

# UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET  
Exhibit R-2

DATE: February 2003

BUDGET ACTIVITY: 3      PROGRAM ELEMENT: 0603640M  
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
C2297 Marine Corps Warfighting Lab-Core								
	39,814	43,528	37,693	36,604	37,661	35,754	36,852	37,575
C9154 Congressional Addds								
		4,135						
R2223 Marine Corps ATD								
	19,358	17,202	18,711	21,842	23,128	23,926	24,642	25,114
R2362 Extending the Littoral Battlespace								
	666	930						
R2995 California Central Coast Research Partnership (C3RP) Initiative								
	1,249	3,027						
R9028 Marine Corps Future Logistics								
	1,637							
R9029 Fast Refueling System								
	1,649							
R9290 Expeditionary Unit Water Purification Technology								
		6,148						
Total	64,373	74,970	56,404	58,446	60,789	59,680	61,494	62,689

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: As the land warfare component of Naval Expeditionary Forces, the Marine Corps has unique and technologically stressing requirements resulting from its amphibious mission, Marine Air-Ground Task Force (MAGTF) organizational structure, reliance on maneuver, logistic sustainability, and intensive tempo of operations in diverse environments. Critical Marine Corps requirements addressed in this program element (PE) are Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), Maneuver, Logistics, Training and Education, Firepower, and Mine Countermeasures (MCM). These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in an operational environment. Multiple transitions into the Sub-system/Component Advanced Development phase are planned, as well as fieldable prototyping to reduce risk in System Concept Development and Demonstration. Joint service efforts are in line with Defense Technology Objectives (DTOs) and Joint Warfighting Objectives (JWOs). In addition, Marine Corps warfighting experimentation in conceptual operational assessment of emerging technologies is funded. This PE also provides Extending the Littoral Battlespace efforts in the

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area of command, control, communications, computers, and intelligence (C4I), and fires and targeting. Efforts focus on connectivity between MAGTF and Fleet organizations and naval sea-based fire support. Specifically, this PE supports the following capabilities: promptly engaging regional forces in decisive combat on a global basis; responding to all other contingencies and missions in the full spectrum of combat operations (high, mid, and low intensity), in Military Operations in Urban Terrain (MOUT), in operations other than war (OOTW), and warfighting experimentation. This PE supports all of the Marine Corps mission areas. Within the Naval Transformation Roadmap, this investment will achieve one of three key transformational capabilities required by Sea Shield as well as technically enable the Ship to Objective Maneuver (STOM) and Persistent ISR key transformational capabilities within Sea Strike and the enhanced Sea-borne Positioning of Joint Assets within Sea Basing.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

## B. PROGRAM CHANGE SUMMARY:

	FY 2002	FY 2003	FY 2004	FY 2005
FY 2003 President's Budget Submission:	61,843	51,606	52,662	57,159
Adjustments from FY 2003 President's Budget:				
SBIR Adjustment	-1,104			
Execution Adjustments	+3,936			
S&T Adjustments			+5,000	+2,500
NWCF Rate Adjustments			+44	+47
Congressional Plus-Ups		+25,210		
Cong Rescissions/Adjustments/Undist. Reductions	-302	-1,032		
Pay Raise/Inflation Adjustments		-814	-1,302	-1,260
FY 2004/2005 President's Budget Submission:	64,373	74,970	56,404	58,446

## PROGRAM CHANGE SUMMARY EXPLANATION:

Schedule: Not applicable  
Technical: Not applicable

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C2297 Marine Corps Warfighting Lab-Core	39,814	43,528	37,693	36,604	37,661	35,754	36,852	37,575

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Marine Corps Warfighting Laboratory (MCWL) is the centerpiece experimental test bed for the operational enhancement of the Marine Corps. Using the Special Purpose Marine Air-Ground Task Force (Experimental) (SPMAGTF(X)), augmented by other Marine units, as its "test bed" organization, MCWL demonstrates the usefulness and necessity of integrating new technological developments and advanced concepts into the Operational Forces of the Marine Corps. Performing in the joint as well as individual service arena, MCWL focuses on developing and field testing future operational and technological concepts and serves as the focal point for the enhancement/refinement of future warfighting capabilities. The organizational thrust is to provide an institutional mechanism for continuously generating new ideas for warfighting capabilities. Concepts of operation are validated by means of various Warfighting Experiments.

Through a process of experimentation, which is designed as an ongoing mechanism to ensure the relevance of Marine forces in the face of change, MCWL experimentation encompasses inquiries into multiple technology and warfighting areas, including: Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) and Information Technology; Reconnaissance, Surveillance, and Target Acquisition (RSTA); Fires; Medical, Non-Lethal Technologies; Expeditionary Logistics; and Advanced Training and Education Techniques.

MCWL develops tactics, techniques, and procedures (TTPs) and evaluates advanced technologies that create or enhance future warfighting capabilities, and integrates them into the Marine Corps Expeditionary Force Development System. MCWL also provides all the efforts for Marine Corps Combat Development Command (MCCDC) Wargaming in support of the Expeditionary Force Development System and Experimentation.

Using operational forces, under the operational control of MCWL's own SPMAGTF(X), MCWL conducts a number of Advanced Warfighting Experiments (AWEs) supported by several Limited Objective Experiments (LOEs), Limited Technology Assessments (LTAs), Wargames, and Studies. AWEs, LOEs, and LTAs examine discrete variables in as much isolation as can be achieved. Technologies used in LTAs are gathered for use in larger LOEs while LOEs are building blocks from which resulting AWEs are constructed. Detailed descriptions are provided below:

- An AWE is defined as a larger scale operational experiment where advanced warfighting capabilities and enabling technologies are evaluated to determine the military utility, operational effectiveness and

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operational suitability in as realistic an environment as possible. These AWEs examine an operational concept that envisions a greatly expanded, lethal, fluid, chaotic, and more opportunistic battlefield within a maneuver warfare approach. An AWE answers experimental issues under conditions most closely approximating conflict using the Advanced Warfighting Concept under examination. It further serves as a venue for integrating all warfighting functions for the purpose of integrated experimentation. All experimentation conducted during a phase builds toward the AWE.

- LOEs are considerably smaller in scope than AWEs and focus on a discrete set of closely related experiment objectives. These experimental forces will be highly trained, technologically infused, highly lethal, and intellectually prepared to fight in this chaotic and opportunistic environment. LOEs are designed to answer questions that, if left unanswered, would have a significant adverse impact on the successful execution of experimental operations in the related AWE.
- LTAs are oriented on the performance characteristics of specific technologies and equipment to assess their usefulness by means of analysis or experimentation. MCWL conducts LTAs in cases where the performance characteristics of developing technology are insufficiently documented to conduct operational planning necessary for experimentation. MCWL plans and conducts LTAs to effectively incorporate a technology into follow-on experiments.
- A Wargame is a broad discipline manifested in a range of activities from a few individuals conducting Action-Reaction-Counteraction drills to a significant commitment from Operating Forces Staff or SPMAGTF(X) Command Element (CE) to execute a Command Post Exercise (CPX) supported by extensive modeling and simulation (M&S). A Wargame is integral to MCWL's experimental process and precedes the execution of each LOE/AWE to refine the LOE/AWE Experimentation Plan. Wargames are also the primary means by which MCWL prepares for and supports Joint Experimentation conducted either in the form of Joint wargames or simulations using the emerging Distributed Continuous Experimentation Environment.
- A Study is a low-cost (relative to operational experimentation) technique designed to result in broader or deeper research into an Experimental Issue. MCWL undertakes a study when a literature search reveals that existing studies are inadequate to support experiment objectives and synthesis is required and is focused on one or a few closely related Experiment Issues. A Study can contribute to any stage of the Innovation and Experimentation Process, but is most useful during experiment planning.

Under the guidance of the Experimental Campaign Plan (ECP) (formerly known as Five Year Experimentation Plan (FYEP)), MCWL's prior accomplishments and current plans include six known AWE "build-up" phases culminating in actual AWE execution:

- Hunter Warrior: (March 1996 through April 1997) Experimented with advanced operational concepts and technologies on an extended and dispersed battlefield, in open and mountainous terrain at the mid-intensity operational level.

