

ARCHIVED REPORT

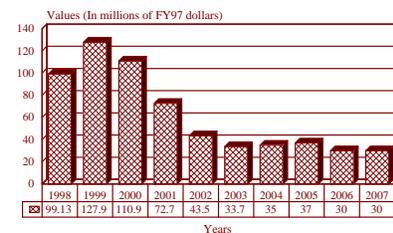
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EW Development (Navy) - Archived 2/98

Outlook

- Technology-based development efforts
- Congressional funding added in FY97
- Funding levels vary as projects are completed/added

10 Year Value of Production Forecast
1998 - 2007



Orientation

Description. PE#0604270N consolidates many of the Navy's electronic warfare development efforts under a single line. The efforts include radar warning receivers, deceptive jammers, infrared jammers, and expendable devices.

Sponsor

US Navy

Naval Air Systems Command
NAVAIR HQ
47123 Buse Rd Unit IPT
Patuxent River, Maryland 20670-1547
Tel: +1 (301) 342-3000

US Navy

Naval Sea Systems Command (NAVSEA)
2531 Jefferson Davis Highway
Arlington, Virginia (VA) 22202
USA
Tel: +1 703 602 3381

Contractors. Vary with R&D effort changes.

Status. This is an ongoing system development effort.

Total Produced. This is a development program only.

Application. This program develops electronic warfare systems and upgrades for tactical aircraft, helicopters, surface combatants, data-link vulnerability assessments, communications and non-communications jammers, EW devices for emergency contingencies, operational deception systems, and exploratory electronic warfare technology.

Price Range. Indeterminate.

Technical Data

This element includes development of electronic warfare systems for Navy, Marine Corps, and Army tactical

aircraft, helicopters, surface combatants, data-link vulnerability assessments, communications and non-commun-

ications jammers, and for the development and testing of electronic warfare devices for emergency contingencies.

Variants/Upgrades

Many of the developments of this program will be used to upgrade existing systems.

Program Review

Background. This information is based on the latest Program Descriptors.

Project C1961, Mobile Electronic Warfare Support System (MEWSS). The Mobile Electronic Warfare Support System (MEWSS) is an electronic warfare suite of equipment configured in the highly mobile, survivable light armored vehicle. This program develops a material change for the current, outdated electronic warfare suite. Threat tactical communications are rapidly advancing to complex, advanced modulations requiring computer-intensive, open architecture solutions.

MEWSS fulfills the requirement to provide responsive EW support to maneuver commanders, which enhances the ability to defeat the enemy by isolating and suppressing the opposing fire control and command and control nets at a critical point of time in the battle. MEWSS will provide electronic over-watch of the entire electronic spectrum, freeze the enemy in place and help eliminate enemy counter-fire. MEWSS accomplishes this by detecting and locating threat sensors and advanced communications and also jamming advanced threat tactical communications.

MEWSS incorporates Army Intelligence and Electronic Warfare Common Sensor (IEWCS) electronics including the TACJAM-A EW/Communications Intelligence subsystem, Communications High Accuracy Location System-Exploitable, and the Common Module Electronic Intelligence (ELINT) system.

In FY90, the engineering analysis needed to increase onboard power was completed. A prototype of the power increase hardware was completed and installed in the engineering development system. The Navy approved the modification installation of the new MEWSS power system and initiated a thermal design study to overcome cooling problems.

FY91 plans called for completing the integration of the MEWSS Test Bed System, and conducting an evaluation of the Test Bed. Plans also called for beginning engineering of an "approved" Test Bed System in to the MEWSS LAV. Engineering of the new thermal design was to be completed. Personnel would also initiate engineering of the Land Navigation System into the

MEWSS Product Improvement effort. Power distribution engineering was also to be completed.

FY92 called for testing the MEWSS prototype and completion of the Product Improvement engineering design.

The following accomplishments/plans include milestone dates and/or cost estimates (in US\$ thousands) for that specific item.

There was no activity in FY93.

In FY94, activities were funded under Program Element (PE)0305885G, National Security Agency Tactical Cryptologic Program. The program conducted a Milestone II on the restructured program. Engineers completed integrating the IEWCS Engineering Development Model (EDM). The MEWSS Developmental Test (DT) emphasized only MEWSS-unique items; whereas, Army IEWCS DT results were used to the maximum extent possible.

The FY95 plan was to integrate the objective Communications High Accuracy Locations System - Exploitable (CHALS-X) subsystem into the MEWSS EDM (US\$527,000). Engineers also planned to design and install the MEWSS Product Improvement Program (PIP) reporting data link hardware (US\$229,000) and initiate Integrated Logistics Support (ILS) documentation for the effort (US\$100,000). They would also design and install the MEWSS PIP power unit and power distribution system (US\$700,000). Plans also included completed IEWCS equipment integration and factory testing (US\$750,000). Program personnel would participate in Army Limited User Testing of IEWCS systems (US\$200,000).

The following accomplishments were funded in PE0605873M, Marine Corps Program Wide Support, Project C0033, Marine Corps Operational Test and Evaluation Activity. Planners would conduct an Initial Operational Test and Evaluation (IOT&E) and publish an Independent Evaluation Report (IER) for MEWSS PIP (US\$110,000).

Navy funding for this project ended in FY96.

Project E0556 - EW Counter Response (EA-6B Advanced Capability (ADVCAP). The EA-6B Weapon System is

designed for jamming and destruction of enemy land-based, shipborne and airborne command, control and communications systems and radars associated with early warning, target acquisition surveillance, anti-aircraft artillery, target acquisition, surface-to-surface and surface-to-air missiles. In this capacity, it will support carrier-based tactical aircraft and battle group operations in dense radar-controlled environments.

