



Australian Government

MARH030 Apply knowledge of core Autonomous Underwater Vehicles (AUV) operations

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

This unit involves the skills and knowledge required to apply knowledge of core Autonomous Underwater Vehicles (AUV) operations.

This includes identifying key working components of an AUV, applying safe handling techniques, determining requirements for optimal mission planning, explaining control theory in relation to performance, conducting safe launch and recovery, assessing mission data, optimising performance and explaining control theory relating to AUV performance.

It also includes hydrostatics to optimise ballasting, surface piloting techniques, tracking technologies and principles of mission planning software.

This unit applies to people working in the maritime industry in the capacity of:

- AUV Operator
- AUV Technician.

This unit applies to AUV operations being conducted in Near Coastal (NC) waters within the limits of the operators AMSA Certificate of Competency.

Licensing/Regulatory Information

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MARH034 Demonstrate fundamental knowledge of Autonomous Maritime Systems (AMS) operations

MARH035 Demonstrate fundamental knowledge of Autonomous Maritime Systems (AMS)

Competency Field

H - Navigation

Unit Sector

Maritime Sector

Elements and Performance Criteria

ELEMENTS

PERFORMANCE CRITERIA

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1. Identify key working components of an AUV

- 1.1** Communication and navigation systems are identified
- 1.2** Power, control and propulsion systems are identified
- 1.3** Sensor payloads and data transfer system are identified
- 1.4** Ballasting system is identified

2. Apply safe handling techniques for an AUV

- 2.1** Location of safe lifting points and sensitive ('no touch areas') are identified
- 2.2** AUV is transitioned from storage to operational area safely and according to operational procedures
- 2.3** Process for initialising, shutting down and recharging AUV is conducted safely and according to operational procedures
- 2.4** Process for data transfer of mission and payload data is conducted according to operational procedures

3. Conduct safe launch and recovery (LAR) of an AUV

- 3.1** Critical factors required for safe launch and recovery systems (LARS) operations are outlined
- 3.2** Deck-handling skills and equipment used to support AUV LAR are outlined
- 3.2** AUV LAR from stationary platform and moving vessel using a seal launch is conducted according to operational procedures
- 3.4** AUV LAR from a stationary vessel using a davit is conducted according to operational procedures

4. Apply hydrostatics to optimise AUV ballasting

- 4.1** Local oceanographic conditions relevant to AUV ballasting are identified and described
- 4.2** Optimal AUV 'pose' at the surface and behaviour during a shallow ascent when correctly AUV ballasted is described

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| | 4.3 | AUV ballasting is conducted safely and correctly according to operational procedures |
| 5. Apply principles of AUV mission planning software | 5.1 | Process for loading navigational charts into the mission planning software is outlined |
| | 5.2 | Start and end points are set using mission planning software according to operational requirements |
| | 5.3 | Mission waypoints and transects are set using mission planning software according to operational requirements |
| | 5.4 | Optimal depth and speed control are set using mission planning software according to operational requirements |
| | 5.5 | Total mission timing and distance are estimated manually and using mission planning software |
| | 5.6 | Mission files are uploaded from mission planning software to the AUV following operating procedures |
| 6. Determine requirements for optimal mission planning AUV mission scenarios | 6.1 | Limitations on AUV performance, including maximum dive and climb angles and minimum turning radius, are determined |
| | 6.2 | Best practise mission planning for surveying over submerged riverbeds is outlined |
| | 6.3 | Best practise mission planning for steep terrain is outlined |
| | 6.4 | Best practise mission planning for strong currents is outlined |
| | 6.5 | Best practise mission planning for surveys around maritime infrastructure is outlined |
| 7. Apply AUV tracking technologies | 7.1 | AUV is located using hydrophone |
| | 7.2 | Acoustic beacons are located using ranger modem |
| | 7.3 | Best practises for focusing AUV search and rescue operations are described |

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| 8. Apply AUV surface piloting techniques | 8.1 Remote control of the AUV at the surface is established |
| | 8.2 AUV piloting to and from the support vessel and around obstacles through the adjustment of course and speed is conducted |
| 9. Conduct assessment of AUV mission data | 9.1 Key information within master mission log file and operator logbook are accessed and interpreted |
| | 9.2 Post-mission analysis is conducted to assess the success of the mission relative to payload objectives |
| | 9.3 Vehicle performance analysis is conducted to assess the engineering behaviour of the AUV |
| 10. Conduct missions to assess optimised performance of AUV | 10.1 AUV mission to assess improved navigation with acoustic transponders is conducted |
| | 10.2 AUV mission to assess the impact of payloads on hydrodynamics is conducted |
| | 10.3 AUV mission to optimise sensor data coverage is conducted |
| 11. Explain control theory in relation to AUV performance | 11.1 Concepts of input, output, error, feedback and gain for a simple control system are described |
| | 11.2 Principle of tuning the three components of proportional-integral-derivative (PID) control to improve the achievement of an AUV depth goal is outlined |
| 12. Plan and evaluate an AUV mission | 12.1 AUV mission is designed and planned according to operational requirements |
| | 12.2 AUV mission is conducted following a standard operating procedure |
| | 12.3 Post-mission analysis, including vehicle performance analysis, is completed with a post-mission debrief |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the MAR Maritime Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No equivalent unit.

Links

Companion Volume Implementation Guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>