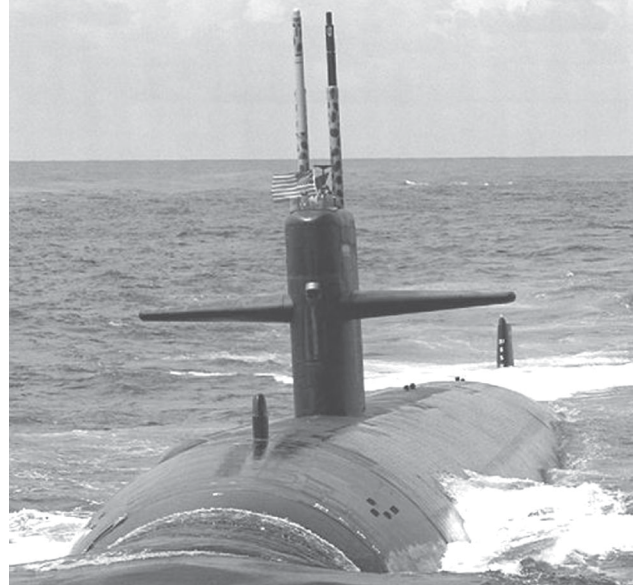


Acoustic Rapid COTS Insertion (A-RCI) AN/BQQ-10 (V) Sonar System

SUMMARY

- The Navy is revising the Acoustic Rapid Commercial Off-the-Shelf Insertion (A-RCI) Test and Evaluation Master Plan (TEMP) to update the test concept and to incorporate using Capability Development Documents (CDD) and Capability Production Documents (CPD). The revised TEMP and CDDs/CPDs should be approved in FY05.
- The Navy intends to complete a new Advanced Processing Build (APB) for A-RCI each year. Plans are to observe testing throughout the development process and to conduct an operational test on each variant.
- A-RCI APB-00 Phase III and Phase IV completed operational evaluation (OPEVAL) in September 2003. The Navy has not operationally evaluated A-RCI APB-01, APB-02, and APB-03.
- A-RCI APB-00 did not meet its effectiveness or suitability thresholds. However, A-RCI is an improvement over existing legacy systems.
- The Navy continues to deploy submarines with A-RCI APB systems that have not completed operational testing.



A-RCI uses installed legacy sensors and replaces central processors with COTS personal computer technology and software installed in an open architecture.

SYSTEM DESCRIPTION AND MISSION

The Navy initiated the A-RCI AN/BQQ-10 (V) Sonar System as Engineering Change 1000 to the AN/BSY-1 Combat System on improved *Los Angeles* class submarines. The concept uses installed legacy sensors and replaces central processors with COTS personal computer technology and software installed in an open architecture. A-RCI allows for faster, more economical, and more frequent hardware and/or software upgrades. The program expanded to provide improvements that could be back-fit into all nuclear attack (SSN) and ballistic missile (SSBN) submarines totaling over 60 ship sets.

These improvements provide expanded capabilities, particularly in littoral waters, for covert intelligence collection and surveillance and covert insertion and support of Special Forces. Expanded capabilities for anti-submarine warfare focus on diesel-electric submarines, covert mining, and covert strike of targets ashore. Specific software improvements include passive ranging, spatial vernier processing, full spectrum processing, dual towed array concurrent processing, low frequency active interference rejection, passive broadband, passive narrowband and passive detection, tracking processing, track management, onboard training, and port/starboard ambiguity resolution.

The operational test and evaluation plan for A-RCI features four phases followed by periodic testing as evolutionary upgrades are made to the hardware and/or software. A-RCI Phase I added initial improvements to the towed array processing and added the TB-29 towed array.

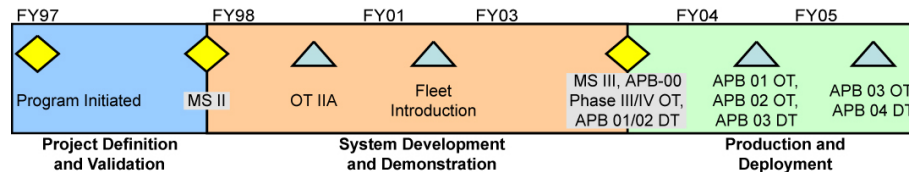
Phase II was the first implementation of the towed array improvements. When DOT&E placed the program on oversight in 2001, Phase II testing was already underway. The Navy provided insufficient submarine test resources for Phase II, resulting in the deployment of Phase II equipped ships without operational testing. The Navy did not complete Phase II testing due to repeatedly cancelled tests and equipment failures. As a result, Phase II evaluation was conducted in conjunction with Phase III and Phase IV testing.

NAVY PROGRAMS

Phase III is a major replacement of the sonar processing hardware and software for the towed array, hull array, and the spherical array. The Navy certified Phase III for testing in March 2002.

Phase IV is an upgrade to the high frequency mine hunting and ice avoidance sonar. The Navy certified Phase IV for testing in August 2002. APB-00 was the baseline version for A-RCI Phase III and Phase IV testing. The Navy's plan is to develop and release software improvements, called APB, annually and to update equipment, called Technology Insertions (TI), every other year. Currently APB-01, APB-02, APB-03, and TI-02 are in development.

TEST AND EVALUATION ACTIVITY



A-RCI Phase IV OPEVAL testing completed in February 2003. A-RCI Phase III OPEVAL testing completed in September 2003. The Navy continued to develop improvements to A-RCI and developed APB-01, APB-02, and APB-03 software upgrades and TI-02 technology insertion to A-RCI. The Navy has not certified these upgrades ready for operational testing. Poor system reliability, delays in APB software development, installation and integration problems, and a lack of test assets prevented evaluation of these upgrades. To gain insight into system performance, the Commander, Operational Test and Evaluation Force (COMOPTEVFOR) is observing development testing on system upgrades in the laboratory and at sea.

Detailed planning for the subsequent testing of scheduled APB upgrades was a priority during 2004. Significant effort to integrate at sea testing with other scheduled operations has resulted in some developmental test system performance observations. Draft CDD and CPD documentation for each of the upgrades has been prepared and reviewed.

TEST AND EVALUATION ASSESSMENT

COMOPTEVFOR found the Phase III systems to be effective, but not suitable, and the Phase IV systems to be not effective and not suitable. DOT&E agrees with the suitability assessments. However, using the OPEVAL data, Phase IV met 94 and 111 percent of the two detection performance thresholds, while Phase III achieved only 127, 73, and 34 percent of its three search performance thresholds. Phase IV performance is clearly better than the legacy system it replaced. The Phase III superiority is less clear, particularly when operating in some environments and in the areas of target classification and localization.

The procurement, installation, and deployment of A-RCI Phase II, III, and IV systems continued in 2004 despite the lack of operational testing of the latest APBs. In addition, complete developmental testing and reporting on the newer builds has not occurred. Currently 24 (plus) submarines have A-RCI versions (APB-01, 02, 03, or TI-02) installed that have not been operationally tested. The Navy should work with COMOPTEVFOR and operational commanders to complete these tests. New ship set installations continue to have integration problems with legacy systems as well as continued reliability, crew training, and documentation issues. Navy development of new APBs should be event-based to ensure lab and development testing, crew training, and operational testing and evaluation are completed and major deficiencies addressed before fielding the next APB.