BALLISTIC MISSILE DEFENSE ORGANIZATION

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FY 1996 / 1997 Biennial Budget Estimates

February 1995

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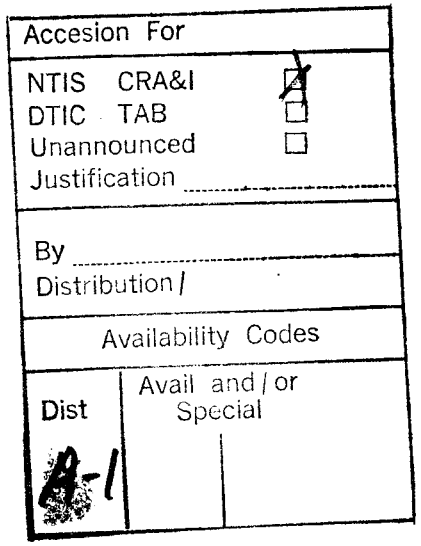
Letter Of Transmittal

- Editorial Note -

The numbering system shown on some pages of this book corresponds to the numbering system used within the FY 1996 budget book that was produced by the OSD Comptroller during February, 1995.



Program Overview

Ballistic Missile Defense Organization
FY 1996/97 President's Budget

PROGRAM OVERVIEW

OVERVIEW

The Ballistic Missile Defense (BMD) program is structured to respond to existing and emerging ballistic missile threats around the world. The program focuses its highest efforts on acquisition programs designed to defend against the ballistic missile threat that is "here and now," namely theater-class ballistic missiles. However, the program is developing Theater Missile Defense (TMD) systems that address the growing threat of longer-range ballistic missiles in both theater and strategic classes. The program continues to invest in the BMD technology base in order to enhance future BMD systems for both TMD and National Missile Defense (NMD) applications.

The TMD program consists of: near-term improvements to existing air and tactical ballistic missile defense systems; core TMD acquisition programs to meet the existing theater ballistic missile threat; and advanced TMD capabilities for the future. The TMD program addresses the existing and emerging ballistic missile threat to U.S. forces deployed overseas, as well as our friends and allies. The TMD core program consists of core acquisition programs: PATRIOT Upgrades, Navy Area Defense Program, and the Theater High Altitude Area Defense (THAAD) System. TMD in this Future Years Defense Plan also includes procurement of appropriate battle management, command, control, and communications for these theater capabilities, and provides for an FY 1998 start of an acquisition program for one of the three advanced capabilities programs. The remaining systems will be sequenced within the overall planning profile with FY 2000 and FY 2004 possible starts.

In recognition of the low probability of a long-range ballistic missile attack from the former Soviet Union or China, but to preserve an adequate defense against the acquisition or indigenous development of a long-range ballistic missile capability by another potentially hostile nation, NMD efforts are focused on achieving and maintaining technical readiness to deploy in the future. This will be accomplished by emphasizing risk reduction programs, key technologies, and activities to resolve critical technical issues, as well as activities to reduce deployment timelines.

To support the TMD acquisition programs and the NMD technology readiness program and to provide for potential breakthroughs in BMD capability, advanced technologies will be

supported, but at a lower level of effort than in previous years. Management and program support activities are tailored to these revised BMD objectives.

THEATER MISSILE DEFENSE PROGRAM

Core TMD programs are an enhanced version of the PATRIOT air and missile defense system, PATRIOT Advanced Capability Level-3 (PAC-3); the Navy Area Defense Program, a sea-based AEGIS/Standard Missile-2 (SM-2) Block IVA upgrade; Marine Theater Missile Defense, which includes upgrades to the TPS-59 radar and the HAWK missile; and the land-based Theater High-Altitude Area Defense (THAAD) System, to include TMD Ground-Based Radar (GBR). Additional efforts will involve concept exploration activities for a potential sea-based Navy Wide Area Defense Program, Corps SAM, and the Boost Phase Interceptor system. Due to fiscal constraints, these systems will be phased in over time beginning in FY 1998.

PAC-3 - PATRIOT is a long-range, mobile, field Army and Corps air defense system, which uses guided missiles to simultaneously engage and destroy multiple targets at varying ranges. The PATRIOT Advanced Capability Level 3 (PAC-3) Upgrade Program is the latest evolution of the phased material change improvement program to PATRIOT. The material changes will provide improved performance across the spectrum for system and threat intercept performance. The material changes include a new PAC-3 missile (previously known as ERINT), remote launch capabilities, communications and computer/software improvements, and radar upgrades to enhance system performance by improving its multi-function capability for tracking, and target handling capability against air breathing, ballistic and cruise missile threats. The PATRIOT operates as the lower tier of the Army's TMD enclave concept and is developing the capacity to interact with the Navy Cooperative Engagement Capability (CEC) system.

Navy Area Defense Program - The Navy Area Defense Program leverages the currently deployed AEGIS cruisers and destroyers equipped with the Standard missile. The Standard Missile-2 Block IVA program upgrades the Block IV with additional sensors and weapons system software to significantly improve tactical ballistic missile defense capabilities. The program includes a phased development with early integration into the AEGIS command and control structure and a series of risk reduction flights at White Sands Missile Range. A User Operational Evaluation System (UOES) is planned to allow early warfighter testing and to provide a limited deployment capability in case of national emergency.

Marine Corps TMD - The Marine Corps Tactical Missile Defense Initiative provides a basic TMD capability for the Marine Corps for interim point defense of vital assets in the amphibious operating area. This TMD capability is accomplished through product improvements to the AN/TPS-59 Radar and the Hawk missile system, and through development of the Air Defense Communications Platform (ADCP). The program is jointly funded by BMDO and the Marine Corps. Both the AN/TPS-59 and the ADCP will have Milestone III reviews in FY 1996.

