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**CURRICULUM OUTLINE OF INSTRUCTION  
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE  
CIN: A-4H-0107 CDP: 9545  
VER: 1.0 CHANGE: 1**

<b>MODULE 1-5: UNDERSEA WARFARE</b>		
<b>Lesson #</b>	<b>Topic</b>	<b>Objectives</b>
1-5-1-2	Full Spectrum ASW	<p>EO 1-5-1-2.1 <b>DESCRIBE</b> the nine Global ASW CONOPS assumptions (TO 1-5-1.3).</p> <p>EO 1-5-1-2.2 <b>DESCRIBE</b> the ten threads of Full-spectrum ASW (FSASW) considering (TO 1-5-1.3):</p> <ul style="list-style-type: none"> <li>• Level of command at which they are planned</li> <li>• Capabilities required for execution</li> <li>• Your role and how this supports the combatant commander's warfighting objective</li> </ul>
1-5-1-3	ASW Missions	<p>EO 4-1-1.3 (CBT) <b>IDENTIFY</b> the policy and guidance used for the planning and execution of ASW missions (TO 1-5-1.3).</p> <p>EO 1-5-1-3.1 <b>DESCRIBE</b> ASW Operations, Missions and Tasks (TO 1-5-1.3, TO 1-5-1.4):</p> <ul style="list-style-type: none"> <li>• Local Antisubmarine Warfare</li> <li>• Area Antisubmarine Warfare</li> <li>• Single Ship Antisubmarine Warfare</li> <li>• Coordinated Antisubmarine Warfare</li> </ul> <p>EO 1-5-1-3.2 <b>DESCRIBE</b> these governing documents and their roles in ASW (TO 1-5-1.3, TO 1-5-1.4, TO 1-5-1.5):</p> <ul style="list-style-type: none"> <li>• OPGEN</li> <li>• OPTASK Anti-Submarine Warfare (ASW)</li> <li>• OPTASK ASW SUPP</li> <li>• OPTASK Meteorology and Oceanography (METOC)</li> <li>• Daily Intentions Message (DIM)</li> <li>• Rainform Green</li> <li>• Order Table (TABORD)</li> <li>• BARNSTORM</li> </ul>
1-5-1-4	ASW Command and Control	<p>EO 1-5-1-4.1 <b>DESCRIBE</b> the following Strike Group ASW battle space (TO 1-5-1.3, TO 1-5-1.5):</p> <ul style="list-style-type: none"> <li>• Datum</li> <li>• Furthest On Circle (FOC)</li> <li>• Torpedo Danger Area (TDA)</li> <li>• Weapons Engagement Zone (WEZ) (Torpedo or ASCM)</li> <li>• Vital Area (VA)/Torpedo Danger Zone (TDZ)</li> <li>• Contact Identification and Engagement Area (CIEA)/ Reaction Zone</li> <li>• Surveillance Area (SA)</li> <li>• Missile Danger Zone (MDZ)</li> <li>• Strike Group Operations Area (SGOA)</li> </ul> <p>EO 1-5-1-4.2 <b>DESCRIBE</b> the role of the Theater Anti-Submarine Warfare Commander (TASWC) (TO 1-5-1.4).</p> <p>EO 1-5-1-4.3 <b>DESCRIBE</b> the role of the Submarine Operating Authority (SUBOPAETH) (TO 1-5-1.4).</p>

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		<p>EO 1-5-1-4.4 <b>DESCRIBE</b> the role of the Strike Group ASW Commander (TO 1-5-1.4).</p> <p>EO 1-5-1-4.5 <b>DESCRIBE</b> the responsibilities of the following commanders and coordinators in the Strike Group ASW organization (TO 1-5-1.4):</p> <ul style="list-style-type: none"> <li>• Submarine Element Coordinator (SEC)</li> <li>• Submarine Advisory Team (SAT)</li> <li>• Helicopter Element Coordinator (HEC)</li> <li>• Search and Attack Unit (SAU)</li> <li>• Scene of Action Commander (SAC)</li> </ul> <p>EO 1-5-1-4.6 <b>DESCRIBE</b> the roles and responsibilities of the ship's internal ASW team (TO 1-5-1.3):</p> <ul style="list-style-type: none"> <li>• TAO</li> <li>• ASWE</li> <li>• Anti-Submarine Tactical Air Controller (ASTAC)</li> <li>• Officer of the Deck (OOD)</li> <li>• Engineering Officer of the Watch (EOOW)</li> </ul> <p>EO 1-5-1-4.7 <b>DEMONSTRATE</b> an understanding of the ASW chain of command from the Theater ASW Commander to ownship (TO 1-5-1.4, TO 1-5-1.5).</p>
