FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2002

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602131M
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Marine Corps Landing Force Technology	12,144	30,961	30,274	32,499	36,341	39,798	39,186	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Marine Corps is tasked to develop, in conjunction with the Navy, Army, and Air Force, those phases of amphibious operations that pertain to tactics, techniques, and equipment used by the landing force. It is organized into five amphibious expeditionary warfighting capability areas. These are; Mobility; Weapons; Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); Logistics; and Training and Education. Mobility and Weapons programs develop advanced technologies for application on current and future Marine Corps expeditionary weapons and vehicle systems. Emerging capability requirements for future armored vehicles include improved mobility, survivability, and lethality over legacy systems. Weapon systems for the individual Marine include advanced small arms development, non-lethal systems, and improved anti-armor weapons. C4ISR supports Expeditionary Maneuver Warfare by providing secure, robust, self-forming, mobile communications networks; distributed computing to support information dissemination to all echelons; and sensors, software, and data processing to support formation of the user-appropriate common picture. The Logistics programs are structured to meet emerging Marine Corps Warfighting Concepts Expeditionary Maneuver Warfare and Sea Based Logistics. Logistic program areas to meet these emerging concepts include improved distribution capabilities, Logistics Command and Control (C2) Systems, and reduced energy demand. The Training and Education program areas invests in technologies to enhance the performance of the warfighter that relate to the neural and cognitive part of human performance.

(U) The primary objective of this Program Element (PE) is to develop and demonstrate the technologies needed to meet the Marine Corps' unique responsibility for amphibious warfare and subsequent operations ashore. This PE provides the knowledge base to support Advanced Technology (6.3) and is the technology base for future amphibious/expeditionary warfare capabilities. This PE supports the Concept Based Requirements System of the Marine Corps Combat Development

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Command and responds directly to the Marine Corps science and technology process. The Future Naval Capabilities (FNC) process is supported and funds are programmed accordingly. The core program also supports discovery and invention. Due to the number of efforts in this PE, the programs described are representative of the work included in this PE.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is budgeted within the APPLIED RESEARCH Budget Activity because it investigates technological advances with possible applications toward the solution of specific Naval problems, short of a major development effort.

B. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2001 ACCOMPLISHMENTS:

- (U)($2,974) Mobility Thrust: Transitioned data to Coastal Offshore Battlefield Reconnaissance and Analysis (COBRA) program/Mine Countermeasures Future Naval Capabilities (FNC). Tested Tunable Filter Multi-spectral Camera in flight. Conducted studies and utilized urban terrain modeling to evaluate payoffs in vehicle hardening, signature management and vehicle configuration to exploit the current state of the art in materials and protection systems as they pertain to the littoral environment.

- (U)($336) Weapons Thrust: Conducted air bursting munitions effectiveness study. Conducted lethality modeling and simulation for Objective Crew Served Weapon.

- (U)($2,549) C4ISR: Continued devising Joint Tactical Radio System (JTRS) Software Communications Architecture version 1.0 Standard. Injected Marine Corps specific requirements into and performed network modeling of proposed JTRS wide-band network waveforms (WNW); began JTRS WNW standardization process. Developed and prototyped JTRS wide-band wearable antennas. Completed Mobile Direction Finding development of signal characterization software and completed location, orientation and timing card design. Moved effort to 0603640M program for prototype development

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in FY2002. Initiated and continued development of a black and white, still-frame imaging capability with infrared payload for the Infantry Reconnaissance Round.

- (U)($2,173) Logistics: Expeditionary packaging technologies for biodegradable and non-expendable materials explored. Light Weight Water Purifier evaluated for modification to meet USMC requirements – man portable, High Mobility Multi-purpose Wheeled Vehicle (HMMWV) transportable. Military assessment of Small Unit Logistics system conducted. Continued development of Onboard vehicle Refueler Communication system. Corrosion study completed.

