ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 6 - Management and Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

COST (*In Thousands*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	35551	39095	44019	49594	56079	63491	66451	Continuing	Continuing
D983 Major Test & Evaluation - USAKA	4428	7436	8196	7722	8447	14385	9989	Continuing	Continuing
D984 Major Technical Test Instrumentation	28827	27006	29275	33612	39005	38803	44402	Continuing	Continuing
D986 Major User Test Instrumentation	2296	4653	6548	8260	8627	10303	12060	Continuing	Continuing

A. Mission Description and Budget Item Justification: This program funds development and acquisition of major developmental test instrumentation for the U.S. Army Test and Evaluation Command (ATEC) and Developmental Test Command (DTC) test activities: White Sands Missile Range (WSMR), NM; Yuma Proving Ground, (YPG), AZ; Aberdeen Test Center (ATC), MD; Dugway Proving Ground (DPG), UT; Redstone Technical Test Center (RTTC), AL; and Aviation Technical Test Center (ATTC), AL; and for the US Army Kwajalein Atoll (USAKA), which is managed by the U.S. Army Space and Missile Defense Command. Program also funds development and acquisition of Operation Test Command (OTC) major field instrumentation. Requirements for instrumentation are identified through a long range survey of project managers, Research Development and Engineering Centers (RDECs), and Battle Laboratories developing future weapon systems and the test programs that require these systems. Army testing facilities are also surveyed to determine major testing capability shortfalls.

B. Program Change Summary	FY 1999	FY 2000	FY 2001
Previous President's Budget (FY 2000/2001PB)	37030	39380	40190
Appropriated Value	37284	39380	
Adjustments to Appropriated Value			
a. a. Congressional General Reductions	-254		
b. b. SBIR/STTR	-937		
c. c. Omnibus or Other Above Threshold Reductions		-155	
d. d. Below Threshold Reprogramming	-394		
e. e. Rescissions	-148	-130	
Adjustments to Budget Year Since FY2000/2001PB			+3829
Current Budget Submit (FY 2001 PB)	35551	39095	44019

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PROJECT: D983

COST (*In Thousands*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
D983 Major Test & Evaluation - USAKA	4428	7436	8196	7722	8447	14385	9989	Continuing	Continuing

Mission Description and Justification: **Project D983 - Major Test and Evaluation (T&E) Investment - USAKA:** This project funds the purchase of major Improvement and Modernization (I&M) equipment for the US Army Kwajalein Atoll/Kwajalein Missile Range (USAKA/KMR) in the Marshall Islands. USAKA/KMR is a national test range supporting Army, Ballistic Missile Defense Organization (BMDO), US Air Force, National Aeronautics and Space Administration (NASA), and other customers. Upgrades to radars, telemetry, optics, command/control and other equipment are required to maintain USAKA as a national test range. FY 2000 increase supports the Kwajalein Missile Range (KMR) Modernization and Remoting (KMAR) project which is a concurrent, range-wide modernization effort to maximize the use of common, standardized Commercial Off-The-Shelf (COTS) technology to replace obsolete components; implement common hardware/software architectures and automation; and "remote" the operation of range sensors and instrumentation to the island of Kwajalein. This effort will upgrade range capabilities that are critical to the success of Theater Missile Defense (TMD) and National Missile Defense (NDM) test missions as well as reduce USAKA/KMR annual operating costs by $18M per year beginning in FY03. These savings are already reflected in USAKA PE 0605301A.

FY 1999 Accomplishments:

- 4428 Continued KMR Modernization and Remoting (KMAR) – Completed purchase of Advanced Research Project Agency (ARPA) Lincoln C-band Observable Radar (ALCOR) and Millimeter Wave (MMW) radar intermediate frequency (IF) receiver, digital pulse compression, computer, and recording equipment. Began installation of ALCOR transmitter control, antenna control, and radiation monitor interface, and console subsystems. Completed remoting of Gagan Island post-impact telemetry. Completed Super Recording Automatic Digital Optical Tracker (RADOT) optics computer upgrades.