1-5-1-5	Waterspace Management (WSM), Prevention of Mutual Interference (PMI) and Safety	<p>EO 1-5-1-5.1 <b>DEFINE</b> the following Waterspace Management (WSM) action areas, terms, and their associated attack rules (TO 1-5-1.4):</p> <ul style="list-style-type: none"> <li>• ASW Free Area (ASWFA)</li> <li>• Submarine Action Area (SAA)</li> <li>• Submarine Patrol Area (SPA)</li> <li>• Submarine Safety Lane (SSL)</li> <li>• Joint Action Area (JTAA)</li> <li>• Submarine Generated Search Area (SGSA)</li> <li>• NOTACK</li> <li>• Compensatory Allowance</li> </ul> <p>EO 1-5-1-5.2 <b>DESCRIBE</b> Prevention of Mutual Interference (PMI) concepts (TO 1-5-1.4):</p> <ul style="list-style-type: none"> <li>• Horizontal PMI</li> <li>• Vertical PMI</li> </ul> <p>EO 1-5-1-5.3 <b>DEFINE</b> the following Prevention of Mutual Interference (PMI) terms (TO 1-5-1.4):</p> <ul style="list-style-type: none"> <li>• Stovepipe</li> <li>• Moving Haven</li> <li>• Static haven</li> </ul>

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		EO 1-5-1-5.4 <b>APPLY</b> WSM principles to conduct an effective ASW engagement (TO 1-5-1.4).  EO 1-5-1-5.5 <b>DESCRIBE</b> safety precautions and procedures used between surface units and submarines (TO 1-5-1.4).
1-5-1-6	Navy-Wide OPTASK ASW and Brevity Codes.	EO 1-5-1-6.1 <b>APPLY</b> specific and implied ASW PPR's, as detailed in the Navy-Wide OPTASK ASW for the following (TO 1-5-1.5): <ul style="list-style-type: none"> <li>• Datum Establishment</li> <li>• METFR Ranges (VA)</li> <li>• FOC Ranges (default values)</li> <li>• Weapon Delivery Platform Priority</li> <li>• Torpedo Countermeasures</li> <li>• Pre-Planned Responses</li> <li>• SIAP</li> <li>• ASIAP</li> <li>• Reporting Instructions</li> <li>• ES Instructions</li> </ul> EO 1-5-1-6.2 <b>DESCRIBE</b> standard ASW operational and exercise definitions IAW Allied Tactical Publications and Allied Exercise Publications (TO 1-5-1.3, TO 1-5-1.5).  EO 1-5-1-6.3 <b>DESCRIBE</b> code words commonly used in ASW operations and exercises (TO 1-5-1.3, TO 1-5-1.5).
1-5-1-7	USW Perspectives (NMAWC Guest Lecture)	EO 1-5-3-7.1 <b>DESCRIBE</b> current threat country's naval objectives and missions (TO 1-5-1.1, TO 1-5-1.2).  EO 1-5-3-7.2 <b>DESCRIBE</b> current threat country's submarine activities, to include recent operational patrols (TO 1-5-1.1, TO 1-5-1.2).  EO 1-5-3-7.3 <b>DESCRIBE</b> global mine trends (TO 1-5-1.1, TO 1-5-1.2).
1-5-2	<b>ASW Communications</b>	TO 4-2.1 (CBT) <b>IDENTIFY</b> ASW communications circuits and procedures.  TO 1-5-2.1 <b>IDENTIFY</b> external ASW communications circuits used in ASW missions and various ASW related voice reports.  TO 1-5-2.2 <b>COMMUNICATE</b> effectively on internal and external Anti-Submarine Warfare circuits, including delivering all required reports.