THAAD SYSTEM - Formerly termed the Upper Tier Theater Missile Defense System (UTTMDS), the combined THAAD and TMD-GBR programs are now called the "THAAD System." While modifications of existing systems deal with many theater ballistic and cruise missile threats, the THAAD system fulfills the user requirement for multiple shot opportunities to intercept theater ballistic missile threats. Multiple shot opportunities are necessary to neutralize threats carrying weapons of mass destruction at higher altitudes and longer ranges to achieve the required level of defense. THAAD provides the interceptor while the Theater Missile Defense Ground-Based Radar (TMD-GBR) provides the necessary surveillance sensor.

The THAAD Program is currently in Demonstration/Validation and undergoing a series of flight tests. The program will reach Milestone II in early FY 1997. Another key feature of the THAAD Program is the User Operational Evaluation System (UOES to allow early warfighter testing and to provide a limited deployment capability in case of national emergency.

The TMD-GBR meets an immediate requirement for a more capable wide-area-defense radar. It provides surveillance and fire control support as an integral part of the THAAD System, and cuing support to lower tier systems such as PATRIOT. The TMD-GBR utilizes state-of-the-art radar technology to accomplish its required functions of threat attack early warning, threat type classification, interceptor fire control, external sensor cuing, and launch and impact point estimation. In particular, TMD-GBR will be able to provide a capability to perform threat classification against tactical ballistic missiles, and kill assessment after intercept. The TMD-GBR will undergo a series of dedicated and integrated characterization tests in preparation for a THAAD System Milestone II. TMD-GBR development activities will be the basis for the NMD-GBR RDT program.

TMD C^3 - C^3 systems provide the framework for synchronizing and integrating TMD operations. TMD C^3 is considered an extension of the CINCs' existing air defense command

and control structure. The acquisition strategy takes advantage of the large inventory of C^3 assets already available in the theater and maximizes the use of existing command center and communications capabilities. This approach minimizes costs and provides an enhanced early combat capability. Some modifications were required to account for the unique features of TMD. The primary focus is on interoperability and the free exchange of improved warning and surveillance data. To this end, the necessary command and control additions, such as Joint Tactical Information Distribution System (JTIDS), are being procured for TMD systems.

In addition to these modifications and developments, BMDO is pursuing a series of advanced concepts to answer shortfalls in the core programs and to meet future threats. There are currently three advanced concept programs: Navy Wide Area Defense Program, Corps SAM, and the Boost Phase Interceptor. Although validated requirements exist for all these concepts, funding limitations have dictated a staggered development schedule with a new start scheduled for FY 1998. An advanced concept will be considered for a new start based on national priorities, maturity, capability, effectiveness, lethality, current and projected threat, operational need and affordability. If any of the three are not selected, additional research and development will be conducted to further refine the technology and manufacturing processes and to reduce cost.

Navy Wide Area Defense Program - The Navy Wide Area Defense program will provide an upper tier sea-based capability to counter the TBM threat. The program will build on the core sea-based program, the lightweight exo-atmospheric projectile (LEAP) technology efforts, and the existing AEGIS ships infrastructure. The current effort includes LEAP flight tests, an independent cost and operational effectiveness analysis, and force integration studies including concept engineering. The program will also investigate the option of using a THAAD missile variant.

Corps SAM - The Corps SAM program develops a new mobile air and missile defense system to protect Army or Marine maneuver forces against short-range ballistic missiles and advanced cruise missiles fired from any direction. Corps SAM would be more transportable, relieving tremendous demand for airlift assets early in a regional conflict. High-level discussions are being carried out with German and French officials regarding a trilateral cooperative development program (called the Medium Extended Air Defense System, or MEADS).

Boost Phase Intercept - The primary objective of the kinetic energy boost phase interceptor (KE BPI) demonstration program is to demonstrate an effective, air-launched

boost phase intercept capability by FY 1999. The KE BPI demonstration will perform a TBM intercept employing an operationally representative interceptor with design parameters traceable to the Air Force's Operational Requirements Document. The demonstration will be structured to include all key elements required of the eventual operational system (missile, launch aircraft, off-board sensor, and BM/C3I) integrated to the extent required to achieve a missile kill against a representative TBM in boost phase. This demonstration is structured to show that an integrated system is feasible, militarily useful, and operationally suitable, and that it has an achievable development path to eventually meet all requirements for an operational system. The KE BPI missile will be an endo-atmospheric, and probably exo-atmospheric, high-speed advanced tactical missile. Currently, the launch aircraft are the F-15 (Air Force) and F-14 (Navy). The program will be managed by the Air Force with Navy and Army participation.

Other TMD Support - BMDO funds the engineering and support costs associated with the development and test of TMD systems. This approach results in overall reduced costs by avoiding duplication amongst the Services while pursuing standardized approaches to threat definition, countermeasures, phenomenology, test and evaluation, user interfaces, technology insertion and lethality. Centralized systems engineering and BM/C^3 definition insure interoperability while meeting user requirements.

Another essential part of TMD support are BMDO's International Programs with friends and allies. This type of burden sharing yields a valuable technology exchange for the U.S. in core and advanced TMD programs. As a result of the proliferation of ballistic missiles and their use in the Gulf War, many U.S. allies and friends have recognized the potential threat of missile attack, and are cooperating with BMDO through discussions, planning, and development of TMD systems. BMDO supports a cost sharing technology program with Israel, which will provide the U.S. with technology improvements and lead to Israeli deployment of the Arrow interceptor system. The U.K. has recently initiated a study to determine their specific requirements for ballistic missile defense. Moreover, in their 1994 defense white papers, the French, Germans, Canadians and Australians address the threat posed by ballistic missiles. The NATO ad hoc working group on TMD is preparing their final report after a year-long effort of finding ways to cooperate in TMD programs. The Japanese government is leading their first bilateral U.S.-Japanese TMD study as a result of their 1994 Defense Advisory Committee Report to the Prime Minister. This Report suggested the need for Japan to pursue a TMD program in cooperation with the U.S.