- (U)($1,699) Training & Education Thrust: Transitioned Advanced Amphibious Assault Vehicle (AAAV) modeling and simulation products developed as part of the Small Unit Tactics Trainer (SUTT) program to the Capable Manpower (CM) Future Naval Capabilities (FNC) program. Completed Fire Team Cognitive Skills Trainer Demonstration (FTCSTD) report. This report evaluated the ability of a Commercial Off The Shelf (COTS) computer game to perform as a Tactical Decision Game (TDG) for accomplishing Marine Infantry and Combat Arms required skills training. Transitioned the FTCSTD products to the Deployable Virtual Training Environment (DVTE) program. Completed Marine Air Ground Task Force (MAGTF) Federation Object Model (FOM) prototype development and testing in an integrated simulator network. Transitioned the MAGTF FOM products to the DVTE program.

(U) FY 2001 CONGRESSIONAL PLUS-UP:

- (U)($2,413) Center for Emerging Threats and Opportunities (Non-Traditional Warfare Initiatives): Conducted Military Operations in Urban Terrain (MOUT) Experimentation at the Strategic, Operational, and Tactical levels of war. Conducted 2 major strategic level war games, 2 operational level war games, and 3 limited objective field experiments concentrating on technological enhancements in the areas of robotics, micro-UAVs, and directed energy non-lethal weapons. Products included a Reconnaissance/Surveillance/Target acquisition (RSTA) Tactics/Techniques/Procedures (TT&P) document, Directed Energy TT&P document, and a joint Urban Operating concept draft document. A prototype shipboard was developed in port defense course for the US Navy in the wake of the U.S.S. Cole attack. This included

a Navy version of the Combat Decision Range and completed a major study on Ships to Objective Maneuver (STOM) capabilities to include identification.

2. (U) FY 2002 PLAN:

• (U)($5,435) Mobility Thrust: Evaluate alternate power sources for advanced hybrid electrical systems and improvements in high efficiency and high energy density vehicle power sources compatible with Operational Maneuver From The Sea (OMFTS) and Ship To Objective Maneuver (STOM) operating concepts, e.g. fuel cells, micro turbines and power management systems. Evaluate active suspension systems, integration of novel shock and strut systems for Marine Corps future vehicles. Develop lightweight armor/structural materials. Develop unmanned ground vehicle (UGV) technology. Complete studies of urban terrain issues, visibility, rubble, and trafficability. Assess UGV technology for the mission payload package; sensors, self-protection and effects, in order to complete input into the UGV Operational Requirements Document.

• (U)($3,436) Weapons Thrust: Develop sensor fusion/fire control technologies, e.g. advanced ground weapon fire control systems fusing multiple sensor inputs (thermal, visual, acoustic) into a single display. Conduct Marine Air Ground Task Force (MAGTF) Expeditionary Family of Fighting Vehicles (MEFFV) lethality modeling and simulation. Develop non-lethal weapons technology, e. g. neuro-muscular disruption systems to deliver shock or trauma to multiple targets at greater than contact weapons ranges. Complete air burst munitions study of alternative methods of integrating low cost mobile sensor and missile system components into advanced combat systems.

• (U)($2,315) C4ISR: Initiating high-density data storage (rugged, no moving parts) applied research program. Developing chip-manufacturing processes for emerging test prototype device. Initiating Command and Control testbed for testing interoperability, usability and military suitability of developmental software. Initiating conformal antenna development effort for very-high frequency and ultra-high frequency radio vehicle applications. Completing JTRS architecture and standard development work for transfer to the JTRS Joint Program Office. Selecting WNW

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Standard Version 1. Completing wearable JTRS vest antenna work (human effects, ruggedness, prototype development) for transition to acquisition command. Testing and completion of development for technology maturity of a black and white, still-frame imaging capability with infrared payload for the Infantry Reconnaissance Round.

- (U)($1,470) Logistics: Investigate water filtration technologies by completing evaluation of Lightweight Water Purifier and development of Nuclear Biological and Chemical (NBC) water packaging compatible with Modular Load Bearing Equipment (MOLLE) modular lightweight load bearing system. Investigate fuel quality sensing technology to include pressure transducer sensors to provide fuel asset visibility. Continue to refine Expeditionary Packaging technologies for biodegradable and non-expendable materials. Continue development of Small Unit Logistics ground logistics C2 program.