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<b>Lesson #</b>	<b>Topic</b>	<b>Objectives</b>
1-5-2-1	ASW Voice Communications	<p>EO 4-2-1.1 (CBT) <b>IDENTIFY</b> the internal and external communications circuits used in ASW missions (TO 4-2.1).</p> <p>EO 4-2-1.2 (CBT) <b>IDENTIFY</b> the Brevity code words used in ASW missions and warfare reports (TO 4-2.1):</p> <ul style="list-style-type: none"> <li>• Contact</li> <li>• Datum</li> <li>• Situation Report (SITREP)</li> <li>• Amplifying Report</li> <li>• DOG BOX</li> <li>• Aircraft State</li> <li>• Emergency Tango</li> </ul> <p>EO 1-5-2-1.1 <b>DESCRIBE</b> the following primary External communications circuits covered and procedures used during ASW activities (TO 1-5-2.1, TO 1-5-2.2).</p> <ul style="list-style-type: none"> <li>• TG CMD</li> <li>• FLT TAC</li> <li>• ASW C&amp;R</li> <li>• SATCOM/HF</li> <li>• ASW A/C</li> </ul>
1-5-2-2	ASW MMTT 1: Voice Communications	<p>EO 1-5-2-2.1 <b>CONDUCT</b> the following ASW voice reports (TO 1-5-2.1, TO 1-5-2.2):</p> <ul style="list-style-type: none"> <li>• Raid Reports</li> <li>• Lost Contact Report</li> <li>• Weapon Discharge Report</li> <li>• SAU Reports</li> <li>• TAS Reports</li> </ul>
1-5-3	<b>ASW Capabilities and Limitations</b>	<p>TO 4-3.1 (CBT) <b>IDENTIFY</b> the capabilities and limitations of weapons, sensors, countermeasures, and helicopters available to the TAO, both organic and external to the ship, to engage in ASW activities.</p> <p>TO 4-6.1 (CBT) <b>IDENTIFY</b> torpedo guidance methods and ASW threat platforms.</p> <p>TO 1-5-3.1 <b>EMPLOY</b> own and external ship assets in an ASW environment considering the following:</p> <ul style="list-style-type: none"> <li>• Fixed Wing Assets</li> <li>• Rotary Wing Assets</li> <li>• Weapons Employment</li> <li>• Torpedo Countermeasures Preparations</li> <li>• Maneuvering with and without ADC</li> <li>• Surface Ship Radiated Noise</li> </ul>

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Lesson #	Topic	Objectives
		<p>EO 1-5-3-3.5 <b>DESCRIBE</b> the minimum required weapon presets for a deliberate attack Mk 54 lightweight torpedo. (TO 1-5-3.3, TO 1-5-3.4).</p> <p>EO 1-5-3-3.6 <b>DESCRIBE</b> the safety features associated with the Mk 54 lightweight torpedo (TO 1-5-3.3, TO 1-5-3.4).</p> <p>EO 1-5-3-3.7 <b>DESCRIBE</b> safety zones associated with firing a VLA (TO 1-5-3.3, TO 1-5-3.4).</p> <p>EO 1-5-3-3.8 <b>EMPLOY</b> the appropriate ASW weapons attack option for a (TO 1-5-3.3, TO 1-5-3.4):</p> <ul style="list-style-type: none"><li>• Counterfire</li><li>• Urgent Attack</li><li>• Deliberate Attack</li></ul> <p>EO 1-5-3-3.9 <b>DESCRIBE</b> re-attack criteria for the Mk 46 Mod 5A (S) and (SW) lightweight torpedoes (TO 1-5-3.3, TO 1-5-3.4).</p> <p>EO 1-5-3-3.10 <b>DESCRIBE</b> re-attack criteria for the Mk 54 lightweight torpedo (TO 1-5-3.3, TO 1-5-3.4).</p>
1-5-3-4	Torpedo Counter-measures	<p>EO 1-5-3-4.1 <b>EMPLOY</b> torpedo countermeasure systems, tactics, and procedures for (TO 1-5-3.2):</p> <ul style="list-style-type: none"><li>• Towed Systems</li><li>• ADCs</li><li>• PRAIRIE/Masker Air</li><li>• Deceptive Lighting</li><li>• Darken Ship</li><li>• EMCON</li><li>• Quiet Ship</li><li>• Zig Zag</li><li>• Mad Maggies</li></ul>