NATIONAL MISSILE DEFENSE PROGRAM

The NMD program is structured as an evolving Technology Readiness Program that provides a hedge against the emergence of a ballistic missile threat to the United States. This program is developing elements and performing critical system engineering and integration activities to develop and maintain system capability and reduce the lead time to deploy an effective defense of the United States homeland against a limited missile attack. To be able to defend against a ballistic missile threat, a system must have: interceptors with long range and effective threat negation capability; sensors capable of threat detection, tracking, and discrimination; and command and control, which provides rapid, coordinated, and assured threat engagements. There is no system today to defend the U.S. against ballistic missile attack. The strategy adopted for the NMD program is to plan for and develop an early ballistic missile defense capability, which could be deployed in less than four years and be effective against relatively simple threats. At the same time, the strategy also provides for progressive and incremental development of more capable deployment options that are on a path to an objective system capable of countering a spectrum of existing ballistic missile-delivered weapons that could threaten the U.S.

Ground-Based Interceptor (GBI) - The GBI project is continuing to take advantage of prior BMDO interceptor accomplishments to develop the exoatmospheric kill vehicle (EKV). The emphasis is on demonstrating early term intercept of high speed, long range ballistic missiles. The EKV must acquire a threat cluster using commit and handover information provided by the NMD system. It must combine the NMD system data with the scene that its on-board seeker observes, use its on-board seeker and discrimination algorithms to select the lethal object, and maneuver (divert) to destroy it by force of impact. EKV seeker fly-by tests are planned to demonstrate seeker operation in the actual engagement environment, and reduce risk for subsequent intercept flight tests. The limited GBI budget will force a down select from two EKV contractors to one contractor at the end of FY 1995. Each contractor will complete a seeker flight test in FY 1997. The winner of the down select will fly a kill vehicle in an FY 1998 intercept test.

Ground-Based Radar (GBR) - The NMD Radar Technology Demonstrator (RTD) effort is developing an ABM treaty-compliant testbed radar to resolve critical technology issues associated with development of an NMD-GBR and to provide the primary fire control sensor to support integrated NMD system testing at the U.S. Army Kwajalein Atoll missile test

range. The effort leverages developments made under the TMD-GBR project to resolve the critical issues of discrimination, target object map, kill assessment, and electromechanical scan. It includes algorithm development, real-time software and hardware in the loop simulation, and finally a radar technology demonstration. The software and hardware simulations will be enhanced versions of the TMD models and executed on existing NMD data processors. The NMD-RTD will convert existing TMD-GBR Dem/Val radar hardware into a larger, limited field-of-view unit with sufficient range to support NMD test requirements. The program will develop unique NMD software to satisfy the NMD requirements and modify existing TMD operations and applications software.

Battle Management, Command, Control & Communications (BM/C^3) - The BM/C^3 project is focused on maximizing the system level performance of the NMD elements. As such, the BM/C^3 element is developing tactically representative hardware and software that integrate NMD interceptor and sensor operations to support informed C2 decision making. The BM/C^3 project is using an open system framework and has established BM/C^3 component definitions that ensure the flexibility to support NMD Technology Readiness Program dynamics, contingency deployment options and operational requirements evolution. The Site-level BM/C^3 provides the ability to operate the integrated interceptor, in-flight data links, and fire-control radar in accordance with the Engagement Plans. The CINC-level BM/C^3 provides the vehicle for CINC command and control of NMD assets and overall direction of the ballistic missile defense capability. It also provides the capability to support extensive decision support systems and situational awareness by correlating the best available sensor and intelligence data. Inherent in this structure is the flexibility to match the evolving NMD capability.

Other NMD Support - The NMD system engineering and integration effort is focused on maximizing the system level performance through a balanced allocation and flowdown of requirements to the elements. Closely aligned to this effort, the NMD deployment planning effort is identifying required activities, including schedules and costs, and the impacts of fielding an operationally-effective NMD System in the shortest possible time.

ADVANCED TECHNOLOGY

To maintain the vitality of a BMD architecture over time, technologies that provide options for improvements to planned and deployed defenses must be developed. Among the most important technological requirements are capabilities to defeat straightforward

countermeasures, to counter threat evolution, particularly advanced munitions that complicate an effective defense, to reduce the perceived advantages of weapons of mass destruction and the potential for proliferation of currently deployed theater ballistic missile systems, and to increase affordability and sustainability as users gain operational experience with deployed systems.

BMDO investment in advanced technology continues, although at a level substantially below that of past years. This investment provides component technologies to improve performance or reduce cost for our acquisition programs, an understanding of physical processes to support the acquisition programs, and technical solutions to mitigate unforeseen threats.

To meet future needs, advanced technology programs are investing in high leverage technologies that yield improved capabilities in kinetic energy interceptors and advanced sensors. Directed energy systems are being brought to an orderly conclusion in FY 1997. Innovative sciences are investigating new ideas and technologies to missile defense.

Potential high payoffs of the Advanced Technology Program include continuous theater presence that provides defensive capabilities against surprise attack and during the early stages of rapidly escalating conflicts, exo- and endoatmospheric intercepts with a high probability of kill at lower cost that expand battle space, enlarge defended areas, and overcome simple countermeasures, fused multi-sensor detection and tracking that extend through the missile flight path, and identification and discrimination that support assured targeting.