Total 4428

FY 2000 Planned Program:

- 7236 Continue KMR Modernization and Remoting (KMAR) – Begin installation of remaining IF receiver, digital pulse compression, computer and recording system equipment. After validation and verification testing ALCOR radar modernization is complete. Complete three T3 circuits from Kwajalein to the KREMS radars on Roi-Namur in addition to mission voice circuit upgrades to allow full automation of Kiernan Re-entry Measurement Site radar complex at Roi-Namur as each radar system completes modernization. Relocate Gagan Island 3m antenna to Roi-Namur. Begin installation of MMW modernized radar transmit control, antenna control and radiation monitor interface equipment. Complete mission planning workstation and simulation capabilities to allow for automated mission planning. Update RADOT optics computers.
- 200 Small Business Innovative Research/Small Business Technical Transfer (SBIR/STTR) Program.

Total 7436

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FY 2001 Planned Program:

•	7496	Continue KMR Modernization and Remoting (KMAR) – Complete installation of IF receiver, computer, digital pulse compression and recording equipment. After validation and verification MMW radar modernization is complete. Begin installation of ALTAIR radar modernization transmit control, antenna control, radiation monitor interface subsystems. Construct KMR Space Surveillance Center addition to the KMR Mission Control Center and install, verify and validate operation of computer, and consoles prior to relocating spacetrack operators from Roi-Namur Island to Kwajalein Island.
	700	Begin MMW radar 4Khz upgrade in support of NMD testing.
Total	8196	

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BUDGET ACTIVITY: 6 - Management and Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

PROJECT: D984

COST (*In Thousands*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
D984 Major Technical Test Instrumentation	28827	27006	29275	33612	39005	38803	44402	Continuing	Continuing

Mission Description and Justification: This project develops and acquires major test instrumentation to perform developmental testing of weapon systems at U. S. Army Test and Evaluation Command (ATEC) Developmental Test Command (DTC) activities which include: Yuma Proving Ground (YPG), AZ; Aberdeen Test Center (ATC), MD; Dugway Proving Ground (DPG), UT; White Sands Missile Range (WSMR), NM; Redstone Technical Test Center (RTTC), AL; and Aviation Technical Test Center (ATTC), AL. Projects are designated major based on their visibility, assessed relative technical risk (medium-high), schedule risk, cost (generally greater than $1M/yr or $5M total project) and applicability to other mission areas or services. These projects are technically demanding, pushing the state of the art, unique instrumentation assets or suites to meet the technology shortfalls, and generally result from development programs managed by a professional project management team. The Test Support Network (TSN) at WSMR provides complete secure coverage of voice, data and video in a single integrated, transport system. TSN will provide advanced encryption capabilities and remote control of switching capabilities for test configuration and total network data arrangement control. The Land Combat Instrumentation (LCI) provides for upgrade and expansion for ATC's suite of instrumentation required for performance testing of combat and tactical vehicles, advanced armor, and advanced munitions. The Frequency Surveillance System (FSS) provides remote capabilities to daily operations of radio frequency spectrum surveillance at WSMR in support of all Service and non-DoD agency tests. The Dynamic Infrared Scene Projector (DIRSP) conducts performance testing of night vision sensors and Infrared (IR) imaging seekers at RTTC, and will provide the capability to fully simulate and synthesize present and future battlefields with a mix of real and simulated objects. The Hardened Subminiature Telemetry and Sensor System (HSTSS) is developing, miniaturizing, and hardening an instrumentation/telemetry package at YPG that will provide continuous direct measurement of internal functioning and flight data for cannon-launched munitions, smart submunitions, and small missiles/rockets. The Range Digital Transmission System (RDTS) will improve test operations and will reduce test costs allowing for efficient data collection and remote operations at YPG. The Mobile Infrared Scene Projector (MIRSP) project will conduct performance testing of imaging infrared and FLIR sensors while installed on the weapon system under test at ATTC.

FY 1999 Accomplishments:

- 10997 Continued WSMR TSN Phase I to include installation and acceptance testing to support IOC. Initiated installation of breakout and feeder sites to support WSMR TSN Phase II.
- 1826 Continued installation of the LCI Automotive Communication Network (ACN) at ATC Churchville test area. Completed Direct Fire Productivity Improvement instrumentation.
- 6377 Purchased, integrated, and initiated factory acceptance testing WSMR FSS equipment at the contractor's site.
- 2925 Continue DIRSP system integration and began preliminary factory acceptance testing at contractor's facility.
- 4667 Continued development of HSTSS instrumentation for YPG and started acceptance testing of key components. Awarded EMD contract for referenced Crystal Oscillator which provides the "clock" for the transmitter timing that gives the IRIG compatibility accuracy required by the T&E ranges.
- 938 Completed RDTS acquisition strategy and Engineering Design Plans to include engineering drawings and site survey report. Completed RDTS telecommunications installation plan and the telecommunications system engineering plan.