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- Urban Warrior: (April 1997 through June 1999) focused on developing new TTPs and supporting technologies for operations in urban, close terrain, and near urban littoral areas.
- Joint Contingency Force (JCF) (also known as Millennium Dragon): (October 1999 through September 2000) Designed to identify, study, and improve new concepts and tactics for the Marine Corps under the auspices of the Operational Maneuver from the Sea (OMFTS) concept. In support of these concept-based experiments, new enabling technologies were developed, tested, and evaluated for operational use in a combat environment.
- Capable Warrior: (June 1999 through FY 2001) Used lessons learned in Hunter Warrior and Urban Warrior to integrate the full capability of a Marine Air-Ground Task Force (MAGTF) with naval units operating at the numbered fleet level of a Joint Task Force from the sea. Developed initial TTPs for an OMFTS force. Capable Warrior concluded with an experiment referred to as Kernel Blitz Experimental (KBX).
- Millennium Challenge 2002 (MC02): (FY 2001 through FY 2002) Congressionally mandated, Secretary of Defense directed, United States Joint Forces Command (USJFCOM) sponsored joint field experiment. (MCWL participation referred to as "Millennium Dragon"). MC02 was a large-scale, live, virtual, and constructive joint field experiment and demonstration, incorporating elements of all the Services and Special Operations Command critical future warfighting capabilities and forces at the operational level of war.
- Sea Viking 2004 (SV 04) (formerly known as Olympic Dragon): (FY 2002 through FY 2004) A series of related events that constitute near-term Marine Corps Service experimentation. SV 04 is also the first step in an experimentation program designed to transform the 1997 Ship-to-Objective Maneuver (STOM). SV 04 will culminate in a live force experiment conducted in the fall of 2004 by West Coast Navy and Marine Corps operating forces. Focus: The focus of SV 04 is "On the Move/Over the Horizon" Command and Control (OTM/OTH C2), with particular attention to the MAGTF's Command, Ground Combat, and Combat Service Support Elements.

## B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY 05
MCWL Operations (Support)	4,773	5,136	4,818	5,333

MCWL Operations (Support) efforts include overall MCWL experimentation doctrine, planning, wargaming, as well as transition efforts.

FY 2002 ACCOMPLISHMENTS: Initiated SV 04 AWE Experimentation Planning and technology investigations. Initiated Revolution in Military Affairs (RMA)/Project Ellis Program which is the Marine Corps component of the Office of the Secretary of Defense (OSD)/Net Assessment's RMA Wargaming Program. RMA provides an exploratory venue to address critical conceptual, organizational, and technical issues essential to success on the 21<sup>st</sup> century battlefield. Moreover, this program significantly strengthens Project Ellis as a process of accessing the impact of changes in the strategic landscape on concepts, organization, and technology. Continued Strategic Planning through the location, development, and evaluation of advanced warfighting operational and organizational concepts and related

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enabling technologies. Synthesized results and lessons learned into proposed TTPs for the Marine Corps. Continued research; planning; modeling and simulation (M&S), concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. This includes investigations into Operations Other Than War (OOTW). Continued providing technical, strategic, and managerial support to the Marine Corps. Continued development and integration of new Marine Corps Tactics, Techniques, Technologies, and Procedures (TTTPs) in order to provide future Marine Corps capabilities in the areas of Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities (DOTMLPF). Completed Millennium Dragon 2002 Experimentation Planning and technology investigations

FY 2003 PLANS: Continue near term SV 04 planning focused on enhancing the capabilities of a deploying Amphibious Ready Group (ARG)/Marine Expeditionary Unit (MEU). Examine programs of record (POR) and experimental technologies developed with an eye toward achieving a significantly more capable force and assess the capability of these POR systems to support the STOM concept. Continue Strategic Planning through the location, development, and evaluation of advanced warfighting operational and organizational concepts and related enabling technologies. Synthesize results and lessons learned into proposed TTPs for the Marine Corps. Expand investigations into transition avenues for maturing TTTPs. Continue research; planning; M&S, concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. Continue providing technical, strategic, and managerial support to the Marine Corps. Continue development and integration of Marine Corps DOTMLPF recommendations. Continue RMA/Project Ellis efforts. Continued Science and Technology Operations Information Center (STOIC) development, an Information Management Database System used to support MCWL.

FY 2004 PLANS: Conclude the SV04 AWE Experimentation Planning and technology investigations. Continue Strategic Planning efforts. Continue investigations into transition avenues for maturing TTTPs. Synthesize results and lessons learned into proposed DOTMLPF recommendations for the Marine Corps. Continue research; planning; M&S, concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. Continue providing technical, strategic, and managerial support to Marine Corps Experimentation. Continue to refine and extend established wargaming programs, and explore and develop innovative research and gaming methods and techniques to include "next generation" M&S capabilities. Continue STOIC development efforts.

FY 2005 PLANS: Continue Strategic Planning efforts. Continue investigations into transition avenues for maturing TTTPs. Synthesize results and lessons learned into proposed DOTMLPF for the Marine Corps. Continue research; planning; M&S, concept, and wargame development; preparation; execution; and analysis and assessment to extend exploration of critical components. Continue providing technical, strategic, and managerial support to Marine Corps Experimentation. Continue to refine and extend established wargaming programs, and explore and develop innovative research and gaming methods and techniques to include "next generation" M&S capabilities.

	FY 02	FY 03	FY 04	FY 05
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Command, Control, Communications, Computers, and Intelligence (C4I)	9,184	9,628	9,481	8,911
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This section encompasses all MCWL C4I related experimentation efforts.

FY 2002 ACCOMPLISHMENTS: Initiated Integrated Global Positioning System (GPS) Radio System (IGRS) effort to aid in data collection efforts. Initiated research and experimentation with Voice Over Internet Protocol (IP) (VoIP) technologies. Expanded Marine Corps Interface Module (Airborne) (MCIM) (A) research experimentation efforts. Continued to develop information processing and to further integrate capabilities into the Integrated Marine Multi-Agent Command and Control System (IMMACCS) and the C4 Lab facility. Initiated effort to experiment with Over the Horizon (OTH) communications technologies. Continued to develop enhanced capability for Shared Net and IMMACCS Graphical User Interface (GUI) communications/situational awareness technology. Continued to refine capability for the IMMACCS Agent Engine. Continued to evaluate the effectiveness of commercially available (off-the-shelf) technology for providing wireless connectivity for the small units. Curtailed voice recognition software research. Continued investigation into technology alternatives to C4 Lab. Incorporated lessons learned from Capable Warrior AWE into ongoing technical development efforts and assisted Limited Objective Experiments (LOEs) planned in preparation for Millennium Dragon 2002 AWE.

FY 2003 PLANS: Initiate experimental planning and C4ISR development to support the SV 04 Advance Warfighting Experiments (AWE). Continue to develop information processing and to further integrate capabilities into the IMMACCS and the C4 Lab facility. Continue to develop enhanced capability for Shared Net and IMMACCS GUI (now referred to as Command and Control Integration (CCI)) efforts. Initiate development of intelligent agent decision support tools. Conduct experiments and evaluate the performance of advanced C2 investigations and experiments for sea based C2. Continue to evaluate the effectiveness of commercially available (off-the-shelf) technology for providing wireless connectivity to the tactical level. Continue/expand alternative OTH communications technology investigations. Initiate efforts to constitute a Digital Combat Operations Center (DCOC) and On the Move/Combat Operational Center (OTM/COC) capability. Completed IGRS data collection efforts. Expand experimentation and integration of the intra-squad radio systems.

FY 2004 PLANS: Provide Command, control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) support for the SV 04 AWE. Continue to develop information processing and to further integrate capabilities into the C4 Lab facility. Continue to develop intelligent agent decision support tools. Continue to conduct experiments and evaluate the performance of advanced C2 investigations and experiments for sea based C2. Continue to evaluate the effectiveness of commercially available (off-the-shelf) technology for providing wireless connectivity to the tactical level. Continue OTH communications investigations and voice translation efforts. Investigate collaborative planning capabilities. Investigate tactics, techniques, and procedures (TTPs) and technologies of a Navy/Marine seabased COC. Continue experimentation and development of intra-squad radio systems. Continue to search for new and emerging technologies.

