

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

February 2002

BUDGET ACTIVITY
5 - Engineering and manufacturing development

PE NUMBER AND TITLE
0604746A - Automatic Test Equipment Development

COST (In Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	12466	13174	11839	12274	10253	10210	10184	Continuing	Continuing
L59 DIAGNOST/EXPERT SYS DE	3381	5227	3729	3752	3740	4056	4049	Continuing	Continuing
L65 TEST EQUIPMENT DEVELOPMENT	2907	974	978	1070	1163	1195	1193	Continuing	Continuing
L66 EMBEDDED DIAGNOSTICS/PROGNOSTICS DEVELOPMENT	6178	6973	7132	7452	5350	4959	4942	Continuing	Continuing

A. Mission Description and Budget Item Justification: Provides for the development and testing of calibration equipment, general-purpose test equipment, off-platform diagnostic/prognostic equipment, and embedded diagnostics technology and software to support the increasingly complex electronics of Army weapon systems. The program focuses on commercial state-of-the-art test technologies common to multiple weapon platforms; thereby, minimizing the cost of troubleshooting and maintenance in the field. Provides for the development and evolution of general-purpose automatic test/diagnostic equipment and system enhancements required to overcome existing deficiencies and voids in organic test and diagnostic capabilities; and to ensure the operational readiness, accuracy, and effectiveness of the Army's weapon and combat support systems. This program also provides for the Army's participation in development of a Joint Service Automatic Test System (ATS) architecture (NxTest). The Joint Service system will preclude proliferation of Service-specific ATSS in a theater and with a goal to reduce Department of Defense equipment, personnel, and funding burdens by allowing all Services' test program sets to execute on common test system architecture. This program element further provides for the development of modular, reconfigurable automatic and semi-automatic systems to satisfy the test and diagnostic requirements of Army weapon systems, and also the calibration and repair requirements of Army general-purpose test, measurement, and diagnostic equipment. Provides for the development of a rapidly deployable calibration set with emphasis on digital electronics and tailored to support Army field units. This calibration set will alleviate the serious deployability and survivability shortfalls in the current systems, and will continue with a preplanned product improvement program to provide for continuous upgraded capabilities. Also, provides for the development of expert systems and artificial intelligence applications for the Army Diagnostics Improvement Program to support the horizontal technology integration of self-diagnostic technology in Army weapon systems. The goal of embedding diagnostics is to reduce the logistical burden and improve readiness through minimizing the need for external testers and to improve the troubleshooting abilities of soldiers in the field. These projects support the Legacy-to-Objective transition path of the Transformation Campaign Plan (TCP).

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<u>B. Program Change Summary</u>	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2002 PB)	12837	11582	12006
Appropriated Value	12956	13282	0
Adjustments to Appropriated Value	0	0	0
a. Congressional General Reductions	0	-108	0
b. SBIR / STTR	-371	0	0
c. Omnibus or Other Above Threshold Reductions (Inflation)	0	0	0
d. Below Threshold Reprogramming	0	0	0
e. Rescissions	-119	0	0
Adjustments to Budget Years Since FY2002 PB	0	0	-167
Current Budget Submit (FY 2003 PB)	12466	13174	11839

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BUDGET ACTIVITY 5 - Engineering and manufacturing development				PE NUMBER AND TITLE 0604746A - Automatic Test Equipment Development				PROJECT L59	
COST (In Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
L59 DIAGNOST/EXPERT SYS DE	3381	5227	3729	3752	3740	4056	4049	Continuing	Continuing

A. Mission Description and Budget Item Justification: This project funds development of general-purpose automatic test/diagnostic equipment and system enhancements. These systems and equipment are required to overcome existing deficiencies and voids in organic test and diagnostic capabilities and to ensure the operational readiness, accuracy, and effectiveness of the Army's weapon and combat support systems. The project provides 1) the improvement of general-purpose automatic test equipment to meet the new Army systems' testing and technological requirements; 2) market surveys of commercially available test equipment, methods, and procedures to determine applicability to Army requirements; 3) the development and validation of test and diagnostic software; and 4) the Army's participation in the Joint Services NxTest Technical Working Group. This project supports the Legacy-to-Objective transition path of the Transformation Campaign Plan (TCP).

FY 2001 Accomplishments:

- 1039 Evaluated new hardware upgrades for the Integrated Family of Test Equipment (IFTE).
- 408 Conducted test program set compatibility testing in preparation for the Electro-Optics Test Facility customer test.
- 934 Developed and evaluated software applications for the IFTE.
- 1000 Prepared Army's requirements for incorporation of development efforts on a Department of Defense (DoD) joint service automatic test system.

Total 3381

FY 2002 Planned Program

- 1525 Evaluate hardware enhancements for Electro-Optic Test Facility (EOTF).
- 775 Develop new software test applications for the IFTE.
- 117 Commence prototype development of a more rapidly deployable automatic test system.
- 1430 Conduct Electro-Optics Test Facility customer test.
- 505 Initiate prototype of interconnecting device in support of IFTE.