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FY 1999 Accomplishments: (continued)

•	1097	Continue Phase I of the MIRSP project, which develops a risk mitigation prototype for the objective MIRSP (which is Phase II). The prototype will be a full-up infrared scene projector housed in a mobile trailer and will be fielded with the Aviation Technical Test Center, Ft Rucker, Al.
Total	28827	

FY 2000 Planned Program:

•	13190	Continue WSMR TSN Phase II installation effort to include fiber optic service extension and additional network/subnetwork capability. Complete Phase I and achieve IOC.
•	754	Continue installation of ACN instrumentation at ATC.
•	381	Complete integration and final system acceptance test of FSS equipment at WSMR.
•	735	Complete DIRSP system integration and factory acceptance testing at contractor's facility. Complete Site Acceptance testing at Redstone Technical Test Center.
•	6135	Award GPS Sensor Contract for HSTSS. Incorporate HSTSS into TERM-KE tactical configuration. Incorporate HSTSS into MLRS program for stockpile reliability testing.
•	2147	Initiate installation plans and system engineering for all outside digital fiber optic cable and inside plant electronics to support Phase I of RDTS for the YPG West Kofa test ranges to support telecommunications systems.
•	2961	Complete MIRSP Phase I system fabrication, integration and testing at ATTC. Initiate requirements definition and concept development for Phase II Objective MIRSP.
•	703	Small Business Innovative Research/Small Business Technical Transfer (SBIR/STTR) Program.
Total	27006	

FY 2001 Planned Program:

•	18186	Complete WSMR TSN Phase II system integration. Initiate Phase III to include extension of fiber optic service to additional WSMR test sites.
•	901	Continue installation of ACN instrumentation at ATC.
•	3954	Continue development and acceptance testing of HSTSS components.
•	4893	Continue installation of digital fiber optic cable to support YPG RDTS Phase I.
•	1341	Continue development of MIRSP Phase II, (the fullup system).
Total	29275	

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BUDGET ACTIVITY: 6 - Management and Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

PROJECT: D986

COST (*In Thousands*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
D986 Major User Test Instrumentation	2296	4653	6548	8260	8627	10303	12060	Continuing	Continuing