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FY 2005 PLANS: Continue to develop information processing and to further integrate capabilities into the C4 Lab facility. Continue to develop intelligent agent decision support tools. Continue to conduct experiments and evaluate the performance of advanced C2 capabilities to support sea based C2. Continue to evaluate the effectiveness of commercially available (off-the-shelf) technology for providing wireless connectivity to the tactical level. Continue OTH communications investigations and voice translation efforts. Continue to investigate collaborative planning capabilities. Continue to investigate TTPs and technologies of a Navy/Marine seabased COC. Continue experimentation and development of intra-squad radio systems. Continue to search for new and emerging technologies.

	FY 02	FY 03	FY 04	FY 05
Drones, Aviation, Sensors, and Vehicles	7,277	6,141	7,246	7,541

This section includes MCWL experimentation efforts involving drones, aviation aspects, sensors, and vehicles.

FY 2002 ACCOMPLISHMENTS: Continued small payload development for Dragon Warrior Unmanned Aerial Vehicle (UAV). Experimented with adding laser designation capability to Dragon Warrior Electro-optic/Infrared (EO/IR) payload. Continued Dragon Eye UAV investigations/ experimentation. Continue sensor technology investigations/ experimentation. Initiated Dragon Runner Mobile Ground Sensor (MGS) development/experimentation efforts. Dragon Runner is a ground mobile sensor that will be used by marine infantry battalions. Continued Unmanned Ground Vehicle (UGV) payload and micro UAV/UGV payload development efforts. Expanded M3M machine gun mounted on helicopter platforms (UH-1N, CH-53E, and CH-46E) experimentation. Continued aviation experimentation in the urban environment and aviation based simulation/instrumentation efforts. Continued to search for new and emerging technologies

FY 2003 PLANS: Reduce small payload development for Dragon Warrior UAV. Continue Dragon Eye UAV investigations/experimentation. Continue sensor technology investigations/experimentation. Continue investigations/experimentation in aviation technologies that could lead to increasing accuracy and effectiveness of Close Air Support missions and also reduce the possibility of fratricide. Expand/refine Dragon Runner MGS efforts. Continue UGV payload and micro UAV/UGV payload development efforts. Continue M3M mounted on helicopter platforms experimentation. Continue aviation experimentation in the urban environment and aviation based simulation/instrumentation efforts. Continue to search for new and emerging technologies.

FY 2004 PLANS: Continue small payload development for Dragon Warrior UAV. Continue Dragon Eye UAV experimentation and refinement of tactics, techniques, and procedures (TTPs). Expand development of the Local Area Sensor System (LASS). Continue investigations/ experimentation in aviation technologies that could lead to increasing accuracy and effectiveness of Close Air Support missions and also reduce the possibility of fratricide. Continue UGV payload and micro UAV/UGV payload development efforts. Continue Dragon Runner MGS efforts. Complete M3M mounted

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on helicopter platforms experimentation. Continue aviation experimentation in the urban environment and aviation based simulation/ instrumentation efforts. Continue to search for new and emerging technologies.

FY 2005 PLANS: Continue small payload development for Dragon Warrior UAV. Continue Dragon Eye UAV experimentation and refinement of TTPs. Continue LASS development efforts. Continue UGV payload and micro UAV/UGV payload development efforts. Continue investigations/experimentation in aviation technologies that could lead to increasing accuracy and effectiveness of Close Air Support missions and also reduce the possibility of fratricide. Continue Dragon Runner MGS efforts. Investigate capabilities to enhance tactical mobility of a vertical maneuver element. Continue aviation experimentation in the urban environment and aviation based simulation/instrumentation efforts. Continue to search for new and emerging technologies.

	FY 02	FY 03	FY 04	FY 05
Fires, Targeting, and Maneuver	4,170	3,315	3,484	3,830

This section includes MCWL experimentation efforts in the areas of firing, targeting, and maneuverability.

FY 2002 ACCOMPLISHMENTS: Under previously titled Mobile Fire Support System (MFSS) concept demonstrator program, participated in a Comparative Demonstration (CD) series to measure differences in precision between 120 millimeter (mm) rifled (MCWL's MFSS) and smoothbore ammunition (Army's version) and conducted Limited Technology Assessments (LTAs) of Light Armored Vehicle (LAV)-mounted and towed advanced technology mortar systems with First Marine Expeditionary Force (I MEF). Wrote development plan, detailed specifications, and project plan for the next-generation automated firing system, the Dragon Fire II. Completed the design and modification of a standard LAV to become a modular platform for the Dragon Fire I and II systems. Completed the experimentation of the Mortar Ballistic Computer (MBC). The MBC is a system to provide accurate technical fire control for the 81 mm and 60 mm mortars in the Marine Corps inventory. Continued efforts evaluating laser rangefinder capabilities. Formerly known as Advanced Close Air Support System (ACASS), continued assistance of the Target Handoff System (Experimental) (THS(X)) development including a vehicle-mounted precision targeting variant. Initiated project to develop a lightweight and expeditionary fires coordination system. Continued to investigate emerging fires and targeting technologies.

FY 2003 PLANS: Continue breach loading capability redesign and fabrication efforts of the fully functional Dragon Fire I concept demonstrator. Conduct the Level I design of the Dragon Fire II including carriage design, fire control design, firing systems design and the integration of all of the systems to achieve the weight objective of 3,000 pounds and full compatibility with internal transport in the MV-22 Osprey. Conduct LTAs firing the Dragon Fire I from the modular LAV testbed. Continue laser rangefinder investigations/experimentation. Continue support for the development of the THS(X). Continue Expeditionary Fires Coordination System (EFCS) development. Continue to investigate emerging fires and targeting technologies. As augmentation to the Mobile Counter Fire System (MCFS) Congressional enhancement, provide continued system development.

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FY 2004 PLANS: Complete first Dragon Fire II concept demonstrator and conduct proof firings, instrumented firings, and ballistic kernel verification/modification. Continue laser rangefinder investigations/experimentation. Complete THS(X) development and transition to the Marine Corps Systems Command (MCSC). Deliver working EFCS and conduct LTAs to test its performance against the design specifications. Continue exploration of precision targeting technologies and systems. Continue development of modular design for fire support systems using the Dragon Fire/LAV testbed and begin the development of the "Fire on the Move" technology. Continue to search for new and emerging technologies.

FY 2005 PLANS: Continue Dragon Fire II concept demonstrator evaluations. Continue laser rangefinder investigations/experimentation. Continue EFCS demonstration/evaluation. Continue exploration of precision targeting technologies and systems. Continue development of modular design for fire support systems using the Dragon Fire/LAV testbed. Continue development of the "Fire on the Move" technology. Initiate investigations into highly mobile, internally transportable counter-fire radar to support a vertical maneuver element. Continue to search for new and emerging technologies.

	FY 02	FY 03	FY 04	FY 05
Seabasing, Logistics, Combat Service Support (CSS), and Combat in the Cities	3,299	6,701	11,080	9,342

This section includes MCWL experimentation efforts involving seabasing, logistics, CSS, urban combat, as well as training and education.

