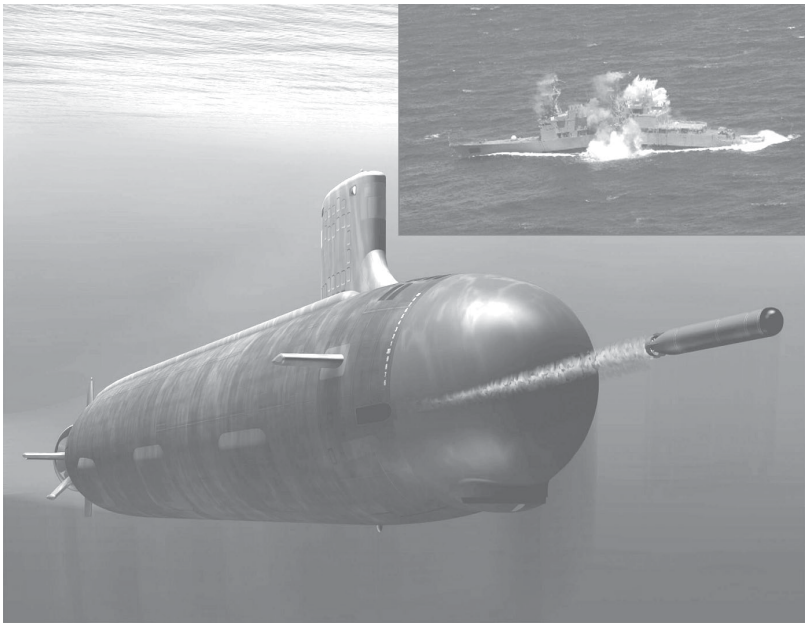
MK-48 Advanced Capability (ADCAP) Torpedo Modernization

SUMMARY

- Parts obsolescence requires replacement of Mark 48 Mod 6 Advanced Capability (ADCAP) Torpedo guidance and control hardware and a rewrite of torpedo software. Regression testing of baseline capabilities will occur in FY05.
- The Mark 48 Mod 7 Common Broadband Advanced Sonar System (CBASS) torpedo modernization began initial developmental testing this year.
- Warshot reliability remains a high priority and the program plans to extend its warshot-testing plan.
- DOT&E approved the Mark 48 Advanced Common Torpedo Guidance and Control Box (ACOT-GCB) torpedo Test and Evaluation Master Plan (TEMP) in November 2004.
- DOT&E approved the Mark 48 CBASS torpedo TEMP in October 2004.



Mark 48 ADCAP Torpedo provides submarines a single torpedo type for destroying ships and submarines.

SYSTEM DESCRIPTION AND MISSION

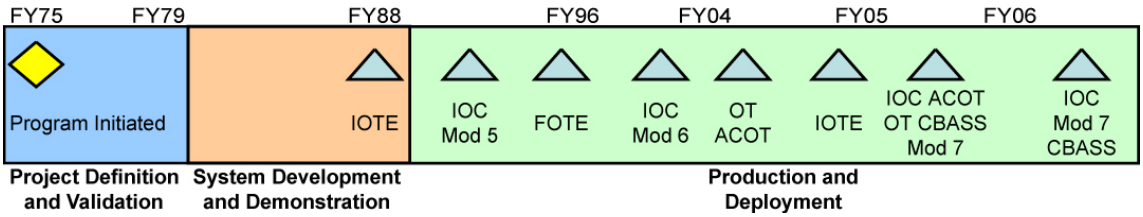
Mark 48 ADCAP Torpedo provides submarines a single torpedo type for destroying ships and submarines in the both deep water open ocean or shallow water littoral environments.

The fleet baselines for ADCAP Torpedo are the Mark 48 Mod 5 and the Mark 48 Mod 6. The Navy plans to introduce a follow-on version of the Mark 48 Mod 6, called the Mark 48 ACOT-GCB, in FY05 in order to replace obsolete components. The next-generation torpedo, the Mark 48 Mod 7 CBASS, planned to start testing in FY05, will incorporate ACOT-GCB parts. The CBASS torpedo is part of a cooperative development program between the United States and Australia.