SUMMARY

In summary, the BMD program is a focused, prudent response to the existing and emerging ballistic missile threat to the United States, our forces overseas, and our friends and allies. The Department is dedicated to getting "rubber on the ramp" for urgently needed TMD systems for the warfighter. In this regard, the BMDO budget will fund the acquisition of TMD material and systems to be deployed throughout the 1990's. When the core TMD systems are deployed, U.S. forces overseas will be protected against the full spectrum of short and longer-range theater-class ballistic missiles. Meanwhile, BMDO is committed to maintaining a well-focused technology readiness program for National Missile Defense, including early deployment options if required. The Department remains committed

to ensuring that as new ballistic threats arise, highly effective ballistic missile defenses will be in place to defend our forces as they go in harm's way. In addition, as new ballistic missile threats to the U.S. develop, the Department is committed to ensuring defensive systems are available to meet the threat.

Appropriation Summary

UNCLASSIFIED

APPROPRIATION SUMMARY

BALLISTIC MISSILE DEFENSE ORGANIZATION

($ In Thousands)

Program Name:	Budget Activity	FY1994* Actual	FY1995* Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate
RDT&E									
0602173C SPT TECH EXP DEV	2	70,160	84,005	93,308	105,313	105,003	100,397	95,568	93,669
0603173C SPT TECH ATD	3	252,862	134,402	79,387	87,823	57,823	57,823	66,323	66,323
0603861C THAAD SYSTEM DEM/VAL	4	710,093	651,901	576,327	72,188	0	0	0	0
0603863C HAWK DEM/VAL	4	29,629	26,800	23,188	0	0	0	0	0
0603864C TMD-BMC3 DEM/VAL	4	12,617	20,009	24,231	24,425	25,237	20,751	22,193	22,278
0603865C PAC3 DEM/VAL	4	77,584	0	0	0	0	0	0	0
0603867C NAVY L/T DEM/VAL	4	150,446	139,676	0	0	0	0	0	0
0603868C NAVY U/T DEM/VAL	4	81,000	68,450	30,442	33,400	0	0	0	0
0603869C CORPS SAM DEM/VAL	4	16,270	14,971	30,442	33,400	0	0	0	0
0603870C BPI DEM/VAL	4	37,022	40,000	49,061	44,300	66,300	72,300	0	0
0603871C NMD DEM/VAL	4	549,973	386,988	370,621	399,038	399,341	399,318	399,472	399,472
0603872C OTHER TMD DEM/VAL	4	272,388	386,368	460,470	449,908	613,099	551,654	951,981	1,116,700
0604861C THAAD SYSTEM EMD	5	0	0	0	664,000	838,000	619,100	212,000	86,000
0604864C TMD-BMC3 EMD	5	0	534	14,301	17,976	25,977	20,861	29,201	29,314
0604865C PAC3 EMD	5	42,097	276,283	247,921	160,070	65,005	775	487	98
0604866C PAC3 RISK EMD	5	97,000	74,000	19,485	9,760	0	0	0	0
0604867C NAVY L/T EMD	5	0	0	237,473	193,600	142,680	151,428	115,482	50,323
0605218C MGMT	6	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971
TOTAL RDT&E		2,605,089	2,467,593	2,442,199	2,483,619	2,563,207	2,213,950	2,122,721	2,088,148
PROCUREMENT									
0208861C THAAD SYSTEM PROC	~	0	0	0	0	11,941	645,833	716,486	776,193
0208863C HAWK PROC	~	0	3,804	5,106	20,430	0	0	0	0
0208864C TMD-BMC3 PROC	~	0	0	32,242	20,300	60,931	0	0	0
0208865C PAC3 PROC	~	120,115	253,272	399,463	413,608	486,247	423,600	469,050	271,967
0208867C NAVY L/T PROC	~	0	14,394	16,897	91,561	123,037	124,261	210,846	209,194
TOTAL PROC		120,115	271,470	453,708	545,899	682,156	1,193,694	1,396,382	1,257,354

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* Represents Modified PE Structure as used by BMDO in FY 1996-2001

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APPROPRIATION SUMMARY

BALLISTIC MISSILE DEFENSE ORGANIZATION

($ In Thousands)

Program Name:	Budget Activity	FY1994* Actual	FY1995* Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate
MILCON									
0603871C NMD	~	2,977	530	832	974	631	688	547	547
0603872C OTHER TMD	~	0	0	2,577	2,961	1,993	2,089	1,642	1,642
0604861C THAAD SYSTEM	~	0	0	13,600	4,700	18,000	4,900	0	0
TOTAL MILCON		2,977	530	17,009	8,635	20,624	7,677	2,189	2,189
BMDO TOTAL		2,728,181	2,739,593	2,912,916	3,038,153	3,265,987	3,415,321	3,521,292	3,347,691
RDT&E TOTAL BY BUDGET ACTIVITY									
EXPLORATORY DEVELOPMENT	2	70,160	84,005	93,308	105,313	105,003	100,397	95,568	93,669
ADVANCED DEVELOPMENT	3	252,862	134,402	79,387	87,823	57,823	57,823	66,323	66,323
DEMONSTRATION/VALIDATION	4	1,937,022	1,735,163	1,564,782	1,056,659	1,103,977	1,044,023	1,373,646	1,538,450
ENG. & MANUFACTURING DEV	5	139,097	350,817	519,180	1,045,406	1,071,662	792,164	357,170	165,735
MANAGEMENT SUPPORT	6	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971
BA TOTAL		2,605,089	2,467,593	2,442,199	2,483,619	2,563,207	2,213,950	2,122,721	2,088,148
BMDO TOTAL BY CONGRESSIONALLY MANDATED PROGRAM ELEMENT STRUCTURE									
BPI	~	37,022	40,000	49,061	44,300	66,300	72,300	0	0
CORPS SAM	~	16,270	14,971	30,442	33,400	0	0	0	0
HAWK	~	29,629	30,604	28,294	20,430	0	0	0	0
MANAGEMENT	~	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971
NAVY LOWER TIER	~	150,446	154,070	254,370	285,161	265,717	275,689	326,328	259,517
NAVY UPPER TIER	~	81,000	68,450	30,442	33,400	0	0	0	0
NMD	~	552,950	387,518	371,453	400,012	399,972	400,006	400,019	400,019
OTHER TMD	~	272,388	386,368	463,047	452,869	615,092	553,743	953,623	1,118,342
PAC3	~	239,796	529,555	647,384	573,678	551,252	424,375	469,537	272,065
PAC3 RISK EMD	~	97,000	74,000	19,485	9,760	0	0	0	0
SUPPORT TECH	~	323,022	218,407	172,695	193,136	162,826	158,220	161,891	159,992
THAAD SYSTEM	~	710,092	651,901	589,927	740,888	867,941	1,269,833	928,486	862,193
TMD-BMC3	~	12,617	20,543	70,774	62,701	112,145	41,612	51,394	51,592
BMDO TOTAL		2,728,181	2,739,593	2,912,916	3,038,153	3,265,987	3,415,321	3,521,292	3,347,691