The efforts under this PE provide for the electronic countermeasure response to these advanced threat weapon systems and C3 networks which are expanding in density and technical complexity. This PE funds the continuing development or integration of all EW systems for the EA-6B Electronic Countermeasures Support Aircraft.

In FY90, the Navy conducted a reliability development and weapon replaceable assembly maintainability demonstration on the ALQ-149. Contractor flight testing and ALQ-99 ADVCAP RPG development continued. HARM Block III/IV integration continued. The Navy conducted a preliminary evaluation of the RPG.

During FY91, the Navy continued qualification testing, Reliability Development Testing (RDT) and Electro-magnetic Interference (EMI) testing on the RFG. Engineers continued PCM software development for initial baseline ADVCAP capability, continued integration of RPG and ALQ-149 on the EA-6B, and continued software development and logistics support development for the RFG and ALQ-149 (ADVCAP). Planners continued Contractor integration/test Band 2/3 Transmitter and commenced the Universal Exciter Upgrade (UEU) study.

The Navy also began the Coherent Countermeasure Program for the EA-6B. Planners completed Navy Developmental and Operational flight testing on HARM block III/IV and commenced Technical Upgrade for Teams (TUT) and ADVCAP TEAMS (ATEAMS).

FY92 accomplishments included software development and logistics support for the RPG and ALQ-149 (ADVCAP), continued integration of the RPG/ALQ-149 on the EA-6B ADVCAP. The Navy began the Universal Exciter Unit Program and continued the COCM and PCM Programs. Planners conducted developmental and operational testing to support the RPG and ALQ-149 Milestone IIA decisions. Engineers continued qualification testing, Reliability Development Tests (RDT) and EMI testing on the Radar Processor Group. They also continued Technology Upgrade for TEAMS (TUT) Tactical EA-6B Mission Support (TEAMS) and ADVCAP TEAMS (ATEAMS) integration.

In FY93, engineers continued software development, logistics and test support for Radar Processor Group

(RPG) and ALQ-149 (ADVCAP) (US\$16.898 million) and integration of the RPG and ALQ-149 on the EA-6B ADVCAP (US\$4.852 million). They also continued the Universal Exciter Unit Development Program (US\$30.000 million), COCM and PCM programs for the EA-6B (US\$4.650 million), contractor acceptance test for Band 2/3 (funding N/A), and delivery of Band 2/3 Engineering Development Models (EDM) 1 through 5 (funding N/A). The Navy continued Band 2/3 qualification and Electro Magnetic Interference (EMI) testing (US\$682,000) and the Technology Upgrade for Teams (TUT) and ADVCAP Teams (ATEAMS) integration (US\$2.520 million).

The program office also began the groundwork for integration of the Software Development Station (SDS) at the Naval Air Warfare Center Weapons Division, Point Mugu, California (US\$200,000), and completed OT-IIA testing of ALQ-149/RPG in support of Milestone IIA (US\$1.240 million)

In FY94, the effort completed a wing fatigue study analysis (using US\$300,000 in FY93 funding). Engineers began developing and integrating the Universal Exciter Upgrade (UEU) into Improved Capability (ICAP) II aircraft (with US\$2.477 million in FY93 funding). Planners continued software and Jammer technique development and test support for ICAP-II development programs (US\$8.193 million FY93 funding). Planners began a Joint Tactical Air Electronic Warfare Study (JTAEWS) (US\$5.000 million in FY94 funding) and integration studies of ALQ-149 into EA-6B ICAP-II (US\$5.845 million FY94 funding). Developers completed delivering Band 2/3 Engineering Development Models 1 through 5.

The Navy terminated the EA-6B ADVCAP program. Congress began pressuring the service to develop a lower-cost upgrade for the Prowler. The Navy was encouraged to use prior-year funds to upgrade their premier jammer.

The Navy's FY95 plan was to use US\$3.483 million in FY94 funding and US\$2.556 million in FY95 funds to continue software and techniques development and test support for ICAP-II development programs. Planners would take delivery of seven (7) UEU EDMs, and complete the ICAP-II UEU follow on test and evaluation (FOT&E) (OT-III/SEP 95). Engineers would complete the UEU development program and integration on ICAP-II (US\$16.4 million FY94 funding). They also planned to complete JTAEWS (US\$1.0 million FY94), begin the low-band transmitter development program (US\$2.0 million FY95 funds), and develop enhanced joint C2W capabilities associated with the Air Force EF-111A termination (US\$3.0 million FY95). The program office would continue the Coherent Countermeasures (COCM) and Proforma Countermeasures (PCM) programs for the

EA-6B. The level of effort would be commensurate with available funds.

In FY96, the Navy spent US\$2.414 million to continue software and techniques and test support for ongoing new threat development and testing in ICAP-II. Engineers completed a Universal Exciter Upgrade (UEU) Operational Evaluation (OPEVAL) and passed Milestone III. Production contract, Aircraft Procurement Navy - Budget Activity 5, awarded in September 1996. Planners continued the Coherent Countermeasures (COCM) and Proforma Countermeasures (PCM) programs for the EA-6B at a level of effort commensurate with available funds. They monitored the development of the Low Band Transmitter development program and began the development of the EA-6B ICAP-III program documentation. Efforts included source selection documentation, specification, and required documentation along with issuing an industry wide Request for Information.

US\$2.544 million was budgeted for continued software/techniques and test support for ongoing new threat development and testing in ICAP-II. The Program Office continued COCM and PCM programs for the EA-6B commensurate with available funds.

Planners monitored the development of the low band transmitter development program. They continued development of the EA-6B ICAP-III program documentation. Efforts include source selection documentation, specification, and required documentation. Obligation of this money began October 1996 and ended February 1997.