FY 2002 ACCOMPLISHMENTS: Established minimal Tactical Warrior experimentation program to explore expanded tactical capabilities in the infantry platoon and company through changes in organization and the exploitation of changes in available training and technology. Initiated M3M machine gun ground experimentation by mounting the system on three vehicle platforms (High Mobility Multi-purpose Wheeled Vehicle (HMMWV), 5-ton truck, and 7-ton truck). Initiated SEAWAY-LOGGY program to provide a set of adaptive command and control tools to support the planning and execution of expeditionary operations. SEAWAY-LOGGY is an object-based software tool kit that incorporates the Integrated Cooperative Decision Making (ICDM) architecture and employs expert system technology for analysis, evaluation, and projection. It is a candidate to become a segment within the Common Logistics Command and Control System (CLC2S) program of record. Initiated preliminary investigations into the Joint High Speed Vessel (JHSV) program to explore the concepts and capabilities with commercially available advanced hull and propulsion technology. Continued to develop and integrate the CSS tools/systems/equipment that will support the "Marine of 2020". Continued to invest in all types of simulation to allow required OMFTS warfighting capabilities to be tested. Continued to search for, evaluate, and perform seabased logistics support and seabasing analysis. Continued investigation/development of a system that tracks personnel involved in Non-combatant Evacuation Operations. Continued rapid prototype development, demonstration, and transition of logistics information

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resources technologies. Continued system concept M&S support for decision support and technology plan development for Joint Expeditionary Forces. Continued to investigate and incorporate automated information technologies for asset tracking, interactive, condition based maintenance support, and sensed logistics information feeds. Continued integrating clothing and equipment that will enhance Marines' survivability. Continued Military Operations in Urban Terrain (MOUT) experimentation efforts, to include Project Metropolis and Project Rifleman. Project Metropolis is the definitive multi-year experiment designated to create a system of realistic warfighting that will allow Marines to shoot, move, and communicate as they accomplish missions during MOUT. Project Rifleman, a subset of Project Metropolis, is a project conducting experimentation with the tactics, techniques, procedures, and technologies of the individual Marine to better enable him to fight and survive in the expeditionary combat environments. Continued to experiment with electronic markers. Continued to leverage ongoing work in the Day/Night Small Unit Target Acquisition and Small Unit Logistics fields. Continued to evaluate CSS for emerging and developing weapons as they apply to operational concepts of logistics support and sustainment for various non-standard scenarios. Continued investigations into existing and emerging training enhancements and simulation equipment and devices. Continued Ground Command and Control (GLC2) efforts. Expanded Joint Experimentation Cell investigation/coordination efforts. Continued Urban Ground Reconnaissance efforts. Completed Guided Parafoil Aerial Delivery System (GPADS) efforts, which included investigations into spare parachute canopies and attachments, as well as obtaining C-130 flight clearance. Completed Night Integrated Training Environment (NITE) Lab support efforts. The NITE Lab is an indoor, year-round, multi-environment training facility.

FY 2003 PLANS: Continue to develop and integrate the CSS tools/systems/equipment that will support the "Marine of 2020". Continue to search for, evaluate, and assess potential solutions to enhanced seabased logistics capabilities. Expand prototype development, demonstration, and transition of logistics decision support systems. Establish the MAGTF Utility Tractor Tactical (MUTT) initiative to assess the military utility of small, utility tractors in support of Airfield and Rapid Runway Repair and rapidly constructed field fortifications and revetments. Establish a Mine Counter Measures (MCM) initiative to develop and assess the TTTPs surrounding a MEU MCM Capability Set. Continue integrating clothing and equipment that will enhance Marines' survivability. Continue MOUT experimentation efforts to include Project Metropolis and Project Rifleman. Continue to experiment with electronic markers. Continue investigations into existing and emerging training enhancements and simulation equipment and devices. Continue to search for and to evaluate emerging commercially available technologies that could significantly improve efforts in this area. Assess Land Warrior technologies for Marine Corps application. Investigate Marine Corps and Special Operations Command (SOCOM) TTPs and Technology collaboration. Land Warrior is an integrated computer/weapon system worn by the individual Marine. Continue M3M mounted on vehicle platforms experimentation. Continue SEAWAY-LOGGY efforts - resulting in support to Marine Corps Material Command and the CSS Advocate in assessing the value of the SEAWAY LOGGY 2.0 software during July 2003. Expand JHSV program efforts to explore the concepts and capabilities with commercially available advanced hull and propulsion technology. Continue Urban Ground Reconnaissance efforts. As augmentation to the Center for Emerging Threats and Opportunities (CETO) Congressional enhancement, provide support for asymmetric warfare studies/investigations.

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FY 2004 PLANS: Continue to develop and integrate the CSS tools/systems/equipment that will support the "Marine of 2020". Continue to search for, evaluate, and assess potential solutions to enhanced seabased logistics capabilities. Continue prototype development, demonstration, and transition of logistics decision support systems. Continue development of the MUTT initiative. Continue development of MCM initiative. Continue to investigate individual equipment to enhance Marines' survivability and combat effectiveness. Continue MOUT experimentation efforts. Continue investigations into existing and emerging training enhancements and simulation equipment and devices. Continue to assess utility of Land Warrior technologies for Marine Corps application. Continue Marine Corps and SOCOM TTPs and Technology collaboration. Expand JHSV efforts. Complete M3M mounted on vehicle platforms experimentation. Continue Urban Ground Reconnaissance efforts. Continue to search for new and emerging technologies.

FY 2005 PLANS: Continue to develop and integrate the CSS tools/systems/equipment that will support the "Marine of 2020". Continue to search for, evaluate, and assess potential solutions to enhanced seabased logistics capabilities. Continue prototype development, demonstration, and transition of logistics decision support systems. Continue MUTT and MCM development/experimentation efforts. Continue to investigate individual equipment to enhance Marines' survivability and combat effectiveness. Continue MOUT experimentation efforts. Continue investigations into existing and emerging training enhancements and simulation equipment and devices. Continue to assess utility of Land Warrior technologies for Marine Corps application. Continue Marine Corps and SOCOM TTPs and Technology collaboration. Continue JHSV efforts. Continue Urban Ground Reconnaissance efforts. Continue to search for new and emerging technologies.

	FY 02	FY 03	FY 04	FY 05
Medical, Analysis, and Non-Lethal	1,732	1,265	1,584	1,647

This section includes MCWL experimentation efforts in the areas of medicine, analysis, data collection, and Non-Lethal weapons/technologies.

FY 2002 ACCOMPLISHMENTS: Continued medical investigations, to include health effects of thermobaric weapons, homeostatic dressings, and en-route medical care. Continued to define the scope, nature, technical utilities, and TTPs that support domestic and international responses to the human and material casualties of a Weapons of Mass Destruction (WMD) deployment. Continued to support instrumentation capability that provides battlespace instrumentation for experimentation. Continued efforts to improve upon the automated data collection system. Continued to provide overall systems engineering and integration support for ongoing experimentation. Continued to provide overall analysis and reporting of experimentation efforts. Continued limited investigations into seeking Non-Lethal technologies that can affect an opponent's infrastructure without necessarily destroying it. Continued limited investigations into the use of Non-Lethal technologies to deter, delay, deny, disrupt, and destroy opponents or their material.

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BUDGET ACTIVITY: 3      PROGRAM ELEMENT: 0603640M  
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations

FY 2003 PLANS: Continue to investigate enhanced medical TTPs and technologies. Continue to support instrumentation capability that provides battlespace instrumentation for experimentation. Continue efforts to improve upon the automated data collection system. Continue to provide overall systems engineering and integration support for ongoing experimentation. Continue to provide overall analysis and reporting of experimentation efforts. Continue to explore emerging Non-Lethal technologies.

FY 2004 PLANS: Continue to investigate enhanced medical TTPs and technologies. Continue battlespace instrumentation experimentation efforts. Continue efforts to improve upon the automated data collection system. Continue to provide overall systems engineering and integration support for ongoing experimentation. Continue to provide overall analysis and reporting of experimentation efforts. Continue to explore emerging Non-Lethal technologies. Continue to search for new and emerging technologies.

FY 2005 PLANS: Continue to investigate enhanced medical TTPs and technologies. Continue battlespace instrumentation experimentation efforts. Continue efforts to improve upon the automated data collection system. Continue to provide overall systems engineering and integration support for ongoing experimentation. Continue to provide overall analysis and reporting of experimentation efforts. Continue to explore emerging Non-Lethal technologies. Continue to search for new and emerging technologies.

	FY 02	FY 03	FY 04	FY 05
Thermobarics	3,070	0	0	0

This section describes Marine Corps Systems Command's (MCSC's) Ground Weapons thermobaric warhead efforts.

FY 2002 ACCOMPLISHMENTS: The Shoulder-Launched Multipurpose Assault Weapon (SMAW) thermobaric warhead is an addition to the family of warheads already fielded. This warhead will provide an immediate capability to clear caves in addition to be employed in the Military Operations in Urban Terrain (MOUT) environment. Fiscal Year 2002 provided for Phase I efforts of development, integration, and demonstration.

