21st Century ASW: The U.S. Navy Refocuses On ASW For It's P-3 Fleet and Future MMA

by David Reade

Since the beginning of the 20th century, the submarine has been the lethal weapon of choice for totalitarian nations in a worldwide struggle for control of the sea. To counter this threat, the US Navy employed technology, tactics and manpower into what has always been considered a Navy Core Mission .... Anti-Submarine Warfare.

Before the end of the Cold War with the ex-Soviet Union, the US Navy had been faced with the challenges of detection, classification and location of advanced, quiet, nuclear submarines. It became increasingly difficult to detect weak, low-frequency signals, emanating from these quiet nuclear submarines. Had the Cold War not ended when it did, the US Navy would have been forced to develop new technology, tactics and capabilities to counter the ever-increasing quietness of enemy submarines.

But the Cold War did end, and with it the threat posed by the mighty Soviet Navy's submarine force. Unfortunately, with the perceived demise of the threat, so too was the demise of those efforts to counter that threat. With post Cold War budget cuts, many research programs, seeking to find solutions to counter the quiet submarine threat of the future, were cut or curtailed. Fortunately, some research continued and focused on the threat imposed by the proliferation of conventional, advanced diesel- electric submarines operating in the littoral environment.

ASW Today

Today, US Navy ASW has been further weakened by a lack of consensus as to the potential submarine threat from third-world conventional diesel-electric submarines. Further hampered by the competition over warfare priorities and budgetary shortfalls, these issues have combined to push the US Navy's ASW program levels to an all-time low in recent years.With ASW as the cornerstone of modern sea control, the Navy is looking to re-emphasize the importance of ASW in the fleet and re-establish Navy-wide requirements to revitalize its ASW capabilities.

The ASW challenges today, are as important as they were during the onset of the Cold War fifty years ago. There is a worldwide proliferation of modern, quiet diesel-electric submarines with Air Independent Propulsion (AIP). Armed with modern advanced weapons, these submarines represent a lethal threat to US Navy and Allied Forces operating in the diverse, highly dynamic environment of the littoral.

AIP equipped diesel submarines with high-density batteries require less snorkeling and have increased vessel submerged endurance. With advanced weapons, such as the fire and forget, over-the-horizon, anti-ship missiles launched via conventional torpedo tubes, the conventional third-world submarine has become potentially more formidable than the open-ocean Soviet submarines of the Cold War. Third-world submarine tactics can encompass underwater mining, anti-surface and anti-submarine warfare attacks on combatant and merchant shipping as well as terrorist infiltration - all performed practically undetected. The ASW skills needed to counter this conventional submarine threat requires new training, development of new technology and increased opportunities to train the fleet accordingly. Future ASW Operations are also likely to involve cooperative engagements between various sensors from numerous widely dispersed platforms all working together within a Network Centric Environment.

A P-3C Orion takes-off at Naval Air Station Whidbey Island as two other P-3C Orion patrol aircraft are prepared for flight. (US Navy photo by Photographer's Mate 2nd Class Michael Larson.)

Navy Fleet Response Plan (FRP)

In conjunction with the release of a new Fleet Response Plan (FRP), the Navy is re-emphasizing its requirements on ASW in an effort to maintain proficiency and increase the efficiency of future ASW forces. The Navy's Fleet Response Plan, driven by readiness requirements, provides for a greater range of Naval options, changing Fleet Operations from a consistent, forward-deployed force to a "Surge" force. With a surge capable fleet, the Navy can quickly respond to crises around the world. With predictability now a liability in a world of terrorist attacks, this concept established an unpredictable Naval Force. The FRP gives warfare planners more flexibility when it comes to employing Naval Forces. In regards to the P-3C Orion, the FRP drives realignment of existing P-3C Fleet operations, crew training and integration of new equipment, in order to support a renewed emphasis on ASW, despite challenges such as budgetary restraints, and aircraft sustainment and availability. The new fleet ASW requirements come at a time when the Navy's aging P-3C Fleet is experiencing airframe fatigue issues, and limited assets for high-tempo operational commitments and worldwide deployments.