The FY97 plan had US\$4.621 million planned to continue the ICAP II software/techniques and test support for ongoing new threat development and testing. COCM and PCM programs for the EA-6B continued commensurate with available funds. Planners monitored the development of the Low Band Transmitter. US\$3.231 million was used to develop a test prototype for an anti-jamming GPS demonstration system.

US\$29.716 million was budgeted to continue development of EA-6B ICAP-III program documentation; with efforts including source selection documentation, specification, and required documentation. There was an ICAP-III development contract awarded via a full and open competition. The program incorporated connectivity, an upgraded USQ-113, and a replacement Receiver System.

\$965,000 was reserved for Small Business Innovation Research (SBIR) assessment in accordance with 15 USC 638.

The FY98 plan budgeted US\$2.676 million for the ICAP II software/techniques and test support, along with the COCM and PCM programs for the EA-6B. Planners would monitor the development and begin DT/OPEVAL of the Low Band Transmitter development program. Continue development of the EA-6B ICAP-III program documentation. Efforts would include issuing a Request for Proposal and completing Milestone II.

In FY99, the Navy will spend an estimated US\$3.917 million on the ICAP II software/techniques and test support as well as COCM and PCM programs for the EA-6B. Plans are to complete development and DT/OPEVAL of the Low Band Transmitter and continue to monitor the EA-6B ICAP-III program. US\$31.541 million would continue development of the ICAP III system via contract awarded in FY 97.

funds.

Project E0619 - ASPJ Common Development. This was previously funded under project W0638. The ASPJ, designated the AN/ALQ-165, was a defensive electro-magnetic countermeasure system for self-protection of tactical aircraft (F/A-18, F-14, F-16) that would increase the probability of mission success and survivability when confronted by modern diversified radar-controlled weapon systems. The ASPJ design was compatible with integrated system concepts and able to be installed in existing aircraft, software reprogrammable to keep pace with changing threat scenarios, improved aircraft and support equipment systems, and alternative technologies.

In FY92, the Navy completed OPEVAL. In FY93 plans called for ASPJ baseline system testing only.

On December 15, 1992, the Navy terminated production of the ALQ-165 because of reports of substandard performance during operational tests. However, many doubt the validity of those tests, and the Navy is re-evaluating its position. Approval was given to evaluate the idea of using existing systems in F-14D aircraft.

In 1995, Finland and Switzerland agreed to buy ASPJ units for the F/A-18 aircraft they were procuring. The acquisition would be a combined commercial/FMS procurement. South Korea will acquire the ASPJ for its F-16 aircraft. The US Navy dispatched 24 ASPJ units from storage to Bosnia to support air operations there. They systems were installed on Marine F/A-18Ds flying in support of the United Nations mission there. 36 more units were procured at the direction of Congress to insure a full squadron of F/A-18C/D aircraft could be fielded with ALQ-165 systems.

Project W0638 - Airborne Defensive ECM. This project developed various EW equipment including Radar

Warning Receivers (RWR), DECM, Countermeasures dispenser systems, Radio Frequency Countermeasures (RFCM) and Third World threat training simulators for use by the Fleet Electronic Warfare Support Group (FEWSG). RFCM, IR jammers, expendable devices (flares, chaff and electronic expendables), laser warning receivers and missile warning equipments are to increase aircraft survivability and provide former Soviet threat training simulators for use by FEWSG.

Numerous laboratory EW efforts (hardware and software), improvements to existing EW systems, Electronic Warfare Software Support Activity (EWSSA) and system integration efforts are funded under this project.

During FY90, the APR-39(XE-2) completed TECHEVAL. The Navy initiated FEWSG mission and TSD upgrades. Planned product improvements (P3I) engineering development began on the ASPJ. A software development of the AAR-47 software began. Development of SENS was terminated. Other efforts in IR decoys, IRCM, ECCM, and laser CM continued from previous years.

In FY91, the Navy continued EMD on the Advanced Airborne Expendable Decoy (AAED), ALR-67/Advanced Special Receiver (ASR), Integrated Defense Avionics Program (IDAP), Generic Expendable (GEN-X). GEN-X and BOL CHAFF OPEVAL were completed and the APR-39(XE-2) OPEVAL began. FEWSG continued work on upgrades to the ALT-40 and FEWSG Mission and Tactical Simulation Development (TSD) Avionics. The Navy performed engineering analysis, hardware/software development and prototyping of mission avionics for the ERA-3B replacement. IR Decoy, IRCM, and Laser CM advanced development continued; and planners conducted the ALE-47 TECHEVAL on F/A-18D and began HH-60H test and evaluation. RFCM continued technique development and EWSSA continued software development. Engineers continued updating software for the AAR-47 P3I and commenced OPEVAL of the ALQ-164. EOCM development was terminated.

In FY92, the Navy continued Engineering and manufacturing Development of the ALR-67 Advanced Special Receiver (ASR) and delivered two brassboard systems. Engineers performed Brassboard testing during the second through the fourth quarter. They also delivered two service test models. Planners continued FEWSG Mission and Tactical Simulations Development (TSD) avionics and completed the ALT-40 upgrade program. EMD continued on the Advanced Airborne Electronic Decoy (AAED)/IDAP. First flight of the IDAP/A6E took place.

Program personnel conducted F/A-18D OPEVAL of the ALE-47 and production made a long-lead decision. They

continued HH-60H Test and Evaluation (T&E) and conducted FOT&E. Engineers continued technique development of the RFCMU EWSSA, and continued development of software and EWSSA lab facilities. The APR-39A(XE-2): OPEVAL was completed, as was OPEVAL of the ALQ-164. It was introduced to fleet.