Mission Description and Justification: This project finances the development of major field instrumentation for Operational Testing (OT), Force Development Testing and Experimentation (FDTE), and Army Warfighting Experiments (AWE) for the U.S Army Test and Evaluation Command's (ATEC) which includes operational test directorates at Fort Hood, TX, Fort Bragg, NC, Fort Sill, OK, Fort Bliss, TX and Fort Huachuca, AZ. Each initiative set forth in this program is directly tied to tactical systems that support each of the five Army Modernization Objectives: Project and Sustain; Protect The Force; Win Information War; Conduct Precision Strikes; and Dominate The Maneuver Battle. Cornerstone of this effort is the Mobile Automated Instrumentation Suite (MAIS) which provides users a high fidelity, realistic, real-time capability to measure the performance of hardware and personnel under tactical conditions for small and large-scale operations (up to 1830 players). MAIS is the US Army's only RTCA capability and is used to test all current and future U.S. Army weapons and weapon systems in a force-on-force operational environment. The D986 program includes three major thrust areas: MAIS Pre-Planned Product Improvements (P3I), Instrumentation XXI, and Protocol Data Unit (PDU) Gateway. While each of these thrust areas have discrete objectives, sub-programs, and end states, they are extensively intertwined in a complimentary and synergistic manner such that the net effect of the integrated capabilities provides significant leveraging opportunities in terms of system performance and overall capability afforded to the community. Without these capabilities, the Operational Test community will encounter shortcomings in its ability to adequately assess Medium Force Brigade and Army 2010 and Beyond developments. MAIS P3I RDTE develops the instrumentation required, but not funded, under the basic MAIS program. MAIS P3I RDTE develops performance enhancements and technology upgrades to the MAIS C3 Center, Communications Network, weapons system interfaces, and miniaturization of the vest peripherals, GPS System, and Encryption components. These improvements will enable MAIS to measure and record accrued damage, levels of exposure, effects of countermeasures, evasive action, and instrument threat vehicles, while significantly reducing system intrusiveness and increase the safety of current instrumentation for both vehicle and dismounted instrumentation. MAIS P3I provides insertion of enhancements to the RTCA algorithms; simulation of Opposing Force (OPFOR) weapon systems and player units for newly acquired weapon systems; and development of player units for new weapon systems. These core system enhancements are required as part of the basic program enabling the operational test community to effectively emulate current and future battlefield weapons in a high fidelity environment. Weapon system unique MAIS components are funded by the weapon system program. The Instrumentation XXI thrust area of MIAS develops instrumentation that does not presently exist to monitor, record, stress, and analyze the effects of the digital information battlefield in a realistic operational scenarios. Instrumentation XXI is required by the operational test community to integrate digital battlefield data collection and analysis tools into the MAIS. These tools will collect, store and analyze data from this new dimension of digital battlefield warfare. Instrumentation XXI ensures Army 2010 and Beyond communications can be captured and analyzed at various echelons from the tactical vehicle to the command center, in realistic operational scenarios. Personnel and resources cuts have already been taken in the test community predicated upon data reduction/analysis streamlining provided by this MAIS capability. The PDU Gateway thrust area responds to the current OPTEMPO and PERSTEMPO demands to force the US Army to conduct more realistic, more accurate, and comprehensive evaluations at reduced costs by virtually replicating a greater number of troop resources in force-on-force testing and training exercises. PDU Gateway provides MAIS the opportunity to interface the Live component "weapons systems" into the synthetic environment and leverage live tests with simulations. The ability to fully stress the entire battlefield with numerous simulated entities present opportunities for significant cost savings and greater realism than would otherwise be achievable.

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FY 1999 Accomplishments:

•	2296	Completed the First Generation Dismounted Troop miniaturization design, development and testing in preparation for production. Completed the design and development of the Javelin interface. Completed the design, development, and implementation of a MAIS-MILES interoperability capability. Initiated the feasibility study and requirements definition of MAIS future miniaturization, specifically Micro Programmable Electronics (MPE). Initiated the design and development of the MAIS Weapons Performance Module (WPM) which miniaturizes the remaining MAIS functionality and secures cost savings resulting from decreased production and life-cycle support costs.
Total	2296	

FY 2000 Planned Program:

•	4550	Complete the design and development of the MAIS Weapons Performance Module (WPM) and the Micro Programmable Electronics (MPE) initiative. Continue MAIS miniaturization, specifically the design, development, and testing of system algorithms. Initiate studies, implementation concepts, and conduct preliminary testing of a new programmable encryption device mandated by the National Security Agency. Initiate the development of core system algorithms and interfaces for existing and emerging weapon systems. Initiate development of a reconfigurable interface/controller that allows MAIS to use the training community's surrogate weapons. Initiate development of player unit Bus Architecture for player unit instrumentation kits to improve performance, safety, and eliminate bulky cabling. Initiate C3 Center upgrade and performance improvement studies. Evaluate and prototype a multi-spectral laser receiver that receives both simulated engagement pairing and tactical laser messages.
•	103	Small Business Innovative Research/Small Business Technical Transfer (SBIR/STTR) Program
Total	4653	

FY 2001 Planned Program:

•	6548	Complete development of the player unit Bus Architecture. Continue MAIS P3I core weapon system interface development for existing and emerging weapon systems. Continue development of the MAIS reconfigurable surrogate interface/controller. Continue MAIS miniaturization, specifically design, development and testing of system algorithms. Initiate the development of core system algorithms and interfaces for existing and emerging weapon systems to include vest peripherals, GPS System and Encryption components. Continue development of a reconfigurable interface/controller that allows MAIS to use the training community's surrogate weapons. Continue development of the MAIS Weapons Performance Module. Initiate After Action Review, Test Officer's Training Station, Combat Identification for Dismounted Soldiers (CIDDS) and the Land Warrior Interface. Implement development of the Weapon System Software Compatibility Upgrade. Initiate design and development of the MAIS P3I Wearable Computer. Implement C3 Center upgrade and performance improvements. Implement new encryption device in conjunction with MPE.
Total	6548	