Fatigue Crisis

When the US Navy began fiscal year 04, it had approximately 227 P-3C Orion aircraft. As a result of findings under the P-3C Service Life Assessment Program (SLAP), and inspection work associated with the P-3C Sustainment Program, that number will drop to 176 by October 1st, 2004 – which is the beginning of the next fiscal year. The Navy's P-3C SLAP determined that fatigue cracks were most likely developing in the wing structures of well over half the P-3C fleet. In conjunction with SLAP, the P-3C Sustainment Program, initiated several inspections and pre-emptive repair projects to address fatigue issues in order to sustain the life of the current P-3C fleet until the MMA replacement aircraft for the P-3 comes on line in 2020.

Under P-3C sustainment, three projects will inspect, repair and/or replace aircraft structures that are predicted to fail, potentially leading to a catastrophic event. Special Structural Inspections (SSI) inspect those aircraft that are suspected of having significant fatigue damage, and have limited service life remaining. SSI focuses on fatigue-prone areas of the outer and center wing of the P-3. Approximately 66 aircraft

fall within this category, and will have to be inspected every 27 months for the length of the aircraft's service.

The Enhanced Special Structural Inspection (ESSI) program encompasses more specific pre-emptive fatigue area material replacement of the outer wing along with the inspection of the center wing. ESSI is the near- term solution to address fatigue issues of the Navy's most valuable

Naval Air Station North Island, Calif. (Jan. 30, 2003) – A P-3C Orion patrol aircraft assigned to the "Skinny Dragons" of Patrol Squadron Four (VP 4), takes off from Naval Air Station North Island. VP-4 was participating in exercises with the nuclear powered aircraft carrier USS Nimitz (CVN 68) Carrier Strike Group. (US Navy photo by Senior Chief Photographer's Mate Mahlon K. Miller.)

AIP assets. Approximately 44 aircraft will receive ESSI. The Special Structural Inspection Kit (SSI-K) program is the long-term solution to sustain an additional 63 high value P-3C aircraft. SSI-K includes large-scale material replacement of the outer wing, center wing and adjacent structure. This unpredicted situation of sustaining the existing P-3C Fleet constitutes a fatigue crisis, and has seriously impacted and complicated the FRP schedule and ASW training processes. It is also the Navy's mandate to further reduce the P-3C fleet down to 148 aircraft by end of FY 2005.

The Navy, hampered by these aircraft fatigue issues, continues to modify P-3C UD III aircraft with AIP Kits. AIP equipped aircraft currently stand at 62 with a total of 73 kits funded. The Navy is planning to modify more aircraft to relieve mission-tired AIP aircraft operating in Afghanistan and Iraq. The last five funded kits to be installed will be incorporated into P-3C UD II.5 airframes. In some cases, fatigue and corrosion damaged AIP aircraft are being re-winged with wings donated from some of the 30 P-3C aircraft retired from service in FY 2004. This is a result of a realignment of the service life expanded index for the P-3C Fleet from technical data derived under P-3SLAP.

Mission-capable AIP aircraft will join BMUP enhanced aircraft and be further upgraded with the USQ-78B acoustics-suite upgrade. This upgrade deals directly with obsolescence in the acoustic-suite of Update III aircraft. The mod enhances the acoustic capability by adding an Improved Extended Echo-Ranging (IEER) system through the employment of new Air Deployable Active Receiver (ADAR) sonobuoys.