UNCLASSIFIED

* Represents Modified PE Structure as used by BMDO in FY 1996-2001

RDT&E Exhibits

Boost Phase Intercept Program
PE 0603870C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603870C (Proj: 1265)
PE Title: Boost Phase Int. (U)

Project Number / Title: 1265 Boost Phase Interceptor

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603870C RDT&E	37,022	40,000	49,061	44,300	66,300	72,300	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Boost Phase Intercept (BPI) Technology Program funded and continuing under this project is designed to meet critical future active defense needs. The BPI program is developing new technologies to demonstrate a deterrent and counter in Theater Missile Defense (TMD) by intercepting a theater ballistic missile (TBM) in its boost phase of flight. Present BMDO/TMD architectures focus on midcourse and terminal defenses which allow fragments of the TBM and/or warheads to inflict potential damage on friendly areas. During a TBM's boost phase, the missile is readily visible, slow moving, and extremely vulnerable. Boost phase intercept of TBMs can cause missile debris to fall on enemy territory or to fall short of the intended target(s) and significantly reduce the number of TBMs in post-boost flight, thus thinning out the number of TBMs reaching subsequent defensive layers and reducing the burden on terminal defenses. Interceptor component technologies advanced through the BPI program have potential applicability and benefit to all endoatmospheric interceptors.

(U) The BPI program will integrate and demonstrate critical technologies culminating in BPI technology experiments. BPI experimental elements may include off-board sensor(s) that detect and track TBMs, launch aircraft, battle management (BMC^3), the missile, and lightweight endoatmospheric kinetic kill vehicles (KKVs). To achieve boost phase intercept, the interceptor missile and KKV may achieve hypersonic velocities within the atmosphere. The demonstrations will validate the solution to critical KKV technology associated with high-speed atmospheric flight and will provide: (1) new capabilities with reduced costs/risks compared to

current interceptor weapons systems, and enhancements to other interceptors under development; (2) reduction of technical risks and costs to support an acquisition program; and (3) technical solution to provide contingent residual boost phase intercept capabilities for theater defense. The program also will use existing contracts and technologies currently under development to reduce schedule and cost, and will be planned and conducted with BMDO, Air Force, Navy, and Army elements to maximize user interaction.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project has enabled BMDO to successfully integrate critical technologies which will serve the long-term interest of the BPI program and to initiate designs which meet projected BPI requirements. Under TMD funding in FY94, advances in KKV technology, concept development, and test planning activities were conducted by BMDO with significant involvement from the Services. The BPI program initiated concept of operations (CONOPS) development, intercept test planning, and KKV, booster, and kickstage development; conducted KKV cooled window thermal and optical tests at hyperthermal facilities; and completed fabrication of cooled KKV forebodies for aero-optic testing, which is critical for designing the guidance and control algorithms for high-speed endoatmospheric flight.

(U) FY 1994 Accomplishments:

- ($2.300M) Test fired kickstage motor, scale-up to be used for the BPI missile, PE 0603216C.
- ($3.200M) Hyperthermal tests of cooled windows for the kill vehicle, PE 0603216C.
- ($2.400M) KKV seeker development to be used for BPI, PE 0603216C.
- ($8.700M) Program planning and concept of operations for BPI, PE 0603216C.

The following technology investments that were supported in FY94 are associated with the endoatmospheric kill vehicle high-altitude, long-endurance (HALE) UAV flight tests as a BPI/sensor platform, PE 0603218C, (now transferred to DRO).

- ($7.859M) Low altitude flight test of high-altitude long-endurance (HALE) gasoline-powered UAV (RAPTOR Demonstrator) (terminated).
- ($4.912M) Demonstrated miniaturized pumped propulsion technology using a monopropellant via flight test (terminated).
- ($3.701M) Began launch detection and tracking experiments of a ballistic missile.

The following technology investments that were supported in FY94 are associated with the D-2 Hypervelocity Interceptor Program, PE 0603218C.

- ($3.950M) Tested TMD version of aeroshell and sabot in Israel, delivered prototype TMD transceiver and one axis of three axis solid propulsion system for TMD.