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1-5-3-5	Torpedo Evasion Maneuvers	<p>EO 1-5-3-5.1 <b>DESCRIBE</b> the Big Bird and Raging Bull torpedo evasion maneuvers (TO 1-5-3.2).</p> <p>EO 1-5-3-5.1 <b>DESCRIBE</b> the force evasion concept (TO 1-5-3.2):</p> <ul style="list-style-type: none"> <li>• Who executes force evasion</li> <li>• Force evasion direction and course</li> <li>• Mean Line of Advance and Speed of Advance</li> <li>• ADC deconfliction</li> <li>• Dynamic adjustment</li> <li>• Force counterfire policy</li> </ul> <p>EO 1-5-3-4.3 <b>LIST</b> the effectiveness of all torpedo countermeasures (TO 1-5-3.2):</p> <ul style="list-style-type: none"> <li>• Maneuvers</li> <li>• Nixie</li> <li>• Acoustic Device Countermeasures</li> <li>• Continuous Magnetic Countermeasure/Reactive Magnetic Countermeasure</li> </ul>
1-5-3-6	SSN Operations and Threat Tactics (NAVSUBSCOL Guest Lecture)	<p>EO 1-5-3-6.1 <b>LIST</b> US SSN communications capabilities at periscope depth (PD).</p> <p>EO 1-5-3-6.2 <b>LIST</b> US SSN communications capabilities at depth.</p> <p>EO 1-5-3-6.3 <b>DESCRIBE</b> the limitations of SSNs in joint surface task group/SSN operations.</p> <p>EO 1-5-3-6.4 <b>DESCRIBE</b> the expected actions/tactics generally used by SSNs in the following circumstances:</p> <ul style="list-style-type: none"> <li>• Actions in patrol areas</li> <li>• Actions to intercept surface forces</li> <li>• Actions to penetrate a screen</li> <li>• Actions to evade ASW units in contact</li> </ul> <p>EO 1-5-3-6.5 <b>DESCRIBE</b> ways in which a SSN will exploit the ocean environment against surface ships.</p> <p>EO 1-5-3-6.6 <b>DESCRIBE</b> the ASUW approach and attack tactics used by nuclear submarines against ASW capable surface ships.</p> <p>EO 1-5-3-6.7 <b>DESCRIBE</b> the ASUW approach and attack tactics used by SSNs against non-ASW capable ships.</p>
1-5-3-7	SSK Operations and Threat Tactics (NUWC Guest Lecture)	<p>EO 1-5-3-9.1 <b>DESCRIBE</b> the capabilities and limitations affecting tactical employment of SSKs and Air Independent Propulsion (AIP) submarines.</p> <p>EO 1-5-3-9.2 <b>DESCRIBE</b> the missions and tactics of diesel and Air Independent Propulsion (AIP) submarines.</p>

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<b>1-5-4</b>	<b>Anti-Submarine Warfare Core</b>	<p>TO 4-3.1 (CBT) <b>IDENTIFY</b> the capabilities and limitations of weapons, sensors, countermeasures, and helicopters available to the TAO, both organic and external to the ship, to engage in ASW activities.</p> <p>TO 4-5.1 (CBT) <b>IDENTIFY</b> the concepts and procedures in ASW to include torpedo battlespace areas, classification of datums, locating enemy submarines, verifying sonar contacts, and conducting attacks.</p> <p>TO 1-5-4.1 <b>DEMONSTRATE</b> ASW procedures maximizing:</p> <ul style="list-style-type: none"> <li>• Tactical Use of the Environment</li> <li>• Passive Techniques</li> <li>• Active Techniques</li> <li>• ASW Screens</li> <li>• Detect to Engage</li> <li>• Ship Aircraft Integration</li> <li>• SAU Procedures</li> </ul> <p>TO 1-5-4.2 <b>DEMONSTRATE</b> application of passive ASW principles.</p> <p>TO 1-5-4.3 <b>CONDUCT</b> active ASW.</p> <p>TO 1-5-4.4 <b>EMPLOY</b> ASW sensors in varying environments to detect threat submarines.</p> <p>TO 1-5-4.5 <b>EMPLOY</b> multiple assets in a ASW environment.</p> <p>TO 1-5-4.6 <b>DESCRIBE</b> the optimum employment of all available assets, sensors, weapons, and tactics against a submarine threat, considering ocean conditions, submarine types, threat capabilities, and command and control relationships.</p> <p>TO 1-5-4.7 <b>PERFORM</b> under instruction to basic and intermediate level watch team and command functions in accordance with Allied Tactical and Exercise Instructions and Procedures (ATP/AXP Series).</p>