FY 2003 PLANS: Not applicable

FY 2004 PLANS: Not applicable

FY 2005 PLANS: Not applicable

## Congressional Plus-Ups

	FY 02	FY 03
Project Albert	3,881	5,817

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FY 2002 ACCOMPLISHMENTS: The Project Albert goal is to generate data to support warfighting hypotheses with emphasis on questions relating to urban warfare. Project Albert provides design and development of new tools to capture emergent behavior in synthetic environments that, over time, will lead to more effective maneuver warriors. Project Albert continued efforts to support decision-making in a co-evolving world through developing data, concepts, and tools of 21st Century Operations Analysis especially in the areas of non-linear and asymmetric warfare. During FY 2002, Project Albert accomplishments included: 1) Development of realistic agent-based models of combat with an emphasis on building a toolkit with a variety of ways to treat command and control, communication, combat, terrain, and decision making; 2) Designed and analyzed an influence network (use of Bayesian decision analysis) on a counter terrorist scenario; 3) Developed a Parallel Execution System so that gridded search, evolutionary, and co-evolutionary studies can be accomplished quickly and easily; 4) Developed a scenario translation capability from the ISAAC model to the SOCRATES model, for use in validating operational concepts across levels of resolution; 5) Continued research on the dynamics of competition, with the goal of implementing innovative ideas within military modeling and analysis; 6) Continued implementation of innovative approaches in data perception and understanding into the analysis tools that comprise the Albert toolkit; and 7) Evaluated technical, analytical, and administrative data leading to the development of an integrated and validated capabilities-based Expeditionary Maneuver Warfare (EMW) Command and Control Plan

FY 2003 PLANS: The goal of Project Albert is to investigate and apply promising technologies to support military decision-makers in meaningful ways through modeling, analysis, and new ways of combining them to include important phenomena inadequately represented by current techniques. In FY 2003 models and developing Data Farming techniques are used in two distinct ways to allow decision makers to deal with asymmetric threats and the uncertainty inherent in conflicts in today's world. The first is to understand the large landscape of possibilities in our changing world environment and the second is to discover outliers that, while individually improbable, collectively must be considered when building a robust force capable of protecting the interests of our country. Specific areas of application will include surf zone/beach obstacle reduction and mine countermeasures, human decision-making and Command and Control, and defense against enhanced blast weapons. Other areas of potential application include ship-to-objective maneuver, urban operations, homeland defense, force protection, and uninhabited vehicles.

	FY 02	FY 03
Mobile Counter-Fire System (MCFS)	2,428	2,445

MCFS is a sniper detection system. It is intended to provide the war fighter a means of detecting the origin of incoming sniper fire. The MCFS uses acoustic sensors to track bullet flight, determine the location of the shooter(s), and remotely slew a crew-served weapon toward the shooter(s). The operator is then able to return fire or report the shooter's location. An effective MCFS will remove the ability of enemy snipers to fire well-aimed second and subsequent shots from the same firing position, thus increasing force protection.

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FY 2002 ACCOMPLISHMENTS: Limited evaluations were performed on a single platform (High Mobility Multi-purpose Wheeled Vehicle (HMMWV)) prototype system with a baseline software system. In addition, algorithm research was conducted to address false-alarm issues.

FY 2003 PLANS: Allow for improvements to the MCFS in the areas of correcting previously identified problems, repackaging Fire Control and Sniper Detection systems, increase areas of vehicle protection, increase accuracy of vehicle location coordinates, incorporate a laser range finder, addition of calibration circuits, and to conduct system experimentation.

	FY 02	FY 03
Advanced Light Strike Vehicle (ALSV)	0	3,080

FY 2003 PLANS: This synergistic effort capitalizes upon lessons learned from the Internally Transportable Vehicle and the Reconnaissance Surveillance Targeting Acquisition Vehicle teaming Marine Corps, Navy and industry subject matter experts (SMEs) to investigate promising technologies leading to an effective, combat suitable, ALSV. This effort begins with a "clean sheet of paper" harnessing promising technologies in an effort to balance and mitigate competing performance requirements against vehicle characteristics such as speed, weight and size. Through the use of computer aided design and key technologies such as advanced suspension, hybrid electric drives, and composites the goal is to produce a working prototype ultimately leading, to an objective prototype.

## C. OTHER PROGRAM FUNDING SUMMARY:

### NAVY RELATED RDT&E:

PE 0602131M Marine Corps Landing Force Technology

NON-NAVY RELATED RDT&E: Not applicable

## D. ACQUISITION STRATEGY: Not applicable

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BUDGET ACTIVITY:3 PROGRAM ELEMENT: 0603640M  
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations

Project Number: R2223  
Project Title: Marine  
Corps ATD

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
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R2223 Marine Corps ATD	19,358	17,202	18,711	21,842	23,128	23,926	24,642	25,114
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MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: As the land warfare component of Naval Expeditionary Forces power projection, the Marine Corps has unique and technologically stressing requirements that result from: Mission; Marine Air-Ground Task Force (MAGTF) organizational structure; and reliance on maneuver, logistic sustainability, and intensive tempo of operations in diverse environments. Critical Marine Corps requirements/imperatives addressed in this Project are: Maneuver; Firepower; Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); Logistics; Training and Education; and Mine Counter Measures (MCM). These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in an operational environment. Multiple transitions into the Sub-system/Component Advanced Development Phase are planned, as well as fieldable prototyping to reduce risk in System Concept Development and Demonstration. A tactically effective MCM capability is necessary if MCM is to become a functional component of Naval Expeditionary Maneuver Warfare (EMW). MCM provides synchronization and speed of detection, breaching, clearance, proofing, and marking operations. This project supports: 1) engaging regional forces in decisive combat on a global basis; 2) responding to all other contingencies and missions in the full spectrum of combat operations (high, middle, and low intensity), in Military Operations in Urban Terrain (MOUT), and in operations other than war (OOTW); 3) and warfighting experimentation. By providing the technologies to enable these capabilities, this project supports the goals and objectives of the Strike, Littoral Warfare and Surveillance Joint Mission Areas. These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in an operational environment. Joint service efforts are in line with Defense Technology Objectives (DTOs) and Joint Warfighting Objectives (JWOs).

In addition, this project supports the goals and objectives of the Littoral Combat Future Naval Capabilities (FNC) process. Within the Naval Transformation Roadmap, this investment will achieve one of three key transformational capabilities required by Sea Shield as well as technically enable the Ship to Objective Maneuver (STOM) and Persistent Intelligence, surveillance and Reconnaissance (ISR) key transformational capabilities within Sea Strike and the enhanced Sea-borne Positioning of Joint Assets within Sea Basing.

B. ACCOMPLISHMENTS/PLANNED PROGRAMS:

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Project Title: Marine  
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	FY 02	FY 03	FY 04	FY 05
Command, Control, Communications, Computers, and Intelligence, Surveillance and Reconnaissance (C4ISR)	2,116	2,600	3,253	4,000

This activity demonstrates enhanced communications and situational awareness in warfighting environments and communication technologies for near term USMC operations.

FY 2002 ACCOMPLISHMENTS:

- Completed integration of Mobile Direction Finding capability (moved from 0602131M) for transition to the Team Portable Collection System program.
- Completed Command, Control, Communications, Computers, and Intelligence (C4I) Gateway integration and demonstration. Supported and participated in Millennium Challenge Joint Exercise.

FY 2003 PLANS:

- Migrate fully-functional Command and Control Technology testbed into systems integration environment for user prototyping, and requirements generation on prospective commercial and developmental software products.
- Initiate demonstration of Low-Probability of Intercept/Low-Probability of Detection (LPI/LPD) ultra-wide band radios for reconnaissance and urban communications.
- Initiate development and demonstration of a Marine-portable, deployable, Tactical Jammer.

FY 2004 PLANS:

- Continue testbed effort in testing and demonstration of emerging commercial and governmental developmental C4I software and hardware.
- Complete demonstration of LPI/LPD ultra-wideband radios.
- Complete development and testing of a Marine-portable Tactical Jammer.
- Complete demonstration of a tactical signals intelligence receiver.