The Navy designed the ACOT-GCB torpedo to replace obsolescent hardware in the Mark 48 Mod 6. The replacement hardware components are to be "form, fit and function" replacements. The software was rewritten into the C language to conform to the new hardware and to enable open design architecture. The Navy expects ACOT-GCB performance to be similar to the Mark 48 Mod 6. ACOT-GCB operational testing begins in December 2004.

Several software builds are currently under oversight. Block III upgrade is the final tactical software upgrade to the Mark 48 Mod 5. Block IV extends Block III capabilities and applies them to the Mark 48 Mod 6 weapon. The more sophisticated CBASS software follows the Block IV. In lieu of future Block Upgrades, the program plans to employ a series of advanced processor builds (APBs) to both the Mod 6 and CBASS weapons as a more flexible means of introducing software changes. APB testing begins in FY05.

TEST AND EVALUATION ACTIVITY



There was no dedicated operational testing in FY04, but the Navy did conduct numerous ADCAP torpedo exercises. These included four Prospective Commanding Officer exercises, including one exercise conducted jointly with the Royal Australian Navy.

The Navy conducted a sinking exercise (SINKEX) in the Pacific of the ex-USS *John Young* (DDG 973) in April 2004. The event consisted of firing one Mark 48 Mod 6 exercise torpedo, for data collection purposes, and one Mark 48 Mod 6 warshot torpedo to sink the destroyer.

DOT&E participated in drafting the TEMP revisions for the ACOT-GCB, and CBASS programs. The Navy plans an operational test for ACOT-GCB in FY05 and for the initial phase of CBASS developmental testing in FY05. For ACOT-GCB, which is designed to deliver the same performance as the legacy Mod 6 hardware, DOT&E supports plans to test the two guidance and control sections side-by-side in the Navy's Weapons Analysis Facility (WAF) hardware-in-the-loop simulator. A limited set of in-water confidence tests will supplement data from these simulations. The verification, validation, and accreditation of the WAF completed in FY04. DOT&E approved the Mark 48 CBASS TEMP in October 2004. DOT&E approved the Mark 48 ACOT-GCB TEMP in November 2004.

TEST AND EVALUATION ASSESSMENT

Following the failure of two Mark 48 Mod 6 warshots during a 2003 SINKEX, the Navy conducted an investigation and determined that weapon reliability was the likely cause. In response, the Navy instituted a flag-level Warshot Reliability Action Panel (WRAP), designed to focus on torpedo production, maintenance, and reliability issues. One of the panel's recommendations was an immediate increase in warshot test firings. The Navy prepared for two separate warshot tests near the end of 2003; however, circumstances beyond the Navy's control cancelled both events. In April 2004, the Navy conducted a successful SINKEX with torpedoes deliberately chosen from a batch with predicted low reliability. The positive results were gratifying, but the Navy needs to continue to test in order to better understand and improve weapon reliability.

DOT&E participated in the validation process for the WAF, which the program accepted in August 2004. Overall, compared to earlier WAF validation efforts in 1997, the recent WAF runs were more repeatable and consistent with in-water data. Much of this appears to be due to improvements in the simulation, particularly with respect to target and environmental modeling. While it is inappropriate to rely solely on the WAF to generate actual torpedo effectiveness results for purposes of operational testing, the simulation should provide a test bed for the side-by-side comparisons planned for the ACOT-GCB OT&E and for regression testing.

The new level of cooperation between the U.S. Navy and the Royal Australian Navy provided valuable opportunities for training and testing, particularly against diesel-electric submarines. In addition, the Australian and U.S. joint CBASS program is developing a portable tracking range for CBASS testing in Australia. However, some torpedo performance questions remain unresolved due to inadequate test and evaluation resources and funding provided by the Navy. For open-ocean shallow water exercises, the tested torpedo's internal monitoring equipment is the only source of data, resulting in post-run analysis biases and errors. Development of other mobile test ranges or other independent instrumentation will alleviate shallow water testing shortfalls. As a more permanent solution, given the high priority of the diesel submarine threat, an instrumented shallow water test range in a threat representative environment would aid in maturing littoral Submarine Warfare tactics and torpedo performance improvement in shallow water. The cumbersome nature of open ocean torpedo firings, coupled with seasonal marine mammal habitat restrictions at many locations, has significantly lengthened development cycle times. The Navy needs to support funding for a viable instrumented shallow water test range.