<b>1-5-4-1</b>	<b>Tactical Use of the Environment</b>	<p>EO 1-5-4-1.1 <b>DESCRIBE</b> the effects of the environment on acoustic and non-acoustic detection sensors (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.2 <b>INTERPRET</b> a bathythermograph (BT) and <b>DRAW</b> a Sound Speed Profile (SSP) (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.3 <b>DESCRIBE</b> the tactical significance of the Active Figure of Merit equation (AFOM), Passive Figure of Merit equation (PFOM), Passive Sonar Equation, and Active Sonar Equation (TO 1-5-4.1, TO 1-5-4.2)</p>

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		<p>EO 1-5-4-1.4 <b>DESCRIBE</b> how to manipulate controllable factors of the Passive and Active Sonar equation to make a target more detectable and decrease the probability of counter detection (TO 1-5-4.1).</p> <p>EO 1-5-4-1.5 <b>DESCRIBE</b> the relationship between the Propagation Loss Curve, the Passive Figure of Merit line, and Probability of detection (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.6 <b>IDENTIFY</b> and <b>DESCRIBE</b> the characteristics of sound propagation paths to include: direct path, surface duct, half-channel, deep sound channel, bottom bounce, and convergence zone (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.7 <b>DESCRIBE</b> the different considerations for the placement of acoustic sensors for each propagation path (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.8 <b>DESCRIBE</b> systems utilized in ocean data collection and tactical decision aids to include: Expendable Bathythermograph (XBT) and PC-IMAT (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.9 <b>DESCRIBE</b> shore based resources available for ocean analysis (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.10 <b>DESCRIBE</b> the effects of bottom topography to include downslope enhancement, upslope enhancement, and topographic shading (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.11 <b>DESCRIBE</b> the tactical employment/placement of friendly assets and sensors operating in the vicinity of a front or eddy (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-1.12 <b>IDENTIFY</b> submarine tactics while operating in the littorals and in the vicinity of a front or an eddy (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.6).</p>
1-5-4-2	Passive Techniques	EO 1-5-4-2.1 <b>DESCRIBE</b> the importance of conducting passive acoustic and non-acoustic missions (TO 1-5-4.1, TO 1-5-4.2).

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		<p>EO 1-5-4-2.2 <b>APPLY</b> passive techniques for (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.4):</p> <ul style="list-style-type: none"> <li>• Area search</li> <li>• Sensor performance</li> <li>• Uniform and efficient search rules</li> <li>• Maneuver</li> <li>• Detect</li> <li>• Tracking/Target Motion Analysis (TMA)</li> </ul> <p>EO 1-5-4-2.3 <b>CONSTRUCT</b> an evaluator plot (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.4).</p> <p>EO 1-5-4-2.4 <b>IDENTIFY</b> the cones of courses (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.4).</p> <p>EO 1-5-4-2.5 <b>SOLVE</b> problems for single and double-leg Ekelund ranges (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.4).</p> <p>EO 1-5-4-2.6 <b>IDENTIFY</b> the systems that will detect torpedoes in a timely manner (TO 1-5-4.6):</p> <ul style="list-style-type: none"> <li>• Towed Array Sonar</li> <li>• TRAFS</li> <li>• Hull Mounted Sonars</li> <li>• DIFAR Sonobuoys</li> <li>• Visual</li> <li>• WQC-2</li> </ul>