In FY93, this project was consolidated with E2175.

Project E2175 - Tactical Air Electronic Warfare. This project develops various EW equipment including Radar Warning Receivers, countermeasures dispenser systems, Radio Frequency Countermeasures (RFCM), Realistic Hostile EW threat training simulators for use by the Fleet Electronic Warfare Support Group (FEWSG), and Defensive Electronic Countermeasures (DECM). RFCM, Infrared jammers, expendable devices (flares, chaff and electronic expendables), laser warning receivers, missile warning equipment and hostile threat training simulators for use by FEWSG are to increase survivability.

Numerous laboratory Electronic Warfare (EW) efforts (hardware and software), improvements to existing EW systems, Electronic Warfare Software Support Activity (EWSSA) and system integration efforts for the ALR-67(V)3 (Advanced Special Receiver - ASR), ALQ-156A Integrated Defense Avionics Program (IDAP), and ALE-50 (Advanced Airborne Expendable Decoy (AAED)) programs are funded under this project.

The IDAP program was terminated after early retirement of the A-6 was announced. As risk reduction for the ALE-50, a subsystem of IDAP testing continued on the A-6 test bed and the QF-4. No follow-on customer for the ALQ-156A (IDAP) exists. The F-18 E/F is the lead platform for the ALE-50.

In FY92, the project was funded under Project W0638.

In FY93, the Navy continued ALR-67(V)3 EMD. Developers delivered seven systems and began Developmental Tests (US\$19.231 million). In the AAED program, program personnel conducted DT, Live Fire Test, Aircraft Integration Test, and System Quality Test. They also conducted DT, Live Fire Test, Aircraft Integration Test, and System Quality Test of IDAP (US\$20.981 million). Engineers continued FEWSG mission and Tactical Simulation Development (TSD) avionics upgrades and initiated the dual-mode ALQ-170 development. They also completed ULQ-21 development (US\$1.800 million).

Managers continued ALE-47 FOT&E on various Navy aircraft and made a production decision in the fourth quarter (US\$2.151 million). The Navy participated with the Air Force in the joint advanced development of IR Decoys, IRCM and Laser countermeasures (US\$2.151 million). Engineers continued EWSSA software development and development of EWSSA lab

facilities (US\$200,000). Project personnel also monitored the Advanced Research Projects Agency advanced development of Electro-Optical Countermeasures (US\$450,000). They also continued RF countermeasures technique development (US\$3.740 million). The program office incorporated corrections to OPEVAL deficiencies and entered DT/OT of the APR-39(XE-2) (US\$3.346 million).

In FY94, the Navy completed an Operational Assessment and Acquisition Review Board for test asset procurement to support OPEVAL of the ALR-67(V)3. Personnel began the Development Test/Operational Test (DT/OT) flight testing and continued EMD (US\$60.230 million). The AAED program included DT/OT Live Fire on the Decoy. Program personnel began development of IDAP and closed out the program with live fires as risk reduction for the IDECM program (US\$6.552 million).

As part of the high-priority IDECM program, the Navy tasked and funded field support to initiate program-related documentation including Statements of Work and specifications. It participated in Cost and Operational Effectiveness Analysis (COEA) efforts. Planners conducted an F-18 EW COEA and awarded a McDonnell Douglas A-Kit study contract for first look at integration into F/A-18E/F (US\$5.060 million).

The FEWSG effort continued the ALQ-170 dual mode development, initiated FEWSG Airborne Electronic Warfare Systems (FIEWS) Electronic Support Measures (ESM) upgrades, and initiated an Adaptive Cross polarization development for the ALQ-167. Engineers completed the airborne intercept development and initiated a pre-launch lock-on development. They also initiated a dual mode transmit development for the AST-6. FEWSG was funded at US\$1.892 million.

EWSSA software and lab facilities development continued. Programmers automated the user data (threat data) file (US\$200,000). Engineers completed Developmental Testing of the APR-39(XE-2) and began System Tests (US\$500,000).

Program personnel conducted engineering and development of the ALE-47 extended dispenser assemblies and component item breakout, completing the development and testing of the interface hardware and software that make it possible for the ALE-47 to program the GEN-X decoy (US\$480,000).

US\$1.272 million was included to cover travel and support services.

Plans for FY95 were to complete DT/OT flight testing of the ALR-67(V)3. Engineers would develop Consolidated Automated Support System Test Program Sets (CASS TPS) (2nd increment) and update the contractor system to support OPEVAL. Program personnel would develop a

Software Support Activity (SSA) and continue Logistics Development (US\$22.645 million).

Designers would begin development of an ALR-67 Direction of Arrival (DOA) Improvement Program (US\$4.000 million) and complete AAED Operational Testing on the decoy and begin integration efforts on the F/A-18E/F (US\$16.531 million).

The Navy planned to award a contract for Engineering and Manufacturing Development contract of the IDECM RF subsystem. An award was made to Sanders, a Lockheed Martin Company, on November 3, 1995. Planners would also conduct risk reduction studies and testing on the RF subsystem and conduct the MCAIR A-Kit study contract effort for RF integration into the AV-8B/F/A-18, and support for the MAWS/Advanced Strategic Tactical Expendable (ASTE) source selection and initial integration (US\$24.944 million).

Engineers completed the ALQ-170 dual mode development and began FEWSG Electronic Support Measures upgrades. They also completed the ALQ-167 adaptive cross polarization development and completed the airborne intercept development. Planners initiated pre-launch lock-on development and initiated mode transmit development. They completed pre-launch lock-on development for AST-6 (US\$2.829 million). Planners continued EWSSA software and lab facility development (US\$200,000).