(U) FY 1995 Plans:

- ($26.5M) Continue KKV design; evaluate cooled contractor window hardware and seeker in aero-optical shock tunnel and aero-thermal wind tunnel tests; initiate fabrication of flight configured seekers.
- ($3.2M) Continue development of Air Force and Navy CONOPS, architectures.
- ($10.3M) Continue BPI flight experiment mission planning and range requirements definition. Investigate early technology demonstration flight test to characterize KKV seeker performance, to validate KKV flight performance for TMD mission, and to measure the flight environment; begin defining A/C mods and off-board sensors for BPI flight tests; and define axial propulsion modification requirements for interceptor missile to achieve high accelerations.

(U) FY 1996 Plans:

- ($34.0M) Complete BPI seeker and window vibration and flight tests. Complete BPI kill vehicle detailed design and

component ground tests; initiate fabrication of ground test vehicles; conduct divert and attitude control system tests

- ($12.061M) Initiate booster and kickstage development; begin integration of booster and kickstage with kill vehicle; continue propulsion qualification program
- ($3.0M) Define target requirements, integration and flight test support; conduct early flight demonstrations

(U) FY 1997 Plans:

- ($30.7M) Conduct kill vehicle critical design review; complete fabrication of ground test KKVs; begin ground tests
- ($11.0M) Continue integration of booster and kickstage with KKV; conduct launch of control test vehicle, demonstrate staging, and complete KKV ejection and flyout in preparation for full intercept missions
- ($2.6M) Continue target development, integration and test support

Acquisition Strategy: The BPI execution plan involves participation by BMDO, Air Force, Army, and Navy. BMDO will plan, manage, and execute the overall ground and flight test program; oversee service (Air Force and Navy) CONOPS development; develop long-term plans for potential acquisition as a TMD Major Defense Acquisition Program (MDAP); and provide targets of opportunity for KKV seeker and sensor flight tests and threat representative targets for BPI demonstrations. The program plan may consist of development and validation of endoatmospheric kill vehicle technologies required for BPI as well as design, fabrication, and test of the KKVs; missile integration, which includes missile component modifications and integration with the KKV; modification of launch aircraft; integration of all experiment elements; and battle management and communication between the elements required for flight test and intercept demonstration.

On-going, competitively-awarded, CPFF contracts for the KKV will continue through the completion of ground and flight tests. The BMDO manages these contracts. The Navy and the Air Force will define an affordable and practical CONOPS in FY95. The acquisition strategy for the flight tests will be evolved.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603870C (Proj: 1265)
PE Title: Boost Phase Int. (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	36,089	61,100	65,300	70,300	232,789
Appropriated Value		40,000			40,000
Adjustments to Appropriated Value		0			0
Current Budget Submit	37,022	40,000	49,061	44,300	170,383

Change Summary Explanation:
The BPI program was technically restructured after submission of the FY95 CDS for Project 1215 to reflect congressional guidance and the results of the OSD expert panel study on BPI/API. The current execution plan continues endoatmospheric kill vehicle technology development previously funded under Project 1209, and discontinues unmanned aerial vehicle (UAV) and UAV compatible missile activities and exoatmospheric flight tests reflected in the FY95 CDS plan. The revised demonstration plan is compatible with existing Air Force and Navy fire control and launch aircraft.

Funding: Funding includes BPI technology development and demonstration initiated in FY94. Current and outyear funding decreases from prior year submission cause delay of hit-to-kill demonstrations against a powered booster, and may also cause a loss of near-term technical capability.

Schedule: None.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603870C (Proj: 1265)
PE Title: Boost Phase Int. (U)

Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

Related RDT&E:			Funding Dependency? (Yes[1]/No)
1270	AIST	PE#0603173C	No
1293	Adv Cpblty Concept Def	PE#0603872C	No
2294	Adv Capability Dem Val	PE#0603872C	No
1265	Boost Phase Intercept	PE#0603871C	Yes
The Air Force is jointly funding this program			Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone						a	b	c								
T&E Milestone										e	f			h,i	j	l
Contract Milestone													g			
Other Program Events								d								k

a) aero-optical shock tunnel tests (window)
b) aerothermal wind tunnel tests (window)

c) aero-optical shock tunnel tests (seeker)
d) AF & Navy conops definition
e) target demo flight
f) seeker demo flight
g) KKV CDR
h) KKV hover
i) CTV flight
j) preliminary FTV-1
k) KKV delivery
l) preliminary FTV-2

Planned Milestones Beyond FY1997:
BPI missile delivery 2-4 Qtr 1998.
BPI intercept flights 1st, 2nd, 3rd, Qtr 1999.

Corps Surface-To-Air Missile (Corps SAM) PE 0603869C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603869C (Proj: 2262)
PE Title: CORPS SAM (U)

Project Number / Title: 2262 CORPS SAM

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603869C RDT&E	16,270	14,971	30,442	33,400	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The CORPS SAM program is focused on satisfying the need to provide low-to-medium theater missile and air defense to the maneuver forces and other U.S. and allied forward deployed critical assets. It will support force projection operations by providing protection from early entry to decisive operations. The CORPS SAM system will consist of missiles, launchers, sensors, and battle management command, control, communications, computers, and intelligence (BMC4I) elements. It will be easily transportable by all strategic and tactical lift aircraft.

(U) CORPS SAM is a candidate to begin Demonstration and Validation (Dem/Val) Phase in FY98 as one of the Advanced Capabilities (ACAP). This project will be funded as ACAP I in project number 2294 if selected for Dem/Val in FY98 or will continue in concept development as ACAP II or III in project number 1293.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603869C (Proj: 2262)
PE Title: CORPS SAM (U)

(U) CORPS SAM was approved by the Defense Acquisition Board (DAB) for entry into Concept Exploration and Definition phase in August 1990. Extensive government and industry studies and analyses have been conducted to define feasible and cost effective system concepts. These analyses were used to balance the requirements contained in the CORPS SAM Operational Requirements Document that was approved by the Army Deputy Chief of Staff for Operations (ADCSOPS-FD) in Oct 1993. The DAB also directed the CORPS SAM program aggressively pursue international cooperation in the development of the CORPS SAM system. Early discussions were conducted with 11 countries. The greatest potential for cooperation is between Germany, France, and the U.S. in a trilateral cooperative program. CORPS Sam is pursing integration of CORPS Sam BMC4I with the project manager, Air Defense Command and Control Systems to take advantage of previous Army developments that can be incorporated into the CORPS Sam program.