1-5-4-3	Active Techniques	<p>EO 4-5-1.1 (CBT) <b>IDENTIFY</b> the following concepts and procedures in ASW (TO 4-3.1, TO 4-5.1, TO 1-5-4.3):</p> <ul style="list-style-type: none"> <li>• Datum Classification</li> <li>• Maximum Effective Torpedo Firing Range (METFR)</li> <li>• Torpedo Danger Area (TDA)</li> <li>• Torpedo Danger Zone (TDZ)</li> <li>• Vital Area (VA)</li> <li>• Limiting Lines of Approach (LLOA)</li> <li>• Look Zone</li> <li>• Tactical Sonar Range (TSR)</li> <li>• Predicted Sonar Range (PSR)</li> </ul> <p>EO 1-5-4-3.1 <b>APPLY</b> Furthest On Circles (FOC) to a datum (TO 1-5-4.3).</p> <p>EO 1-5-4-3.2 <b>CALCULATE</b> the following (TO 1-5-4.3):</p> <ul style="list-style-type: none"> <li>• Torpedo Danger Zone (TDZ)</li> <li>• Limiting Lines of Approach (LLOA)</li> <li>• Estimated Time of Arrival to Torpedo Danger Area (ETA to TDA)</li> </ul>

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<b>Lesson #</b>	<b>Topic</b>	<b>Objectives</b>
1-5-4-4	Detect, Track, Classify	<p>EO 4-3-2.1 (CBT) <b>IDENTIFY</b> the capabilities and limitations of ASW sensors (TO 1-5-4.1):</p> <ul style="list-style-type: none"> <li>• Various radars</li> <li>• AN/SQQ-89, AN/SQS-56, AN/SQS-53 (Series), AN/SQQ-28, and AN/SQR-19 sonars</li> <li>• DIFAR, DICASS and Ambient Noise sonobuoys</li> <li>• Aviation Expendable Bathythermograph (AXBT)</li> </ul> <p>EO 1-5-4-4.1 <b>DESCRIBE</b> the passive/active ASW Detect, Track, and Classify sequence (TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4).</p> <p>EO 1-5-4-4.2 <b>DEMONSTRATE</b> knowledge of the classifications of subsurface contacts (TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4).</p> <p>EO 1-5-4-4.3 <b>DESCRIBE</b> acoustic/non-acoustic, active/passive sensors employed in gaining contact on a submarine (TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.5).</p> <p>EO 1-5-4-4.4 <b>DESCRIBE</b> the components of the attack hierarchy in accordance with the ASW OPTASK (TO 1-5-4.1, TO 1-5-4.5, TO 1-5-4.6).</p> <p>EO 1-5-4-4.5 <b>EXPLAIN</b> ROE requirements associated with ASW (TO 1-5-4.6).</p>
1-5-4-5	Single Ship Active Detect to Engage	<p>EO 4-5-2.1 (CBT) <b>IDENTIFY</b> the following search concepts and procedures as they relate to ASW (TO 4-3.1, TO 4-5.1, TO 1-5-4.1, TO 1-5-4.2, TO 1-5-4.3, TO 1-5-4.4, TO 1-5-4.5).</p> <ul style="list-style-type: none"> <li>• Acoustically uniform and non-uniform searches</li> <li>• Barrier searches <ul style="list-style-type: none"> <li>○ Parallel searches</li> <li>○ Perpendicular searches</li> </ul> </li> <li>• Stationary searches</li> <li>• Datum Search</li> <li>• Plan of Intended Movement (PIM) Search</li> <li>• Expanding Square Search</li> <li>• Datum Search</li> <li>• Plan of Intended Movement (PIM) Search</li> <li>• Expanding Square Search</li> <li>• PLAN BLACK CORDON</li> <li>• PLAN BLACK OAK TREE</li> <li>• Helicopter searches</li> </ul>

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MODULE 1-5: UNDERSEA WARFARE		
Lesson #	Topic	Objectives
		<p>EO 4-5-3.1 (CBT) <b>IDENTIFY</b> chart check concepts and procedures (TO 1-5-4.1).</p> <p>EO 1-5-4-5.1 <b>APPLY</b> correct active Single Ship Detect to Engage (DTE) procedures for (TO 1-5-4.4, TO 1-5-4.5, TO 1-5-4.6):</p> <ul style="list-style-type: none"> <li>• Actions outside the TDA</li> <li>• Actions on entering the TDA</li> <li>• Actions on gaining initial contact</li> <li>• Actions on losing contact</li> </ul>