Further influenced by the integration of Navy Reserve Squadrons over the next 3-5 years, and the availability of mission capable aircraft, the FRP will institute a "Tiered Inventory Approach" for the Navy P-3C. This encompasses altering the deployment of squadrons from a 12/6 home/deployment cycle to an 18-month home and a 6-month deployment cycle. This effort will help the control the fatigue index of aircraft nearing the end of their useful FLE and provide opportunity for others to be inspected and repaired, to remain in service until the proposed replacement MMA aircraft is procured. With more squadrons at home for longer periods, more ASW training can be accomplished. With fewer mission-capable aircraft available in the fleet, the tiered approach provides for the tactical distribution of aircraft with approximately 10 to 15 ASW-capable aircraft pooled at the Wing level. Here ASW assets will be shared amongst the resident squadrons for ASW proficiency training. The Patrol Wing will coordinate ASW assets and training. In the past, one-half of all airborne mission training time has been devoted to ASW, with a third of the time concentrating on ASuW. The remaining time has gone to train crews in support of Intelligence, Surveillance and Reconnaissance, counter-narcotics and Special Operations missions. Under the new FRP, ASW training will increase greatly, and consume most of the training regimen.

The current P-3C ISR mission, such as overland ops in Afghanistan and Iraq, may eventually be taken over by Maritime UAVs. The proposed high altitude broad area surveillance missions will be flown by the BAMS UAV with a sophisticated tactical missions system.

Technology – Sensors

With a refocus on ASW, technological advances in mission systems must be employed to combat the threat. One area of advancement is in processing power, as it applies in combination with new and improved acoustic and non-acoustic sensors. More processing power can greatly enhances detection capabilities.

Under the Navy's BMUP (USQ-78A) upgrade, new, color, tactical display-and-control-system elements were incorporated into the P-3C UDIII aircraft's UYS-1 Acoustic Suite. The USQ-78B acoustic upgrade adds greater processing power to the existing UYS-1 system, as well as interfaces (to AIP) and software upgrades. This provides the operators with increased detection capabilities when coupled with the (IEER) System. The upgrade provides for workload sharing in relationship to an open-architecture system in support of Network Centric Warfare. The USQ-78B upgrade supports the fleet's need for a large-area

Aviation Warfare Systems Operators 2nd Class Matthew L. Delahunt and Theresa R. Donahue monitor video displays of the Sensor One and Sensor Two stations aboard a P-3C Orion aircraft assigned to the "Golden Eagles" of Patrol Squadron Nine (VP-9), during a mission to the Republic of the Philippines. (US Navy photo by Photographer's Mate 1st Class Edward G. Martens.)

search capability to detect small, quiet submarines operating in shallow water.

The USQ-78B essentially supports the addition of the ADAR sonobuoy. The new AN/SSQ-101 ADAR active receiver sonobuoys consist of improved algorithms to power the Extended Echo Ranging deep water search capability into the littoral shallow waters. They employ a multi-element planar hydrophone array to improve the aircraft's shallow water detection capability and effectively prosecute targets in the littoral. Other new ASW sensor improvements being incorporated into the P-3C AIP aircraft fleet include the ASQ-208(V)1 Digital MAD. This new Digital MAD provides improved range finding with a digital display output to the new MAD display.

Training

The ASW skills to counter this conventional submarine threat require quality training, development of new tactics, and the opportunities to train the fleet accordingly. As the fleet refocusses on ASW, the Navy must re-examine its acoustic / non-acoustic training requirements and regimens to retain perishable ASW skills, and increase efficiency with the new ASW equipment.
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Challenging the mission crews increases proficiency. New equipment means new training requirements to operate them optimally. The Navy is establishing new ASW training improvements through revised classroom curriculums at its FRS and Reserve Training Units, as well as through new training schemes at Fleet Patrol Wings. In this regard, the FRP addresses P-3C training issues. These issues will always be dependent on mission-capable aircraft availability. To mitigate these factors, ASW aircraft will be assigned to the Patrol Wing , which will coordinate ASW mission training amongst the resident squadrons.

In April 2004, a Fleet Antisubmarine

Chief Aviation Electrician's Mate Perry Long, a flight engineer instructor at the Commander, Patrol and Reconnaissance Wing Two Training Facility watches aircrew respond to a scenario he programmed at the operator station in the 2F-87 Operational Flight Trainer, a full motion P-3C Orion aircraft flight simulator. Aircrew personnel from Patrol Squadron Four (VP-4) and other Hawaii-based P-3C squadrons routinely train at the facility to maintain mission readiness. (US Navy photo by Photographer's Mate 1st Class William R. Goodwin.)