FY 2005 PLAN:

- Initiate over-the-horizon communications range extension demonstration.
- Initiate and complete GHz tactical communication system demonstration.
- Initiate demonstration of advanced middleware for system interoperability.
- Continue testbed effort in testing and demonstration of emerging commercial and governmental developmental software and hardware.
- Demonstrate solid-state, high-density data storage device.

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PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations

Project Number: R2223

Project Title: Marine  
Corps ATD

	FY 02	FY 03	FY 04	FY 05
Maneuver	3,521	1,605	1,253	1,700

This activity demonstrates technologies to enhance battlespace mobility and develops an advanced vehicle technology testbed.

FY 2002 ACCOMPLISHMENTS:

- Continued testing and demonstration of light vehicle electric drive mobility performance via testing with the Reconnaissance, Surveillance, and Targeting Vehicle (RST-V) in the field.
- Demonstrated advanced tactical vehicle survivability technologies via testing with the RST-V in the field.
- Developed a Concept Validation Model (CVM) for the Tactical Unmanned Ground Vehicle (UGV) program to help develop and refine system performance specification.
- Awarded four preliminary design efforts for the Tactical UGV program.
- Completed UGV threat assessment and vulnerability study.

FY 2003 PLANS:

- Initiate analyses and limited tests of several individual structural armor materials and countermeasure technologies in support of Marine Corps Air Ground Task Force (MAGTF) Expeditionary Family of Fighting Vehicles (MEFFV) to determine effect on maneuver and survivability.

FY 2004 PLANS:

- Initiate the demonstration of essential combat system technologies, such as materials, propulsion, defensive suites, and lethality systems in support of MEFFV maneuver and survivability improvements.
- Initiate MEFFV platform design concepts.

FY 2005 PLANS:

- Initiate analyses of maneuver and survivability technologies for demonstration on a technology demonstrator testbed.
- Continue with demonstrations of key maneuver components, subsystem, and system breadboards to support initial MEFFV system design studies and trade-offs.
- Continue to develop and evaluate MEFFV platform design concepts and mission variants.

	FY 02	FY 03	FY 04	FY 05
Logistics	3,001	2,362	1,853	2,559

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This activity supports Expeditionary Maneuver Warfare capabilities assessing technologies that enhance logistics flow focusing on sensors, and autonomic logistics.

FY 2002 ACCOMPLISHMENTS:

- Completed exploration of Expeditionary packaging technologies for improved distribution/throughput of sustainment items for Sea Based Logistics.
- Continued development of the Light Weight Water Purifier to meet USMC requirements - man portable, High Mobility Multi-purpose Wheeled Vehicle (HMMWV) transportable.
- Initiated Expeditionary Energy Program that includes lightweight power generation and alternative power sources focusing on man-portable energy solutions.

FY 2003 PLANS:

- Initiate Individual on the move tactical water purification/generation and distribution program.
- Continue Expeditionary Energy Program to include lightweight power generation and alternative power sources.

FY 2004 PLANS:

- Continue development and demonstration of the various technologies in the water generation and distribution program for selection.
- Continue Expeditionary Energy Program down selecting the most promising lightweight power generation technologies.

FY 2005 PLANS:

- Continue development and demonstration of the various technologies in the water generation and distribution program for selection.
- Continue Expeditionary Energy Program development of lightweight power generation technologies.

	FY 02	FY 03	FY 04	FY 05
Training & Education	1,258	2,000	2,507	3,500

This activity demonstrates the enhanced neural and cognitive aspects of human performance including portable synthetic environment generation.

FY 2002 ACCOMPLISHMENTS:

- Completed test and evaluation of Ground Combat Element (GCE) Family of Tactical Decision Making Simulations (TDS) Close Combat Marines (CCM) for use in the Staff Sergeant's Course at the Marine Corps Institute (MCI).
- Completed test and evaluation of GCE TDS Marine Air/Ground Task Force - XXI (MAGTF-XXI) for use in the Captain's Course at the Expeditionary Warfare School (EWS).

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FY 2003 PLANS:

- Complete integration of GCE TDS Close Combat Marines in use for the Staff Sergeant's Course at the MCI. Preliminary Training Effectiveness Evaluation will be completed.
- Planned integration of GCE TDS Marine Air/Ground Task Force - XXI (MAGTF-XXI) in use for the Captain's Course at the EWS. Preliminary Training Effectiveness Evaluation will be completed.
- Initiate test and evaluation of a prototype Rapid Portable Synthetic Environment Generation capability.
- Initiate test and evaluation of a prototype for Combating Terrorism (CbT) TDS for use by the 4<sup>th</sup> Marine Expeditionary Battalion (MEB).

FY 2004 PLANS:

- Initiate test and evaluation of prototype for Combat Services Support Element (CSSE) TDS for use in the Logistics Officer's Course at the Logistics School.
- Continue test and evaluation of technology prototypes developed for a Portable Synthetic Environment Generation capability.
- Initiate test and evaluation of technology prototypes developed for instrumentation and enhanced situational awareness in a Military Operations in Urban Terrain (MOUT) training environment.
- Initiate test and evaluation of a prototype for a Combat Engineers TDS for use in the Engineer Officer's Course.
- Continue test and evaluation of a Combating Terrorism (CbT) TDS for use by the 4<sup>th</sup> Marine Expeditionary Battalion (MEB).

FY 2005 PLANS:

- Initiate integration of CSSE TDS in use for the Logistics Officer's Course at the Logistics School at Camp Johnson.
- Continue testing and evaluation of technology prototypes developed for a Rapid Portable Synthetic Environment Generation capability.
- Continue testing, evaluation, and refinement of technology prototypes developed for instrumentation and enhanced situational awareness in a MOUT training environment.
- Initiate test and evaluation of technology prototypes developed for a Training Mission Support Center (TMSC)
- Initiate testing and evaluation of technology prototypes developed for Augmented Cognition/Enhanced Human Performance (Aug Cog) applied research in the areas of human perception, memory, attention, focus and other neural warfighting attributes.
- Complete test and evaluation of a CbT TDS for use by the 4<sup>th</sup> Marine Expeditionary Battalion (MEB).

	FY 02	FY 03	FY 04	FY 05
Firepower	2,162	1,000	1,000	2,104

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This activity demonstrates enhanced lethality through technological improvements in fuzes and targeting.

FY 2002 ACCOMPLISHMENTS:

- Continued development of air bursting munitions and weapon reliability of the Objective Crew Served Weapon (OCSW) with Joint Services Small Arms Program (JSSAP).

FY 2003 PLANS:

- Initiate study of insensitive fuse technologies to improve storage safety aboard shipping in support of High Mobility Artillery Rocket System (HIMARS).
- Complete development of air bursting munitions and weapon reliability of the OCSW.

FY 2004 PLANS:

- Complete study of insensitive fuse technologies for HIMARS.
- Initiate development of insensitive fuse technologies for HIMARS.

FY 2005 PLANS:

- Initiate advanced development of a micro-electro-mechanical system (MEMS) technology based target information system (TIS) in order to enhance firepower effects at ranges from near contact to 1-2 kilometers.
- Continue development of insensitive fuse technologies for HIMARS for demonstration.

	FY 02	FY 03	FY 04	FY 05
Mine Countermeasures (MCM)	1,300	1,600	1,479	2,600

This activity focuses on advanced development and demonstration of mine countermeasure technologies enabling MCM capabilities in synchronization and speed of mine detection, organic neutralization, assault breaching, tactical clearance, proofing, marking and C4I operations.

FY 2002 ACCOMPLISHMENTS:

- The Advanced Mine Detector Program (AMD) successfully demonstrated the S&T exit phase criteria.
- Completed Mine Countermeasures for Beach Exit Zone to Objectives Study identifying, quantifying and prioritizing MCM requirements, capabilities and deficiencies for naval expeditionary Forces.
- Initiated a three year modeling and simulation study with Duke University to predict performance in various environmental conditions of the Handheld standoff Mine Detection System (HSTAMIDS) and the Advanced Mine Detector.
- Initiated and completed a study of the effects of Nuclear Quadrupole Resonance (NQR) energy on magnetically fused mines.