1-5-4-6	SAU Procedures	<p>EO 1-5-4-6.1 <b>DEMONSTRATE</b> the ability to apply correct SAU active DTE procedures for (TO 1-5-4.4, TO 1-5-4.5, TO 1-5-4.6):</p> <ul style="list-style-type: none"> <li>• Execution of a datum search</li> <li>• Execution of area search</li> <li>• Actions during initial approach</li> <li>• Actions during final approach</li> <li>• SAUC actions on gaining initial contact</li> <li>• SAUC actions on losing contact</li> <li>• Application of attack train principles</li> <li>• Application of BDA</li> </ul> <p>EO 1-5-4-6.2 <b>DEMONSTRATE</b> the ability to correctly integrate ASW helicopters and MPRA assets into an active SAU DTE sequence (TO 1-5-4.4, TO 1-5-4.5, TO 1-5-4.6).</p> <p>EO 1-5-4-6.3 <b>APPLY</b> correct SAU spacing based on environmental data (TO 1-5-4.4, TO 1-5-4.6).</p> <p>EO 1-5-4-6.4 <b>CONDUCT</b> SAU specific voice reports for (TO 1-5-4.5, TO 1-5-4.6):</p> <ul style="list-style-type: none"> <li>• SAUC Intentions</li> <li>• Formations</li> <li>• ZigZag Plans</li> <li>• Search and Attack Plans</li> <li>• Weapon Engagement Orders</li> <li>• SAUC SITREP</li> </ul>
1-5-4-7	ASW MMTT 2: Direct Path TMA	EO 1-5-4-7.1 Given a MMTT scenario; <b>CONSTRUCT</b> an evaluator plot, <b>IDENTIFY</b> possible cones of courses and <b>SOLVE</b> problems for single and double-leg Ekelund ranges (TO 1-5-4.7).

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1-5-4-8	ASW MMTT 3: Single Ship Active (CASEX A1)	EO 1-5-4-8.1 Given a MMTT scenario <b>DEMONSTRATE</b> the ability to conduct the following (TO 1-5-4.7): <ul style="list-style-type: none"> <li>• <b>EXECUTE</b> formatted voice reports</li> <li>• <b>MANEUVER</b> the ship appropriately</li> <li>• <b>DEMONSTRATE</b> PPR's for hydrophone effects</li> <li>• <b>PLAN</b> and <b>EXECUTE</b> datum approach</li> <li>• <b>EXECUTE</b> search and attack plans</li> <li>• <b>DEMONSTRATE</b> initial reactions to gaining contact</li> <li>• <b>CLASSIFY</b> ASW contacts appropriately</li> <li>• <b>RESPOND</b> to safety related issues</li> </ul>
1-5-4-9	ASW MMTT 4: SAU with Helo (CASEX A3)	EO 1-5-4-9.1 Given a MMTT scenario <b>DEMONSTRATE</b> the ability to conduct the following (TO 1-5-4.7): <ul style="list-style-type: none"> <li>• <b>EXECUTE</b> formatted voice reports</li> <li>• <b>MANEUVER</b> ships of a SAU appropriately</li> <li>• <b>DEMONSTRATE</b> PPR's for hydrophone effects</li> <li>• <b>PLAN</b> and <b>EXECUTE</b> datum approach</li> <li>• <b>EXECUTE</b> search and attack plans</li> <li>• <b>DEMONSTRATE</b> initial reactions to gaining contact</li> <li>• <b>CLASSIFY</b> ASW contacts appropriately</li> <li>• <b>RESPOND</b> to safety related issues</li> <li>• <b>EMPLOY</b> air assets appropriately</li> </ul>
1-5-4-10	ASW MMTT 5: ASW Screening Ops	EO 1-5-4-10.1 Given a MMTT scenario <b>DEMONSTRATE</b> the ability to conduct the following (TO 1-5-4.7): <ul style="list-style-type: none"> <li>• <b>EXECUTE</b> formatted voice reports</li> <li>• <b>MANEUVER</b> ships of a SAU appropriately</li> <li>• <b>MANEUVER</b> ships of a Task Force (Main Body and Escorts) appropriately</li> <li>• <b>DEMONSTRATE</b> PPR's for hydrophone effects</li> <li>• <b>PLAN</b> and <b>EXECUTE</b> datum approach</li> <li>• <b>EXECUTE</b> search and attack plans</li> <li>• <b>DEMONSTRATE</b> initial reactions to gaining contact</li> <li>• <b>CLASSIFY</b> ASW contacts appropriately</li> <li>• <b>RESPOND</b> to safety related issues</li> <li>• <b>EMPLOY</b> air assets appropriately</li> </ul>
1-5-4-11	ASW MMTT B: Choke Point Transit	EO 1-5-4-11.1 Given a MMTT scenario, <b>DEMONSTRATE</b> the ability to act as a TAO during a single threat two-ship SAU operation (TO 1-5-4.7).