The Navy completed all training of ALE-47 SSA personnel and certified an organic operational capability. Engineers completed developing and testing the ALE-47 extended dispensers for kinematic expendables (US\$250,000). APR-39(XE-2) operational testing was completed (US\$1.600 million). Professional service support was funded at US\$75,000.

FY96 IDECM accomplishments included (\$44,458) IDECM: Awarding an EMD contract for the RF Countermeasures (RFCM) subsystem, and successfully completing the Preliminary Design Review. Engineers continued the A-Kit design contract efforts for integrating the IDECM RFCM subsystem onto the F/A-18E/F and CMWS/ASTE subsystems integration onto the AV-8B and F/A-18E/F. This provided funding to support Navy-unique efforts in the Joint Service CMWS/ASTE programs.

US\$7.896 million was budgeted to continue IDECM A-Kit design contract efforts to integrate the RFCM subsystem onto the F/A-18E/F and CMWS/ASTE

subsystems integration onto the AV-8B and F/A-18E/F aircraft. This would also set up a logistics support capability. The beginning obligation date was October

1996 and ending date is March 1997.

US\$12.263 million was used to continue Developmental Testing of the ALR-67(V)3 (DT) in the Patuxent River anechoic chamber, laboratory, and flight along with continued user data file generator development. Designers started integration efforts with F/A-18E/F aircraft and planners set up of a logistics support capability.

US\$3.763 million was budgeted to complete the JETS Cost & Operational Effectiveness Analysis (COEA) and began the COEA final report and acquisition documentation in preparation for a milestone decision.

In the ALE-50/AAED program, the Program Office spent US\$5.934 million to continue Developmental Test for F/A-18E/F installation. A Lot V contract was to be awarded to buy needed test assets. Designers would begin a Developmental Test for B-1B installation.

Developers completed the FEWSG Airborne Electronic Warfare Systems (FAEWS)/ALT-40 system upgrades (US\$2.395 million) and completed the AST-6 dual mode transmit development. Designers completed the ALQ-167E/F Band deception technique development and continued ALQ-167 I-Band Digital RF Memory development. Planners initiated ALQ-167 Pulse-to-Pulse Frequency Set-on development and continued equipment exploitation for the ALQ-167E/F. They initiated an ALQ-170 Performance Enhancement Program (PEP) effort and tasked and funded ALQ-170 PEP field support to initiate program related documentation including specification development, statement of work, etc.

US\$200,000 was used to continue EWSSA software development and development of EWSSA lab facilities.

The FY97 plan budgeted US\$52.789 million for IDECM; continuing funding for the RFCM EMD contract. Planners would complete Critical Design Review and continue A-Kit design for the F/A-18E/F and CMWS/ASTE subsystems integration onto the AV-8B and F/A-18E/F. Funding supported Navy-unique efforts in the Joint Service CMWS/ASTE programs.

Developers completed the JETS COEA final report and acquisition documentation in preparation for MS II. This was funded at US\$1.652 million.

US\$12.054 million was used to conduct the ALR-67(V)3 DT/OT laboratory and flight testing. Program personnel awarded a test and integration support contract and completed the logistics capability set up. US\$9.789 million went into the ALE-50/AAED Development Test on F/A-18E/F and B-1B. Planners began logistics development of CASS, Depot, and I-Level. Engineers began development of the Multi-Platform Launch Control (MPLC) modification for IDECM.

In the FEWSG efforts, US\$2.127 million was budgeted to complete the ALQ-167 I-Band Digital RF Memory development, continue the ALQ-167 Pulse-to-Pulse Frequency Set-on development, and continue ALQ-170 PEP effort. Planners would prepare for an ALQ-170 Milestone II and continue equipment exploitation for the AST-6 and AN/ALQ-167. US\$187,000 was allocated to continue EWSSA software development and development of EWSSA lab facilities.

US\$1.710 million was reserved for Small Business Innovation Research Assessment (SBIR) in accordance with 15 USC 638.

The FY98 plan budgeted US\$50.941 million for IDECM RFCM EMD and the A-Kit design efforts, including Navy funding for the Joint Service CMWS/ASTE programs. Planners would initiate RFCM subsystem testing on the F/A-18 and CMWS/ASTE subsystems testing on the AV-8B.

3,719) JETS: Plans were to release a JETS Request for Proposal and conduct source selection for an EMD contract and make a MS II decision 4QFY98 (US\$3.719 million).

US\$12.203 million was allocated for an ALR-67(V)3 Technical Operational Assessment to support LRIP. Planners would also conduct an Operational Evaluation (OPEVAL) to support full rate production and begin to set up of a software support facility. US\$15.101 million was budgeted to complete the ALE-50/AAED OA on the F/A-18E/F, and to complete logistics development of CASS, Depot, and I-Level. Plans included completing OT on the B-1B and continue MPLC modifications for IDECM, followed by modified MPLC quality testing.

The FEWSG effort was funded at US\$14.866 million to continue equipment exploitation by developing technique upgrades and simulation expansions for the AST-6 and AN/ALQ-167. Planners would continue the ALQ-170 PEP effort and initiate procurement of hardware/software for engineering development models for the ALQ-170. They would also continue preparation for a MS II decision and EMD contract award for the ALQ-170 upgrade.

The EWSSA funding (US\$197,000) would continue software development and development of the EWSSA lab facilities.

The FY99 plan budgets US\$56.477 million for IDECM: Continue funding E&MD contract for IDECM RFCM and US\$19.648 million for JETS EMD. US\$2.493 million was planned to complete all ALR-67(V)3 Navy RDT&E efforts and correcting any deficiencies prior to full rate production.

