

## MK 48 ADCAP TORPEDO UPGRADES



The Mk 48 ADCAP torpedo is a submarine launched, heavyweight acoustic homing torpedo. It includes all digital guidance and control (G&C) systems, digital fuzing systems, and an advanced propulsion system for improved speed, depth, and range capability. For the submarine force, the Mk 48-class torpedoes are the only weapons currently carried for attacks on enemy submarines and surface ships.

The Fleet baseline ADCAP is designated the Mk 48 Mod 5. A 1995 upgrade, designated Mk 48 Mod 6, features an improved G&C section and a Torpedo Propulsion Upgrade (TPU). Development of a follow-on hardware change to the Mod 6 ADCAP, called the Advanced Common Torpedo Development Vehicle (ACOT-DV), has been delayed for several years. It will be incorporated into the next-generation torpedo, the Common Broadband Advanced Sonar System (CBASS), planned for FY05.

Three software builds are currently under oversight. Block Upgrade III is the final tactical software upgrade to the Mod 5. Block IV was designed to extend Block III capabilities and apply them to the Mod 6 weapon. The more sophisticated CBASS software is planned to follow 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 Mod 7 weapons, as a more flexible means of introducing software changes. More information on the hardware and software improvements are contained in the classified report.

### **BACKGROUND INFORMATION**

The Mod 5 ADCAP torpedo OPEVAL and B-LRIP report were completed in 1988, with FOT&E in 1991 on Software Block Upgrade I. In 1994, Block Upgrade II was introduced to improve performance. DOT&E assessed ADCAP to be operationally effective following this improvement, but some areas remained unsatisfactory. OPEVAL of Block III was completed in FY97.

The Mod 6 ADCAP, intended to address open issues from previous OT&E, was tested in 1995 and reported in the 1996 B-LRIP report. DOT&E assessed the Mod 6 ADCAP to be both operationally effective and suitable. Although the reliability was marginally below threshold, DOT&E identified the Mod 6 ADCAP as producing a total performance much better against the expected threat than the Mod 5 ADCAP.

Developmental testing for Block IV was completed at Cape Cod in October 1998.

## **TEST & EVALUATION ACTIVITY**

In FY01, the Navy maintained a robust schedule of other ADCAP torpedo exercises. These included four Prospective Commanding Officer exercises, one of which was conducted jointly with the Royal Australian Navy. Another forward-area torpedo exercise provided valuable data from an actual threat environment. Also, OPEVAL of Block IV software was completed in early FY01.

## **TEST & EVALUATION ASSESSMENT**

The results of the Block IV testing are commented on in the classified version of this report.

Since safety considerations preclude actual target intercepts during exercise firings, warshot performance must be assessed separately. In recent combined-arms SINKEXs, naval surface and air units have destroyed the target before the submarine had a chance to fire a torpedo. Since the surface and air attacks, while good training, are of limited operational value and given the limited availability of hulk targets, warshot torpedo firings should be given a higher priority during SINKEXs.

Torpedo reliability, as described in previous Annual Reports, remains a concern. These failures highlight the overall problem of ADCAP reliability, which continues to run in cycles. In addition to the issues discussed above, work force reductions at the weapon's depots may also threaten the fleet's ability to process weapons quickly and accurately.

## **LESSONS LEARNED**

As cited in previous reports, some performance questions remain unresolved due to inadequate T&E resources and funding. 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. DOT&E believes that development of an inexpensive mobile test range, or other independent instrumentation, is necessary to alleviate shallow water testing shortfalls. As a more permanent solution, DOT&E believes that, given the high priority of the diesel submarine threat, an instrumented shallow water test range would help hasten maturation of littoral ASW tactics and improvement in shallow water ASW torpedoes. The cumbersome nature of open ocean torpedo firings, coupled with seasonal marine mammal habitat restrictions at Cape Cod, has significantly lengthened development cycle times. Congressional funding support for a viable instrumented shallow water test range is strongly recommended.

Additional emphasis should be placed on warshot firings to verify the weapon's ability to hit and sink both surface and subsurface targets.

DOT&E supports the flexibility of the APB approach, but will continue to insist upon complete and rigorous testing of all upgrades.

Side-by-side test and evaluation of ADCAP software variants, although on the surface more expensive, might be more cost-effective in the larger scheme because less time might be lost if side-by-side test and evaluation are performed. Right now, disagreements between operational testers and developers are attributable to results taken in arguably different and difficult-to-reconcile environmental and tactical conditions. Side-by-side testing would narrow that gulf. Thus, DOT&E again recommends that future ADCAP test and evaluation be done in a side-by-side manner.