- (U)($3,305) Training & Education Thrust: Evaluate technologies available for the development of a Portable Synthetic Environment Generation capability. This system will be capable of automatically producing a three dimensional synthetic database from a video stream of real world terrain and cultural features in a 'common' database format suitable for Close Quarter Battle (CQB) and Military Operations in Urban Terrain (MOUT) training. Evaluate technologies available for enhancing situational awareness in CQB and MOUT training. This technology must be capable of tracking all aspects of individual movement in real time. Center for Emerging Threats and Opportunities (CETO) Thrust-Evaluate and develop technologies for application to Force Protection of Marine units deployed to high risk environments and for Anti-Terrorism operations to be conducted by the Fourth Marine

Expeditionary Brigade. These technologies will be evaluated in the context of operational experiments to determine feasibility and utility for rapidly emerging asymmetric warfare environments.

- (U)($1,000) Littoral Combat and Power Projection FNC: Initiate program planning to include the development of Enabling Capabilities, Technology Products, Metrics, Exit Criteria, Technology Risk, and Demonstration planning. Identify and fund technologies that can be demonstrated meeting specific exit criteria for transition to acquisition.

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- (U)($1,000) Littoral Combat and Power Projection FNC: Conduct Expeditionary Maneuver Warfare (EMW) wargame 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. Several specific expeditionary vignettes encompassing a high-end forcible entry scenario, a high-end forward operations scenario, and a low-end “three block war” scenario will drive the game.

- (U)($5,000) Littoral Combat and Power Projection FNC: Initiate Expeditionary Fires Technology Program to develop a system with self-contained survey, networked, real-time geospatial fire control, communications and automatic aiming subsystems.

- (U)($2,000) Littoral Combat and Power Projection FNC: Determine the level of increased operational capability that is provided to a "First In" USMC Command Post (oftentimes referred to as a Jump CP) through the development and or integration of a Ku band SATCOM reachback capability with TACSAT and line of sight communication, that includes wireless command post extension, SIPR/NIPRNET, tactical cell phone, and video teleconference capability.

- (U)($1,500) Littoral Combat and Power Projection FNC: Complete development of Dragon Eye, small unit unmanned aerial vehicle designed for one-hour flight at 40-mph airspeed. Transition to Marine Corps Systems Command.

- (U)($1,000) Littoral Combat and Power Projection FNC: Initiate development of portable/deployable Tactical Decision Games that provide the capability for virtual force-on-force interaction and virtual live fire training to include heterogeneous "plug and play" virtual environments (especially for individual and small unit training). Initiate development of precision location indicator devices to be integrated with constructive simulation for live fire training and range safety purposes.

- (U)($3,500) Develop innovative technology solutions in the capability gap areas that emerged from the insights gained from the EMW wargame. Gap technology areas will include C4ISR, Expeditionary Fires, and Maneuver. Initiate and release Broad Agency Announcements.

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3. (U) FY 2003 PLAN:

- (U)($4,422) Mobility Thrust: Initiate hybrid electric mobility platform test bed for MEFFV. Develop lightweight armor/structural materials. Develop lightweight vehicle power technologies. Develop advanced vehicle mobility technologies. Develop UGV technology.

- (U)($2,312) Weapons Thrust: Develop MEFFV requirements excursions, e.g. unique Marine Corps differences from the Army Future Combat Systems (FCS) lethality programs, multi-role cannon, compact kinetic energy missile and directed energy. Develop sensor fusion/ fire control technologies for USMC ground weapons. Develop MEFFV lethality study/ modeling and simulation for future USMC fighting vehicles that meet requirements for OMFTS/STOM which are different from the Army FCS concept. Develop non-lethal weapons technology for transition to Marine Program Manager for Non-lethal Weapons.

- (U)($2,420) C4ISR: Initiate development of low-probability of interception, low-probability of detection ultra-wide band communications (from 6.1). Initiate development of network management capabilities for the low-bandwidth, heterogeneous communications environment. Initiate development of information management technologies for low-bandwidth distributed environments. Continue development of high-density, solid-state data storage devices. Continue development of command and control testbed capability. Continue development of vehicular conformal antenna technology.

- (U)($1,634) Logistics: Investigate expeditionary energy technologies to include fuel cells and technologies associated with reducing fossil fuel consumption. Continued development of water filtration technologies to include water packaging compatible with MOLLE modular lightweight load bearing system. Continued development of Sensor technologies to expand to other areas of Supply beyond fuel to include Water, ammo, etc. Continue to refine Expeditionary Packaging technologies biodegradable and non-expendable materials. Continue development of Small Unit Logistics ground logistics C2 program with emphasis in Autonomic Logistics, sensor technologies to improve readiness of USMC ground equipment.