US\$4.139 million was allocated to support ALE-50/AAED transition of MPLC to the IDECM configuration and conducting FOT&E on a modified MPLC. US\$6.766 million would continue FEWSG, including preparing for ALQ-170 for Milestone III and the initiation of integration of hardware/software for PEP.

US\$199,000 was budgeted to continue EWSSA software and lab facilities development.

Project R1742 - EW Technical Development and Testing.

This program, referred to as "Skunkworks," establishes a standing research group for developing and testing low-cost, high-payoff electronic warfare (EW) systems to meet warfighting requirements during crisis situations. The program typically produces a new product at the end of each 12-month period. This unique requirement ensures that the team continually functions in a quick reaction mode, and is, therefore, well trained in all aspects of rapid response systems engineering and fabrication. Each year, in the absence of a critical situation, the team develops, demonstrates and tests a prototype EW system which meets a specific Navy requirement.

FY90 saw the development and testing of a small ship ASMD EW system to enhance the effectiveness of off-board radar countermeasures. The system includes a computer controlled jammer to assist in decoy distraction.

FY91 plans were to develop a podded counter-targeting jammer suitable for fighter/attack aircraft in the outer air battle.

FY92 saw the development of a five element direction finding array which operates over a classified frequency range, with high angular accuracy. The system was integrated into a pod-mounted assembly compatible with the SH-60B. Provisions were made to allow integration of this system with a specialized feature extraction processor. The system capabilities were demonstrated under laboratory and field conditions.

In FY93, the Navy developed and tested an airborne pod which dispensed a classified payload (US\$670,000). US\$485,000 was put into specific, classified programs under the direction of the CNO.

In FY94, planners allocated US\$832,000 for a variety of classified programs involving testing new ECM pods and similar systems.

FY95 plans involve developing a classified miniature ECM system (US\$629,000) and conducting field and laboratory tests US\$215,000.

FY96 accomplishments included spending US\$582,000 to complete the system design and construction of a classified off-board jammer. US\$148,000 was used to

conduct testing of off-board communications in both the lab and the field.

The FY97 plan budgeted US\$300,000 to perform systems engineering and design of an Advanced Support Pod (ASP). US\$300,000 was planned to obtain an AST-4 pod for aircraft interface, procuring long lead components, and fabricating a system for inclusion in AST-4 pod. US\$78,000 would be used to plan and conduct lab and field demonstration test of the ASP unit.

The FY98 plan included US\$175,000 for a systems engineering analysis for a tactical deception capability against enemy radar systems. US\$375,000 would be used to design and fabricate a deception unit which will spoof enemy radars. US\$127,000 was budgeted to conduct field testing of the spoofer design.

The FY99 plan budgets US\$300,000 to perform a classified systems engineering analysis. US\$455,000 will be used to design and fabricate a jammer/spoofer, with US\$123,000 planned for field testing of the design.

Project R1882 - Datalink Evaluation Analysis (DVAL).

DVAL is an Office of the Secretary of Defense directed program with the Commander, Naval Security Group designated as Executive Agent. It is the only program in the Navy that evaluates anti-jam (AJ) and low probability of intercept (LPI) capabilities in Navy systems using the electromagnetic spectrum.

DVAL typically assesses systems during the developmental stages of the acquisition cycle. It identifies methods for reducing signal vulnerabilities to hostile exploitation. It is also employed after fleet introduction for use in developing countermeasure tactics.

In FY90, the Navy began analysis of the Common High Band Data Link (CHBDL) for the BGPHEs and ATARS programs. Program personnel completed analysis of JTIDS, MILSTAR, EHF SATCOM, and NAVSTAR GPS. ERAM Increment II (Air to Air Surveillance) was published, along with an F/A-18 Annex to Increment IV (Air to Surface). The first revision of Increment I (Air to Air) was published.

In FY91, the Navy continued preliminary analysis of the Common High Bandwidth DataLink (CHBDL) and began analysis of HAVE QUICK/SINGARS systems. Planners also began a revision of DVAL Methodology and revised the draft of ERAM Increment III (Surface to Air) and released Revision 2 of Increment I.

FY92 saw the continued development of Common High Band Data Link (CHBDL) DVAL susceptibility reports. Engineers completed an analysis of the HAVE QUICK system and performed CLASSIC RAPTOR test and analysis. They developed a Military Strategic Tactical and

Relay Satellite PIANO System susceptibility test and completed a summary Joint Tactical Information Distribution System (JTIDS) susceptibility report.

In FY93, the project completed the Common High Band Data Link (CHBDL) susceptibility reports, ending the effort (US\$150,000). Engineers completed the PIANO Radio assessment with a report on at-sea collection and analysis (US\$65,000), completed the final Joint Tactical Information Distribution System (JTIDS) susceptibility report with recommendations (US\$70,000), and developed the DVAL Military Strategic and Relay Satellite (MILSTAR) test plan, and identified test equipment for Follow-on Test and Evaluation (US\$257,000). They also completed the susceptibility report on the Single Channel Ground Airborne Radio System (SINCGARS) (US\$85,000).

The program office began a pre-test analysis of the Battle Group Cooperative Engagement Capability (BGCEC) (US\$55,000), and began a pre-test analysis of the Tactical Intelligence/Integrated Special Intelligence Communications Subsystems (TACINTEL II/INSICOM) (US\$60,000).

The FY94 program completed the pre-test analysis of the Battle Group Cooperative Engagement Concept (BGCEC) and TACINTEL II/INSICOM. Program personnel initiated actions to perform susceptibility assessments of these systems (US\$330,000). They also developed a test plan and equipment necessary for the assessment of Navy Extremely High Frequency (EHF) Satellite Program (NESP) terminals (US\$360,000). These terminals allow communications via the MILSTAR satellite system. The program office published the ERAM Increment V produced draft of Joint Army/ Navy developed ERAM Communications Annex release revision 2, ERAM Increment III, released revision 3, ERAM Increment (US\$475,000).