Warfare Command (FASWC) was established in San Diego to ensure the Navy Warfighters can neutralize enemy submarines. The FASWC will be tasked to integrate advanced ASW networks within the fleet, as well as establishing new ASW doctrines and new operations concepts. It will define Fleet ASW Policy for the integration of renewed ASW Training as stated by the FRP. As new ASW training is established, technology figures prominently in support aspects of that training. P-3C Flight Trainers for example, are being upgraded with more sensitive, high-fidelity motion and visual stimulation to a Class "D" Level equivalent to commercial simulators. The cockpit simulators will be further upgraded to the current AIP configuration and coordinated to mirror the real-world environment of ASW Warfare. The simulator upgrade replaces the need for actual flight time in the aircraft, saving wear and tear on the remaining aircraft, as well as money on fuel and pilot proficiency training.

In the case of Weapons Systems Trainers (WSTs), they too are being upgraded with stimulation and simulation technology to mirror the real-world target environment. These operational mission trainers and simulators will be upgraded with the aforementioned new high-definition stimulation equipment to provide realistic training. Additionally, the Navy is looking at the installation of On-Board Training systems (OBTs) for real-time ASW training onboard ASW mission capable aircraft. This will further assist Squadron ASW training at the Patrol Wings. These advances to training will in turn provide better opportunities to hone ASW skills and develop new tactics.

Increased equipment capabilities derives new tactics development. A resurgence of ASW operations requires the basic skill set and proficiency of the P-3C operators to be renewed. For ASW tactics development, Wing Tactics Units (WTUs) are proposed to be established at each Patrol Wing. With old ASW tactics revised, the WTUs will develop, conduct and implement new tactics, and support the training, and implantation of those new tactics into resident Patrol Squadrons. These new ASW tactics will be derived in association with the Network Centric arena.

Network Centric

Network Centric Warfare is derived from working within a multi-sensor, data-fusion, multi-static environment. The P-3C is an important component of the Network centric battlefield. In ASW operations, the P-3C establishes important communication links with all air assets and ASW ships coordinating the operations. The P-3 can utilize its organic sensors in coordination with tactical ASW data received from others platforms engaged in the operation, to assist in the detection, location, identification and prosecution of the target submarine, often in less time than it took during the Cold War.

MMA

Although the FRP constitutes changes within the existing Navy P-3C Fleet, the plan further addresses the requirements of the future fleet replacement aircraft: the MMA. Originally defined as a Multi-mission Maritime Aircraft, it has been reorganized as the Navy's core ASW warfare aircraft. MMA will transform how the Navy trains, mans, operates and deploys MPA in the future. MMA will be more ASW combat capable than the existing P-3 fleet, but with a smaller force. With the addition of an open-architecture mission system, the MMA will be inherently capable of multi-mission operations, including armed ASuW and ISR, but the primary mission will be ASW! This is, after all, a core competence of the Navy, and must be able to detect the weak signals of conventional quiet submarines. The current P-3C ISR mission, such as overland ops in Afghanistan and Iraq, may eventually be taken over by Maritime UAVs. The proposed high-altitude, broad-area surveillance missions will be flown by the BAMS UAV with a sophisticated tactical missions system.

About the Author

David Reade is the Manager, P-3 Business Development, International Marketing for IMP Aerospace located in Halifax, Nova Scotia Canada. He is also a freelance journalist who has written numerous informative articles on the P-3 Orion, its systems, missions and capabilities for over ten years as a staff writer associate with Lockheed Martin's ASW Log and Airborne magazines. He has also been a regular contributor to VP International's Maritime Patrol Aviation magazine since 1989. David has flown P-3s all over the world and is considered a leading authority on the aircraft. It is this experience and knowledge that led David to write The Age of Orion, a book detailing the developmental history, roles, missions, capabilities and systems of the P-3 Orion.