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L59**FY 2002 Planned Program (Continued)**

- 875 Evaluate commercial automatic test equipment for Army systems.

Total 5227

FY 2003 Planned Program

- 866 Evaluate new electro-optic technologies for the Integrated Family of Test Equipment (IFTE).
- 1062 Develop and evaluate new software applications for the IFTE.
- 776 Continue development for a rapidly deployable automatic test system.
- 525 Continue evaluation of commercial ATE for future Army systems.
- 500 Initiate development of Electro-Optic Test Facility training device.

Total 3729

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<u>B. Other Program Funding Summary</u>	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	To Compl	Total Cost
OPA3, MB4000, Integrated Family of Test Equipment (IFTE)	67754	62956	59596	33632	31049	83460	89484	Continuing	Continuing

C. Acquisition Strategy: This project funds a number of separate but related efforts to develop and upgrade general-purpose automatic test equipment and diagnostic software to support Army weapon systems. The projects are managed by the Product Manager, Test, Measurement, and Diagnostic Equipment and are focused on ensuring maximum use of commercially available technologies and equipment to satisfy the Army's automatic test and diagnostic requirements. When the necessary expertise and capability are available within the Department of Defense (DoD), services required for the individual developmental projects are ordered from the government source; otherwise, commercial contracts are used. Equipment required for developmental projects is obtained by contract from the commercial supplier. Developmental efforts supporting the Electro-Optics Test Facility preplanned product improvement are being completed under a sole source contract awarded to the prime contractor for the system. The Army is participating with the other services in the development of a DoD standard automatic test system. The Army requirement is stated in the Integrated Family of Test Equipment operational requirements document. This developmental effort consists of cooperative in-house and competitive contractual action. The Army's efforts are coordinated with the Joint Service NxTest Technical Working Group.

<u>D. Schedule Profile</u>	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
IFTE ORD Update Approval (2Q FY2000)							
Complete EOTF Customer Test		3-4Q					
EOTF Type Classification-Standard/Materiel Release Approval			4Q				
EOTF Initial Operational Capability				1Q			

NOTE: This is a continuing program of developmental activities to provide a means for satisfying test and diagnostic support requirements of Army weapon systems. It consists of a number of similar and related efforts, many of which do not entail distinct major milestones.

ARMY RDT&E COST ANALYSIS(R-3)

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I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Systems Engineering	SS/CPFF	Northrop Grumman, Rolling Meadows, IL	3225	704	2-4Q	1525	2-3Q	866	2-3Q	Continue	Continue	0
b . Software Development	SS/CPFF	Northrop Grumman, Rolling Meadows, IL	1716	297	1-3Q	285	2-3Q	200	2-3Q	Continue	Continue	0
c . Systems Engineering	Various	Various	35699	996	1-4Q	572	1-4Q	462	1-4Q	Continue	Continue	0
d . Software Development	Various	Various	24115	410	1-4Q	490	1-4Q	776	1-4Q	Continue	Continue	0
e . Testing	Various	Various	4303	200	1-4Q	1430	1-4Q	500	1-4Q	Continue	Continue	0
f . Support Equipment	Various	Various	75	0		0		0		Continue	Continue	0
g . Government Engineering	Various	Various	7270	371	1-4Q	400	1-4Q	400	1-4Q	Continue	Continue	0
Subtotal:			76403	2978		4702		3204		Continue	Continue	0

Remarks: Test and evaluation costs are included as part of the product development costs.

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II. Support Cost	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Contractor Technical Services	Various	Various	862	105	1-4Q	200	1-4Q	200	1-4Q	Continue	Continue	0
b . Integrated Logistics Development	Various	Various	1016	0		0		0		Continue	Continue	0
c . Training Plans/Material	Various	Various	214	0		0		0		Continue	Continue	0
d . Technical Publications	Various	Various	625	0		0		0		Continue	Continue	0
Subtotal:			2717	105		200		200		Continue	Continue	0

III. Test and Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0	0		0		0		0	0	0

Remarks: See product development remark.

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IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Program Management Personnel	Various	Various	6952	298	1-4Q	325	1-4Q	325	4Q	Continue	Continue	0
Subtotal:			6952	298		325		325		Continue	Continue	0
Project Total Cost:			86072	3381		5227		3729		Continue	Continue	0

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BUDGET ACTIVITY 5 - Engineering and manufacturing development		PE NUMBER AND TITLE 0604746A - Automatic Test Equipment Development						PROJECT L66		
COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
L66	EMBEDDED DIAGNOSTICS/PROGNOSTICS DEVELOPMENT	6178	6973	7132	7452	5350	4959	4942	Continuing	Continuing

A. Mission Description and Budget Item Justification: This project funds the developmental efforts of the Army Diagnostics Improvement Program (ADIP). The ADIP has three main thrusts: 1) support embedded diagnostics for interim and objective force Army platforms, 2) improve the diagnostics on legacy systems, and 3) develop a prognostic capability through an anticipatory maintenance system. ADIP develops and tests common procedures, software applications, and hardware devices that can be embedded in weapon systems. Included in this effort is a common Health and Usage Monitoring System (HUMS) for Army helicopters. A similar system is being developed for surface-based systems. This project supports the Legacy-to-Objective transition path of the Transformation Campaign Plan (TCP).