Plans for FY95 were to complete susceptibility assessments of BGCEC and TACINTEL II/INSICOM (US\$90,000), complete the test plan and procedures for the vulnerability test of NESP terminals, and conduct interim tests in preparation for at-sea tests in FY96 (US\$60,000). US\$100,000 will be spent to assess the synchronization algorithm of the SINCGARS radio for susceptibility. Designers will perform a susceptibility and interceptability pretest analysis of MILSTAR Medium Data Rate (MDR) waveform (US\$120,000) and assess the radio developed in a special access program for utility in LPI communication for the Navy (US\$98,000).

They will test the airplane LPI radio being developed by NAVAIR and NRAD for evaluation in an advanced-technology demonstration program (US\$150,000) and publish the ERAM Communications Annex; release

revision 4, ERAM Increment II release revision 1, ERAM Increment IV (US\$400,000).

The FY96 program conducted vulnerability tests of the Advanced Engineering Model (ADM) of BGCEC (US\$125,000), at-sea tests of the NESP terminals and completed the test report (US\$175,000), and complete analyzing the LPI radio tests from FY95 (US\$100,000). Planners continued to analyze MILSTAR MDR vulnerability (US\$140,000) and began vulnerability analysis of submarine vulnerability using SHF communications (US\$100,000). US\$400,000 would go to the release of Revision I of ERAM Increment V and publishing the Annex to ERAM Increment II on Airborne Surveillance & C3 Systems.

In FY97, the project was to complete the test and analysis of ADM of BGCEC (US\$150), complete the assessment of submarine SHF communications (US\$150,000), complete analysis of MILSTAR MDR susceptibility and interceptability, beginning the test design phase (US\$243,000). The Navy would begin assessing a high-frequency radio group (US\$100,000) and spend US\$400,000 to publish revision I to ERAM Increment VI, revision 3 to ERAM Increment III, and revision 2 to ERAM Increment IV.

This effort was not funded beyond FY97.

Project S0954 - Shipboard EW Improvements. This project included SLQ-32 Improvements, Decoy Integration, Rapid ASM Integrated Defensive System (RAIDS), NULKA, and Advanced Torch Decoys.

In FY90, the Navy awarded a full-scale engineering development contract for the SLQ-32(V)4 (CV/CVN) upgrade. They also conducted the SLQ-32 ADVCAP factory test of the engineering development model. A RAIDS engineering management plan was completed and architecture design and prototype software development continued. NULKA Engineering Development Models 1 and 2 and a launcher were delivered. Developmental Testing was started. Testing of the ME 186 gas generator and fuel was completed. The DDI CV/CVN RF distraction effort began.

FY91 accomplishments included awarding an ADVCAP Increase-in-Scope effort and continuing DDI full-scale S/W development. The Navy conducted a RAIDS At-Sea Demo and completed NULKA DT-IIA. NULKA program personnel conducted captive carry tests of the NULKA payload in Australia. NULKA-HERO and EMI testing was completed. The OACM program developed a EW mission breadboard payload, completed EMI testing of a breadboard payload and developed specifications for a portable breadboard EW payload for UAV Helo ship use. The TORCH program completed DTIIA/DTIIB.

In FY92, this program transferred to PE0604755N, Ship Self Defense.

Project R2260 - Specific Emitter Identification. This is a new-start project for systems that collect specific emitter identification information from National Technical Means (NTM) and during choke point monitoring in order to track commercial ships over 500 gross tons. Worldwide research and development will cover classic and Unintentional Modulation of Pulse (UMOP) Electronic Intelligence (ELINT) technology. This will include improved/next-generation Specific Emitter Identification (SEI) technology for miniaturization and automation of hardware, national collection systems, signal processing and analysis, and de-interleaving of signals.

Propagation loss and multi-path signal distortions will be assessed. Fundamental limits to ELINT applied to commercial shipping will be assessed and alternatives will be pursued if warranted, and as directed by the Office of Naval Intelligence and the National Security Agency.

FY96 accomplishments were to begin work on the fundamental problem of automatically extracting SEI information from received signals and transmitting the necessary information to the reporting center (US\$1.222 million). Signals must be received with sufficient time resolution and precision to allow extraction of high resolution parameters and precise characteristics. Various concepts were assessed and an approach chosen

for further development. The effect on emitter signature multipath and propagation and the ability to measure the signals with the required precision (signal to noise ratio) were analyzed and an assessment of feasibility was made.

The FY97 plan budgeted US\$1.020 million for brassboard realization of the concepts for automated signal preparation and processing chosen in FY96 would be developed and tested using data collected during choke point monitoring. A report on the performance of the brassboards was to be released by the end of the year. The analysis of the effects of multipath and propagation loss performed in FY96 would be tested in the field and a report extrapolating the test results to the orbits of the NTM written.

The plans for FY98 set aside US\$1.423 million to address interoperability of the SEI data in support of world wide efforts. Data formats and connectivity were to be evaluated for fleet tactical requirements. Use of alternative data compression techniques would be pursued with automation.

The FY99 plan is to spend US\$1.795 million on next-generation SEI technology that will be developed to provide miniature, high fidelity operation. Extended signal processing technology will be implemented optically for increased throughput and reduced size.