(U) FY 1994 Accomplishments:

- ($ 6.6M) Contractor support provided technical analysis, simulations/modeling, external sensor, BMC4I analyses/assessment, lethality, survivability analysis.
- ($ 5.47M) In-house support finalized request for proposal (RFP); discussed/negotiated and developed international cooperative plans/agreements; conducted Research, Development, and Engineering Center (RDEC) technology assessments efforts; conducted threat/scenario development; conducted modeling and simulation efforts; continued overall program management functions/activities.
- ($ 4.2M) Other Government agencies provided independent assessment activities, combat developer analyses/activities, and government furnished equipment.

(U) FY 1995 Plans:

- ($ 3.6M) Competitively award and execute first increment of two contracts for international teaming with project definition-validation (PD-V) option.

- o ($ 4.0M) Initiate support contracts to provide technical analysis in specialty areas (e.g. lethality, survivability,system simulation/modeling).
- o ($ 6.571M) Continue in-house support to include overall program management support, e.g. conduct source selection activities; continue to discuss/negotiate and develop international cooperative plans/agreements; establish international program management structure; continue RDEC technology assessment efforts; continue threat/scenario updates; continue modeling and simulation efforts.
- o ($ 0.8M) Continue other Government agencies support to perform independent assessment activities and combat developer analyses/activities.

(U) FY 1996 Plans:

- o ($20.9M) Monitor Prime contractor efforts to complete international teaming; exercise option to initiate the PD-V contract efforts.
- o ($ 2.0M) Continue support contracts providing technical analysis, simulation/modeling, external sensor, BMC4I analyses/assessment, and lethality and survivability analyses.
- o ($ 6.942M) Continue in-house support to include overall Program Management Office support; continue RDEC technology assessment efforts; continue threat/scenario updates; continue modeling/simulation efforts.
- o ($ 0.6M) Continue other Government agencies support to perform independent assessment activities and combat developer analyses/activities.

(U) FY 1997 Plans:

- o ($23.4M) Prime contractor -- continue to execute PD-V contract.
- o ($ 2.1M) Continue support contracts providing technical analysis, simulation/modeling, external sensor, BMC4I analyses/assessment, lethality and survivability analysis, and cost estimating.

- o ($ 7.1M) Continue in-house support to include the overall Program Management Office support; continue RDEC technology assessments; continue threat/scenario updates; continue modeling/simulation efforts; initiate activities to support the conduct of the System Requirements Review; initiate the development of RFP for Design and Development contract.
- o ($ 0.8M) Continue other Government agencies support to perform independent assessment activities and combat developer analyses/activities.

Acquisition Strategy: The process to initiate the DEPSECDEF's decision to proceed as a trilateral program among the U.S., Germany, and France began in September 1994. Working groups have been established to refine operation/technical requirements and develop a Memorandum of Understanding and statement of work for trilateral cooperation for the Project Development-Validation (PD-V) phase. The proposed acquisition approach is to select two U.S. industrial teams that will be required to conduct an international teaming and PD-V effort with European industry. During the PD-V phase, the contractors will be required to define/develop a total system concept based upon the Technical Requirements Document, conduct requirements analysis/flowdown, establish a contractor-defined baseline system concept, conduct concurrent engineering design trades, perform simulations/modeling, provide life-cycle-cost estimates, and establish integrated program plans to include a defined risk assessment/abatement plan. Demonstration of critical functions associated with integrated system performance and resolution of key technical issues for the proposed system design concept through the use of end-to-end modeling and digital simulation will be required. Following a successful system design review, an RFP for design and development will be issued to the competing international teams that conducted PD-V. The design and development contract for the remainder of development is envisioned to include all efforts required to accomplish the remaining objectives of the CORPS SAM system development.

B. (U) PROGRAM CHANGE SUMMARY:

FY1994	FY1995	FY1996	FY1997	TOTAL COST

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603869C (Proj: 2262)
PE Title: CORPS SAM (U)

Previous President's Budget	20,000	17,725	30,590	33,400	101,715
Appropriated Value		15,000			15,000
Adjustments to Appropriated Value		-0,029			(29)
Current Budget Submit	16,270	14,971	30,442	33,400	95,083

Change Summary Explanation:
Funding: This project was funded under PE 0603216C project 2212 during FY1994.
Schedule: CORPS SAM RFP release has been delayed pending the signing of a trilateral Statement Of Intent (SOI) between France, Germany, and the United States governments. The final RFP release is now scheduled for February 1995 with a contract award in the fourth quarter of FY95.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
*1155, Phenomenology, PE No. 0603872C	Yes
*1170, TMD Risk Reduction, PE No. 0603872C	Yes
1293, Advanced Capability Concept Development, PE No. 0603872C	Yes
2154, TMD-GBR, PE No. 0603862C/0604862C	Yes
2257, PATRIOT, PE No. 0604865C	Yes
2294, Advanced Capability Dem/Val, PE No. 0603872C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603869C (Proj: 2262)
PE Title: CORPS SAM (U)

2358, HAWK, PE No. 0603863C/0604863C	Yes
3153, Architecture Analysis/BMC3 Initiatives, PE No. 0603872C	Yes
*3157, Environmental Siting and Facilities, PE No. 0603872C	Yes
*3251, Systems Engineering and Technical Support, PE No. 0603872C	Yes
*3261, BM/C3I, PE No. 0603864C/0604864C	Yes
*3265, CINC TMD Assessment Program, PE No. 0603872C	Yes
*3352, Modeling and Simulation, PE No. 0603872C	Yes
*3354, Targets, PE No. 0603872C	Yes
*3359, System Test and Evaluation, PE No. 0603872C	Yes

* These projects provide essential technical, engineering, and/or infrastructure support to TMD major defense acquisition programs.