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- (U)($4,162) Training and Education Thrust: Complete evaluation of technologies available for the development of a Portable Synthetic Environment Generation capability. Commence design of a systems that will be capable of automatically producing a three dimensional synthetic database from a video stream of real world terrain and cultural features in a 'common' database format suitable for Close Quarter Battle (CQB) and Military Operations in Urban Terrain (MOUT) training. Demonstrate feasibility of technologies applicable to enhancing situational awareness in CQB, MOUT, and other warrior training applications. Center for Emerging Threat and Opportunities (CETO) Thrust: Continue to evaluate, develop, and test technologies in operational experiments for applications to Force Protection and Anti-Terrorism. Technologies will include, but not be limited to: surveillance/counter-surveillance; chemical/biological incident response; near-real-time subject matter expert reach-back; intelligent agent symbiosis for modeling incident precursors; modeling and simulation of optimized multi-agency command and control processes.

- (U)($2,500) Littoral Combat and Power Projection FNC: Develop prototype Command and Control technologies for Amphibious Task Force (ATF).

- (U)($5,000) Littoral Combat and Power Projection FNC: Develop prototype Expeditionary Fires technologies to include platform and weapon stabilization techniques to enable firing on the move.

- (U)($5,000) Littoral Combat and Power Projection FNC: Develop prototype technologies for MAGTF Maneuver in the Littorals.

- (U)($2,824) Littoral Combat and Power Projection FNC: Develop prototype Intelligence, Surveillance, and Reconnaissance technologies for the ATF.

C. (U) PROGRAM CHANGE SUMMARY:

	FY 2001	FY 2002	FY 2003
FY 2002 President's Submission	12,180	31,248	
Execution Adjustment	+232		

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SBIR	-268		
Section 8123: Management Reform Initiative		-276	
FFRDC Reduction		-11	
FY 2003 President's Submission	12,144	30,961	30,274

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Not Applicable.
(U) Schedule: Not Applicable.

D. (U) OTHER PROGRAM FUNDING SUMMARY: The Navy's 6.1 program contributes to this effort.

(U) NAVY RELATED RDT&E:

(U) This program adheres to Tri-Service Reliance Agreements in Chemical/Biological Defense; Command, Control and Communications; Conventional Air/Surface Weaponry; Electronic Devices; Ground Vehicles; Ships and Watercraft; Manpower and Personnel; and Training Systems.

(U) PE 0601152N (In-House Laboratory Independent Research)
(U) PE 0601153N (Defense Research Sciences)
(U) PE 0204163N (Fleet Communications-Tactical)
(U) PE 0602235N (Common Picture Applied Research)
(U) PE 0602782N (Mine and Expeditionary Warfare Applied Research)
(U) PE 0603782N (Mine and Expeditionary Warfare Advanced Technology)
(U) PE 0603235N (Common Picture Advanced Technology)
(U) PE 0206623M (Marine Corps Ground/Supporting Arms Systems)
(U) PE 0603640M (Marine Corps Advanced Technology Demonstrations)

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(U) PE 0603612M (Marine Corps Mine/Countermeasures)
(U) PE 0603635M (Marine Corps Ground Combat/Support System)
(U) PE 0206313M (Marine Corps Communications Systems)
(U) PE 0603236N (Warfighter Sustainment Advanced Technology)

(U) NON NAVY RELATED RDT&E:
(U) PE 0603004A (Weapons and Munitions Advanced Technology)
(U) PE 0603005A (Combat Vehicle and Automotive Advanced Technology)
(U) PE 0603606A (Landmine Warfare and Barrier Advanced Technology)
(U) PE 0603607A (Joint Service Small Arms Programs)
(U) PE 0603619A (Landmine Warfare and Barrier Advanced Development)
(U) PE 0603772A (Advanced Tactical Computer Science and Sensor Technology)

(U) PE 0604710A (Night Vision Systems-Engineering Development)
(U) PE 0604808A (Landmine Warfare/Barrier Engineering Development)
(U) PE 0602301E (Computing Systems and Communications Technology)
(U) PE 0602702E (Tactical Technology)

E. (U) SCHEDULE PROFILE: Not applicable.