<b>1-5-5</b>	<b>Mine Warfare Fundamentals</b>	TO 4-8.1 (CBT) <b>IDENTIFY</b> various types of mines, delivery vehicles, and actuation methods.  TO 4-9.1 (CBT) <b>IDENTIFY</b> the available Mine Countermeasures (MCM) assets.  TO 1-5-1.1 <b>DEMONSTRATE</b> knowledge and understanding of Chinese, Iranian, North Korean, and Russian Military capabilities, limitations, and tactics.

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<b>Lesson #</b>	<b>Topic</b>	<b>Objectives</b>
		TO 1-5-5.1 <b>DETERMINE</b> the actions taken by ownship prior to entering a mine threat area and after sighting a mine.
1-5-5-1	Mine Warfare Challenges	<p>EO 4-8-1.1 (CBT) <b>IDENTIFY</b> frequently used US Navy and foreign mines (TO 4-8.1).</p> <p>EO 4-8-2.1 (CBT) <b>IDENTIFY</b> frequently used mine field types and delivery vehicles (TO 4-8.1).</p> <p>EO 4-8-3.1 (CBT) <b>IDENTIFY</b> the different stages of mine detonation and the different ways mines can be actuated (TO 4-8.1).</p> <p>EO 1-5-5-1.1 <b>DESCRIBE</b> conceptual aspects of Mine Warfare (MIW) challenges (TO 1-5-5.1, TO 1-5-5.1):</p> <ul style="list-style-type: none"> <li>• Coordination between ASW, MIW, and EW</li> <li>• Mine warfare environmental considerations</li> <li>• Minesweeping vs. minehunting</li> <li>• Airborne MCM (AMCM) vs. Surface MCM (SMCM)</li> <li>• Vulnerability</li> </ul> <p>EO 1-5-5-1.2 <b>DETERMINE</b> the applicable useful mine warfare information available from the following systems (TO 1-5-5.1):</p> <ul style="list-style-type: none"> <li>• Mine Warfare Environmental Decision Aid Library (MEDAL)</li> <li>• GCCS-M</li> </ul>
1-5-5-2	Active Mine Counter-measures	<p>EO 4-9-2.1 (CBT) <b>IDENTIFY</b> MCM forces (TO 4-9.1):</p> <ul style="list-style-type: none"> <li>• Surface</li> <li>• Undersea</li> <li>• Airborne</li> <li>• Very Shallow Water</li> </ul> <p>EO 4-9-2.1 (CBT) <b>IDENTIFY</b> the following (TO 4-9.1):</p> <ul style="list-style-type: none"> <li>• Organic MCM</li> <li>• Remote Minehunting System (MCM) WLD-1(V) 1</li> <li>• MH-60S</li> <li>• Airborne Laser Mine Detection System (ALMDS)</li> <li>• AQS-24 Airborne Minehunting Sonar</li> <li>• Organic Airborne and Surface Influence Sweep (OASIS)</li> <li>• Airborne Mine Neutralization System (AMNS)</li> <li>• AQS-24 Airborne Minehunting Sonar</li> <li>• Organic Airborne and Surface Influence Sweep (OASIS)</li> <li>• Airborne Mine Neutralization System (AMNS)</li> <li>• Rapid Airborne Mine Clearance System (RAMICS)</li> <li>• BLQ-11 Mine Reconnaissance System Unmanned Underwater Vehicle (UUV)</li> </ul>

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