FY 2001 Accomplishments:

- 1815 Tested and evaluated an initial generic, helicopter-based Health and Usage Monitoring System (HUMS).
- 120 Initiated helicopter-based anticipatory maintenance data collection.
- 1827 Developed and tested generic embedded diagnostics for ground vehicles.
- 1951 Tested initial predictive maintenance capability for ground vehicles.
- 325 Investigated new embedded diagnostic technologies for adaptation to Army maintenance.
- 140 Coordinated diagnostics technologies/architectures for new systems.

Total 6178

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FY 2002 Planned Program

- 1400 Continue to test initial Health and Usage Monitoring System (HUMS).
- 100 Adapt and test the embedded diagnostics for Paladin.
- 2100 Continue evaluation of predictive maintenance operating capability for Brigade Combat Team ground vehicles.
- 2220 Continue helicopter-based anticipatory maintenance data collection and initiate analysis of data.
- 456 Continue investigations of new embedded diagnostics technologies and their application to Army systems.
- 697 Continue development of diagnostic strategies for new systems.

Total 6973

FY 2003 Planned Program

- 1385 Continue to collect and analyze helicopter maintenance data.
- 3600 Adapt and test embedded diagnostics on aviation platforms.
- 903 Integrate predictive maintenance capability into Army logistics systems.
- 672 Continue investigation of new embedded diagnostics technologies and their application to Army systems.
- 572 Continue development of diagnostic strategies for Army systems.

Total 7132

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<u>B. Other Program Funding Summary</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>To Compl</u>	<u>Total Cost</u>
OPA3, N11400, Army Diagnostics Improvement Program	17142	18216	7982	7951	10793	4994	4989	Continuing	Continuing

C. Acquisition Strategy: The ADIP is a Horizontal Technology Integrations (HTI) project for the continuing development and evaluations of maintenance systems, methods, and procedures to improve diagnostic support capabilities for Army weapon systems and for integration of commercial embedded diagnostics technologies into Army maintenance systems. The project is managed by the Product Manager, Test, Measurement, and Diagnostic Equipment (PM TMDE) and is focused on ensuring maximum use of commercial technologies to satisfy the Army's embedded test and diagnostic requirements. PM TMDE coordinates all planning, programming and budgeting efforts with Army Platform PMs. When the necessary expertise and capability are available within the Department of Defense, services required for the individual initiatives under this project will be ordered from the government source; otherwise, existing or new commercial contracts will be used. Equipment required for developmental projects will be obtained by contract from the commercial supplier. Candidate equipment and maintenance methods will be identified and evaluated through market research and government testing and evaluation.

D. Schedule Profile: Not applicable for this item.

This is a continuing program of developmental activities to improve diagnostics of Army weapons and combat support systems. It consists of a number of similar and related efforts that do not entail distinct major milestones.

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I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Systems Engineering	Various	Various	0	1886	1-4Q	3226	1-4Q	4183	1-4Q	Continue	Continue	0
b . Software Development/ Engineering	Various	Various	0	3328	1-4Q	2435	1-4Q	1722	1-4Q	Continue	Continue	0
c . Testing	Various	Various	0	220	1-4Q	287	1-4Q	187	1-4Q	Continue	Continue	0
d . Government Engineering	Various	Various	0	437	1-4Q	464	1-4Q	464	1-4Q	Continue	Continue	0
Subtotal:			0	5871		6412		6556		Continue	Continue	0

Remarks: Test and evaluation costs are included as part of the product development costs.

II. Support Cost	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Contractor Technical Services	Various	Various	0	46	1-4Q	200	1-4Q	206	1-4Q	Continue	Continue	0
Subtotal:			0	46		200		206		Continue	Continue	0

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III. Test and Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
			0	0		0		0		0	0	0
Subtotal:												

Remarks: See product development remark.

IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2001 Cost	FY 2001 Award Date	FY 2002 Cost	FY 2002 Award Date	FY 2003 Cost	FY 2003 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a . Program Management Personnel & Support	Various	Various	0	261	1-4Q	361	1-4Q	370	1-4Q	Continue	Continue	0
Subtotal:			0	261		361		370		Continue	Continue	0

Project Total Cost:			0	6178		6973		7132		Continue	Continue	0
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