FY 2003 PLANS:

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- Initiate and complete NQR studies to increase signal amplification.
- Integrate the Handheld Standoff Mine Detection (HSTAMIDS) sensors (metal detector and ground penetrating radar) with the AMD programs' NQR sensor.
- Commence User evaluation of the AMD advanced test article (first prototype).
- Conduct independent analysis and data collection on the results of TNT, RDX, Tetryl and other explosive detection testing.
- Initiate evaluation of technologies relating to speed of detection (Stand-Off and Close-In), organic neutralization, assault breaching, tactical clearance, proofing, marking, and Command, Control, Communications, Computer and Intelligence (C4I) operations. Examples of potential efforts include the following: (1) Passive electromagnetic (EM) technologies to detect infrared (IR), millimeter wave, and microwave emissions. (2) Active EM technologies to include gamma ray imaging, x-ray backscatter, microwave enhanced IR, Radar, and magnetic induction. (3) Acoustic/seismic technologies to include active and passive acoustics, and high frequency seismic waves. (4) Mechanical displacement, explosives, and robotic technologies. (5) Mechanical and erosion mine and overburden removal, explosives, hydro/air-jet, slow burn, hyper-thermal, vibration, and robotic technologies. (6) Visual, chemical, active EM (including radioactive), film imaging, magnetic induction, acoustic/seismic interrogation, robotic, and change detection technologies.

FY 2004 PLANS:

- Begin building AMD system prototypes and initiate user evaluation and field testing.
- Continue independent analysis and data collection on the results of TNT, RDX, Tetryl and other explosive detection testing.
- Continue efforts to examine speed of detection (Stand-Off and Close-In), organic neutralization, assault breaching, tactical clearance, proofing, marking, and C4I operations.
- Investigate adaptation of US Army special clearance devices to amphibious vehicles and perform test and analyses of capability and utility.
- Evaluate sensor field systems to accurately geo-locate and provide accurate information on threat force mining activity.

FY 2005 PLANS:

- Continue user evaluation and field testing of the AMD.
- Continue independent analysis and data collection on the results of TNT, RDX, Tetryl and other explosive detection testing.
- Transition the AMD prototype to Engineering Development (6.5).

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- Continue with the identification of detection (Stand-Off and Close-In), organic neutralization, assault breaching, tactical clearance, proofing, marking, and C4I operations projects for transition to 6.4 Demonstration and Validation projects.

	FY 02	FY 03	FY 04	FY 05
Littoral Combat/Power Projection (LC/PP)	6,000	6,035	7,366	5,379

The goal of the LC/PP Future Naval Capabilities (FNC) is to support the development of Naval Expeditionary Maneuver Warfare via the application of technologies which enhance the ability of the Navy-Marine Corps team to achieve assured access and sustained operations in the littorals as the naval portion of a joint campaign. By being assigned S&T responsibility for littoral combat, the LC/PP FNC has been given an expansive warfighting problem set. The littoral region is where the future fight will take place and requires a broad naval perspective in identifying and solving capability gaps. In identifying capability gaps, the LC/PP FNC considers all the critical functions of warfighting functions: Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), fires, maneuver, sustainment, and force protection.

FY 2002 ACCOMPLISHMENTS:

- Completed program planning to include the development of Enabling Capabilities, Technology Products, Metrics, Exit Criteria, Technology Risk, and Demonstration planning. Identified and funded technologies that can be demonstrated to specific exit criteria to transition to acquisition.
- Completed Expeditionary Maneuver Warfare (EMW) war-game to determine critical capability gaps that are particularly well suited to be resolved by innovative science and technology solutions in support of the new USMC capstone concept.
- Initiated Expeditionary Fires Technology Program to develop a prototype system with self-contained survey, networked, real-time geospatial fire control, communications and automatic aiming subsystems.

FY 2003 PLANS:

- Initiate the development of advanced Expeditionary Fires technologies to include advanced pointing and aiming system, and advanced version of the North Atlantic Treaty Organization (NATO) ballistic kernel for ballistic prediction.
- Initiate the development and flight testing of tactical unmanned vertical take-off and landing platform technologies for USMC Tier II Unmanned Air Vehicle demonstrator.
- Develop and test software segment to aid in Marine Expeditionary Unit (MEU) planning and execution of Ship to Shore Maneuver (STOM).
- Demonstrate secure wireless network capabilities and transition to acquisition.

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Corps ATD

- Continued Expeditionary Fires Technology Program to develop a prototype system with self-contained survey, networked, real-time geospatial fire control, communications and automatic aiming subsystems.

FY 2004 PLANS:

- Demonstration of prototype expeditionary fires system with stabilization technologies, advanced pointing and aiming system, and advanced ballistic prediction capability.
- Begin flight certification and shipboard integration process for a tactical unmanned vertical take-off and landing platform. Begin development of sensor packages for the air platform.
- Develop, integrate and test additional functionality for STOM planning software.
- Initiate development of Beyond Line of Sight (BLOS) tactical communications connectivity for maneuver forces.
- Continued Expeditionary Fires Technology Program to develop a prototype system with self-contained survey, networked, real-time geospatial fire control, communications and automatic aiming subsystems.

FY 2005 PLANS:

- Transition expeditionary fires technologies for inclusion in Expeditionary Fires Support System (EFSS) and Lt Wt 155 Howitzer acquisition programs.
- Transition tactical unmanned vertical take off and landing platform and sensors to acquisition.
- Evaluate STOM planning and evaluation software during a scheduled training exercise.
- Continue development of BLOS tactical communications connectivity.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

PE 0603635M Marine Corps Ground Combat/Supporting Arms Systems  
PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems)  
PE 0305204N (Tactical Unmanned Air Vehicles)  
PE 0601152N (In-House Laboratory Independent Research)  
PE 0601153N (Defense Research Sciences)  
PE 0204163N (Fleet Communications - (Tactical))  
PE 0602782N (Mine and Expeditionary Warfare Applied Research)  
PE 0603782N (Mine and Expeditionary Warfare Advanced Technology)  
PE 0603235N (Common Picture Advanced Technology)  
PE 0206623M (Marine Corps Ground/Supporting Arms Systems)  
PE 0602131M (Marine Corps Landing Force Technology)  
PE 0603612M (Marine Corps Mine/Countermeasures Systems)  
PE 0603635M (Marine Corps Ground Combat/Support System)

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PE 0206313M (Marine Corps Communications Systems)  
PE 0603236N (Warfighter Sustainment Advanced Technology)

NON-NAVY RELATED RDT&E:

PE 0603004A (Weapons and Munitions Advanced Technology)  
PE 0603005A (Combat Vehicle and Automotive Advanced Technology)  
PE 0603606A (Landmine Warfare and Barrier Advanced Technology)  
PE 0603607A (Joint Service Small Arms Program)  
PE 0603619A (Landmine Warfare and Barrier Advanced Development)  
PE 0603772A (Advanced Tactical Computer Science and Sensor Technology)  
PE 0604710A (Night Vision Systems - Engineering Development)  
PE 0604808A (Landmine Warfare and Barrier Engineering Development)  
PE 0602301E (Computing Systems and Communications Technology)  
PE 0602702E (Tactical Technology)

D. ACQUISITION STRATEGY: Not Applicable

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FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2003

Exhibit R-2a

BUDGET ACTIVITY:3

PROGRAM ELEMENT: 0603640M

Project Number: R2362

PROGRAM TITLE: Marine Corps Advanced Technology Demonstrations

Project Title: ELB

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
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R2362 Extending the Littoral Battlespace (ELB)	666	930						
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A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Extending the Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD) effort responds to the top level military need to rapidly deploy a Naval Expeditionary Task Force with an embarked Marine Air Ground Task Force (MAGTF) as part of a larger Joint Task Force to any region of the world's littorals and conduct military operations from a sea base across the spectrum of conflict to implement national military strategy. Forces employed ashore will be light, agile, distributed, and desegregated and capable of optimizing remote fires, to effectively deter aggression, halt attacks and secure critical areas as a precursor to a much larger force. Forces will be empowered by unprecedented situational awareness via a robust information infrastructure that is fully coupled to a decision/planning/execution system on a shared battlespace network (sea/land). The objective of the ACTD is to demonstrate an enhanced integrated command and control/fires and targeting capability to enable rapid employment, maneuver, and fires to support joint dispersed unit operations in an extended littoral battlespace. A Major Systems Demonstration (MSDI) was completed FY 1999 and a second one (MSDII) was completed in FY 2001. The ELB ACTD was approved by Deputy Under Secretary of Defense (Acquisition and Technology) (DUSD (AT)) on 16 January 1997.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY 05
Extending the Littoral Battlespace (ELB)	666	930	0	0