Funding

	US FUNDING							
	FY96		FY97		FY98		FY99 (Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (USN)								
PE0604270N EW Development								
E0556 EW CR	-	5.0	-	38.5	-	2.7	-	35.5
E2175 Tac Air EW	-	76.9	-	80.3	-	97.0	-	89.7
R1742 EW TD&T	-	0.7	-	0.7	-	0.7	-	0.9
R1882 DVAL	-	1.0	-	1.0	-	0.0	-	0.0
R2260 SEID	-	1.2	-	1.0	-	1.4	-	1.8
RDT&E Total	-	84.8	-	121.5	-	101.8 ^(a)	-	127.9
RDT&E								
(USN estimate)								
E0556	-	63.9	-	28.5	-	13.6	-	3.2
E2175	-	46.1	-	43.3	-	29.0	-	29.5
R1742	-	0.9	-	0.9	-	0.9	-	1.0
R1882	-	0.0	-	0.0	-	0.0	-	0.0
RDT&E Total	-	110.9	-	72.7	-	43.5	-	33.7

^(a) NOTE: The FY98 Defense Appropriation cut this line to US\$99.127 million. The conferees added US\$ 2 million for precision targeting, cut US\$ 2 million from Joint Emitter Targeting System, reduced CMWS US\$ 6.0 million, and ICAP III US\$ 2.676 million.

All US\$ are in millions.

Recent Contracts

There are no recent contracts.

Timetable

C1961 -EW Counter Response:

Mar	1993	ADVCAP OT IIA
1Q	FY94	PDR, EDM
4Q	FY94	Milestone II
2Q	FY94	LRIP
3Q	FY95	Publish IER, IOT&E, MEWSS PIP
1Q	FY96	Milestone IIA
1Q	FY97	Milestone III

E2175 - Tactical Air Warfare:

May	1993	ALR-67(V)3 DT/OT start
Sep	1993	ALE-47 Milestone III
3Q	FY94	AAED CDR, GEN-X interface complete, ALR-67(V)3 CDR & TechEval
4Q	FY94	AAED DT/OT
3Q	FY95	IDECM Milestone II, AAED Decoy Opt III
1Q	FY96	AAED OPEVAL, LRIP; IDECM Milestone II
3Q	FY96	AAED MPLC JPR production decision
2Q	FY96	AAED Milestone III, ALR-67 OPEVAL
1Q	FY97	ALR-67 DoA CDR, AAED; F-16 Milestone III
2Q	FY97	ALR-67(V)3 Milestone III
3Q	FY97	JETS Milestone II
1Q	FY98	AAED OPEVAL; ALQ-170 Milestone II LRIP
2Q	FY98	ALR-67(V)3 LRIP
3Q	FY98	ALR-67 DoA DT
2Q	FY99	ALR-67(V)3 Milestone III
1Q	FY00	IDECM DT
3Q	FY00	ALR-67 DoA Milestone III
3Q	FY02	IDECM Milestone III

Worldwide Distribution

This is a US Navy only program.

Forecast Rationale

Developing effective and affordable electronic warfare systems and techniques is a high-interest item both at the Pentagon and Congress. The Persian Gulf War proved the value of effective countermeasures, and highlighted areas in which improvements need to be made. The EA-6B was one of the star performers in driving Saddam Hussein's army out of Kuwait, but the Navy found several shortcomings in other airborne and ship-mounted EW gear.

The weaknesses in the surface-ship EW suites carried by the US fleet are being addressed by a variety of major projects that have been moved out of this program into the Ship Self Defense program elements, PE0603755N and PE0604755N. As a result, airborne defense countermeasures have become the major focus of this effort. There is a major need for protection from advanced IR/EO-guided threat systems, a requirement in all countermeasures regimes. These efforts are well spread across a variety of protective technologies, schemes, and systems.

There has been a developing debate concerning the focus of, and need for, spending on the EA-6B ADVCAP upgrades. Although the Navy has said it cannot afford the upgrades, and that they are unnecessary with the end of the Cold War, Congress is going along with upgrading the aircraft. An unspoken foundation of the issue may have been the Navy's desire to have more money for future aircraft, while forcing Congress to give it more money for the EA-6B. Congress holds the Prowler in high regard, and to some extent, this plan is working.

The jamming capability of the Prowler in the Persian Gulf was superior. The electronics need upgrading to keep pace with the developing threat and give it an advantage in future combat. The upgrade will be scaled back somewhat, with most of the effort going into enhancing the jammers and adding additional capability, but at a lower cost.

Funding for electronic warfare development efforts is a high priority with both the Navy and Congress. Officials

have realized the importance of providing effective EW systems, and found the consolidated approach to be effective. The Persian Gulf War validated EW's value by completely incapacitating the Iraqi air defense system. This program element has been scaled back with the move of the critical surface EW development to the Ship Self Defense program element.

As time passes and efforts mature, funding requirements will fall. Some new efforts will take their place, but many of the transfers to other lines will prompt a decrease in the out-years. The forecast was based on this Program Element continuing as currently established, and is based primarily on the work to be done. In the out-years, planners may revise the PE and some of the forecast work could be moved to other programs. If this happens, the funding estimated for that work would be transferred as well.

Ten-Year Outlook

		FORECAST FUNDING LEVELS (FY96 US \$ Millions)												
		<u>High Confidence Level</u>				<u>Good Confidence Level</u>				<u>Speculative</u>				
<u>Designation</u>	<u>Application</u>	<u>thru 97</u>	<u>98</u>	<u>99</u>	<u>00</u>	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>	<u>05</u>	<u>06</u>	<u>07</u>	<u>Total</u> <u>98-07</u>	
PE0604270N	EW DEVELOPMENT (US NAVY)	1255.06	99.13	127.90	110.90	72.70	43.50	33.70	35.00	37.00	30.00	30.00	589.93	