow • Adjustments • Physical construction
<p>Learning Outcome 4</p> <p>Assessment criteria</p>	<p>Describe the theory underpinning the applications of sonar.</p> <p>4.1 Describe the following terms in relation to sonar applications.</p> <ul style="list-style-type: none"> • Sonar buoys • Route survey <ul style="list-style-type: none"> ▪ Hydrographic ▪ Oceanographic ▪ Seismological • Side scans • Ultrasound • Non-destructive testing • Dredging • Tide systems <ul style="list-style-type: none"> ▪ Tanker gauge • Navigation • Bottom search • Fish finding <p>4.2 Explain the physical parameters of the items in 4.1 with reference to:</p> <ul style="list-style-type: none"> • Size • Shape • Material <p>4.3 Explain the operating parameters of the items in 4.1 with reference where applicable to:</p>

	<ul style="list-style-type: none"> • Power, current and voltage distribution • Frequency • Cooling • Efficiency
Learning Outcome 5	Describe the constraints and consequences of sonar applications.
Assessment criteria	<p>5.1 Define the following terms:</p> <ul style="list-style-type: none"> • Temperature • Depth • Salinity • Noise <ul style="list-style-type: none"> ▪ Sea ▪ Surface <p>5.2 Describe their affects of temperature, depth, salinity and sea and surface noise on the following.</p> <ul style="list-style-type: none"> • Echo/depth sounder • Sonar communication set • Log • Bathy thermograph
8 Delivery of the module	
Delivery strategy	<p>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.</p>
Resource requirements	<p>Resources should be sufficient for students to carry out practical exercises on an individual basis.</p> <p>Useful references include</p>
Occupational health and safety requirements	<p>A safe and healthy environment will be provided for students and teachers as well as safety procedures with regard to teaching/learning activities.</p>