The Extending the Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD) effort responds to the top level military need to rapidly deploy a Naval Expeditionary Task Force with an embarked Marine Air Ground Task Force (MAGTF) as part of a larger Joint Task Force to any region of the world's littorals and conduct military operations from a sea base across the spectrum of conflict to implement national military strategy. Forces employed ashore will be light, agile, distributed, and desegregated and capable of optimizing remote fires, to effectively deter aggression, halt attacks and secure critical areas as a precursor to a much larger force. Forces will be empowered by unprecedented situational awareness via a robust information infrastructure that is fully coupled to a decision/planning/execution system on a shared battlespace network (sea/land). The objective of the ACTD is to demonstrate an enhanced integrated command and control/fires and targeting capability to enable rapid employment, maneuver, and fires to support joint dispersed unit operations in an extended littoral battlespace. A Major Systems Demonstration (MSDI) was completed FY 1999 and a second one (MSDII) was completed in FY 2001. The ELB ACTD was approved by as a five year ACTD by Deputy Under Secretary of Defense (Acquisition and Technology) (DUSD (AT)) on 16 January 1997. The demonstration phase of this

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FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET  
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PROGRAM ELEMENT: 0603640M

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Project Title: ELB

effort will continue as JTF Warnet beginning in FY04. USMC transition initiatives are part of the Littoral Combat/Power Projection Future Naval Capability (LC/PP FNC)

## FY 2002 ACCOMPLISHMENTS:

- Implemented multiple initiatives within Wireless LAN/Secure Wireless LAN technologies in which these technologies have demonstrated military utility. Established the service technical infrastructure to support the insertion of the technologies into USMC Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) architectures, through the integration into C4ISR test beds.

## FY 2003 PLANS:

- Continue the transition of demonstrated technologies, hardware, software, and processes to Marine Corps acquisition communities. Continue support for service test beds for integration of demonstrated technologies and technical infrastructure.

## C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

PE 0206313M Marine Corps Communications Sys

NON-NAVY RELATED RDT&E:

NA

D. ACQUISITION STRATEGY: Not Applicable

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FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET  
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY:3

PROGRAM ELEMENT: 0603640M

PROGRAM TITLE: Marine Corps Advanced Technology Demonstrations

Project Number: Various

Project Title: Congressional  
Plus-ups

Congressional Plus-Ups:

C2297	FY 02	FY 03
Project Albert	*	*

\* Described in C2297 Project

C2297	FY 02	FY 03
Mobile Counter-Fire System (MCFS)	*	*

\* Described in C2297 Project

C2297	FY 02	FY 03
Advanced Light Strike Vehicle (ALSV)	0	*

\* Described in C2297 Project

C9154	FY 02	FY 03
Center for Emerging Threats and Opportunities CETO)	0	962

CETO is a partnership between the Marine Corps Warfighting Laboratory (MCWL) and the Potomac Institute for Policy Studies (PIPS). CETO's mission is to identify emerging threats, explore concepts, and determine capabilities and solutions to meet future challenges in coordination with the United States Marine Corps (USMC) operating forces. CETO coordinates its work with the operating forces and makes its recommendations to the Commanding General, MCWL regarding emerging capabilities that are candidates for transition to the Expeditionary Force Development System. In addition CETO has recently been tasked to support senior USMC leadership on a wide array of issues.

C9154	FY 02	FY 03
Rapid Deployment Fortification Wall	0	1,010

The purpose of this Improved Expedient Fortification Construction program is to experiment with commercial-off-the-shelf expedient fortification construction systems. Currently the expedient fortification technique is manpower intensive and a one-time-usage, sandbag construction method. Based on the rapidly changing asymmetric environment that our Marines operate in, the need to provide an easy to build, scalable, and re-usable force protection structure is critical. By leveraging modern materials and techniques, the Marine Corps can increase force protection while decreasing the manpower

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FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET  
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY:3

PROGRAM ELEMENT: 0603640M

Project Number: Various

PROGRAM TITLE: Marine Corps Advanced Technology Demonstrations

Project Title: Congressional  
Plus-ups

hours needed to construct expedient fortifications. Efforts will entail investigation and experimentation with new technologies, techniques, and procedures (TTPs).

C9154	FY 02	FY 03
Transportable Transponder Landing System (TTLS)	0	2,163

TTLS was originally developed under a Defense Advanced Research Projects Agency (DARPA) effort through Naval Air Systems Command (NAVAIR) and Advanced Navigation and Positioning Corp (ANPC). The system was designed to provide a precision approach capability by using inexpensive ground systems to provide position information for aircraft equipped with a transponder and standard Federal Aviation Administration (FAA) Category I Instrument Landing System (ILS) equipment. In order for TTLS to suit the USMC tactical mission requirements, several technologies must be developed. These include: Link 4A data-link guidance output to support USMC aircraft; multiple aircraft tracking and guidance; miniaturization of the system for mounting on a supporting ground vehicle; reciprocal approaches/runway support; Local Sector Surveillance & Control; and reduced TTLS susceptibility to jamming. Efforts will entail investigating technology developments.

R2995	FY 02	FY 03
California Central Coast Research Partnership (C3RP) Initiative	1,249	3,027

Defined an area of core excellence and established an Interdisciplinary Center of Excellence in research relevant to national security and the Marine Corps on the Central Coast of California by bringing together the University, government agencies and units (both federal and state), and the private sector, which can evolve into an exceptional national resource. Efforts will continue to explore this potential and to identify and support relevant research and expertise. Completed the definition of core excellence area in information system/network bandwidth development as a national resource for the use of government, academia, and the private sector.

R9028	FY 02	FY 03
Marine Corps Future Logistics	1,637	N/A

Expeditionary Energy program addresses the continuum of mobile power to include all aspects from generation to consumption. These efforts develop new capabilities to reduce logistics footprint ashore. This effort provides technical analysis of lightweight generators, alternative power sources, and on-board vehicle power generation. This effort culminated with the development of three proof of concept systems.

R9029	FY 02	FY 03
Fast Refueling System	1,649	N/A

Provided for operational testing and evaluation, modifications, and purchase of the fast refueling system. FAST is a means to package fuel into configurations that allow emergent fuel re-supply under expeditionary forward operating

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Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY:3

PROGRAM ELEMENT: 0603640M

Project Number: Various

PROGRAM TITLE: Marine Corps Advanced Technology Demonstrations

Project Title: Congressional  
Plus-ups

conditions. The FAST program goal is to initiate design, development, and evaluation of flexible liquid container configurations to support high portability/transport and rapid employment. Technical objectives involve the examination of industrial polymer composites and high strength filament windings derived from carbon filament, kevlar, polyester yarn, fiberglass, neoprene, and synthetic rubbers to provide high reliability, durability and significantly reduced life cycle costs. Field User Test and Evaluation of the FAST system validated needed modifications to the system and refined concepts of employment. Initiated development of technology transition plans for FRS system.

R9290	FY 02	FY 03
Expeditionary Unit Water Purification Technology	N/A	6,148

Expeditionary Unit Water Purification program addresses large capacity water production capabilities in the 100K-500K gallons per day range. These efforts will focus on developing new technologies that will reduce logistics footprint making these large scale systems much more expeditionary. This effort is targeted to provide a C130 transportable system. This effort culminates with the development of a proof of concept system.

R9167	FY 02	FY 03
Man-Portable Quadrupole Resonance	0	*

(\*\$2,445 was appropriated in FY 2003 PE 0603792N)

This activity focuses on advanced development and demonstration of landmine countermeasures technologies; specifically, a landmine detection system on quadrupole resonance technology, engineered into a man-portable configuration.

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