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone																
System Requirements Review									X							
Contract Milestone																
Draft PD-V RFP Release			X*													
Final RFP Release						X										
Int'l Teaming Contract Award								X								

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603869C (Proj: 2262)
PE Title: CORPS SAM (U)

Exercise PD-V Option	X
Other Program Events	
Rqmts.Harmonization w/GE & FR	X
Finalize Trilateral MOA	X
Establish NATO Agency	X

* Completed milestone

Planned Milestones Beyond FY1997:

Transition to project 1293 or 2294	1Q/FY98

Hawk Missile
PE 0208863C / 0603863C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603863C (Proj: 2358)
PE Title: HAWK (U)

Project Number / Title: 2358 Hawk System BM/C3

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0208863C PROC	0	3,804	5,106	20,430	0	0	0	0	Completed
0603863C RDT&E	29,629	26,800	23,188	0	0	0	0	0	Completed

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project will provide a Theater Missile Defense (TMD) capability for U.S. Marine Corps operations. This Marine Corps' TMD initiative is jointly funded with BMDO and will yield a low-risk, near-term capability for expeditionary forces against short-range ballistic missiles. The program consists of modifying the TPS-59 long-range air surveillance radar and the HAWK weapon system to allow detection, tracking, and engagement of short-range TBMs. The program will also provide a communications interface by developing an Air Defense Communications Platform.

(U) Modifications to the TMD mode of the TPS-59 radar will result in TBM target detection at ranges out to 400 nautical miles and 500,000 feet in altitude. Technical, developmental, and operational testing is scheduled for FY 1996 with first units equipped in early FY 1997.

(U) The HAWK weapon system modifications include upgrades to the battery command post and improvements to the Hawk missile that will result in a missile configuration called the "improved lethality missile". The modified HAWK battery command post

will process cueing data to control the high power illuminator radar. The improved lethality missile will incorporate fuse and warhead improvements to 370 improved lethality missiles that have been transferred from the Army to the Marine Corps. Another 600 improved lethality missile modification kits will be procurred and installed by the end of FY 1996. Production of the battery command post modification kits will begin in FY 1995. The installation of all battery command post modifications will be completed by the end of FY 1996.

(U) The Air Defense Communications Platform (ADCP) will convert TPS-59 data messages and Tactical Data Information Link-J (TADIL-J) formatted messages into the intra-battery data link formats required by the Hawk weapon system. The Air Defense Communications Platform (ADCP) will also transmit TADIL-J formatted messages to other theater sensors. This communications interface is currently in development and initial production will begin in FY 1996.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) A major accomplishment in FY 1994 was the integrated test of the HAWK tactical missile defense capability which verified the operation of the TPS-59, data link, battery command post, and improved lethality missile. Two Lance missiles were successfully intercepted and destroyed by the improved lethality missile during this test. Additional FY 1994 accomplishments included approving the TPS-59's baseline design, beginning TPS-59 system integration, and approving the Air Defense Communications Platform's baseline design.

(U) FY 1994 Accomplishments:
PE: 0603863C
- o ($ 2.500M) Conduct AN/TPS-59 design reviews.
- o ($22.129M) Begin AN/TPS-59 system integration effort.
- o ($ 2.500M) Conduct ADCP design reviews.
- o ($ 2.500M) Conduct HAWK engineering change proposal (ECP) test readiness review.

(U) FY 1995 Plans:
PE: 0603863C
- o ($15.000M) Complete AN/TPS-59 system integration effort.
- o ($ 8.000M) Initiate AN/TPS-59 contractor's developmental tests.
- o ($ 3.800M) Initiate ADCP integration and testing.

PE: 0208863C
- o ($3.804M) Initiate HAWK Battery Command Post modification procurement.

(U) FY 1996 Plans:
PE: 0603863C
- o ($20.352M) Complete AN/TPS-59 integration and testing.
- o ($ 1.716M) Complete ADCP integration and testing.
- o ($ .820M) Complete HAWK integration and testing.
- o ($ .300M) Provide targets for live flight testing.

PE: 0208863C

- o ($1.345M) Complete Battery Command Post modification procurement.
- o ($1.837M) Complete improved lethality missile procurement.
- o ($0.533M) Complete HAWK additional fuse modification procurement.
- o ($1.391M) Complete ADCP long lead item procurement.

(U) FY 1997 Plans

PE: 0603863C:

- o No funding/tasks. System development efforts completed in FY 1996.

PE: 0208863C

- o ($14.833M) Initiate AN/TPS-59 procurement.
- o ($1.197M) Complete HAWK North Finding Module procurement.
- o ($4.400M) Initiate ADCP procurement.

Acquisition Strategy: The TPS-59 modification is designated an acquisition category IV (ACAT IV) program being developed by Martin Marietta on a cost plus incentive fee contract. The ADCP is an ACAT IV development program with the software being developed by Advanced Programming Concepts on a cost plus incentive fee contract. The ADCP hardware and software integration is being accomplished by the Naval Systems Warfare Center, Crane, IN. The HAWK modifications are included in an ACAT IV program being developed by Raytheon on a cost plus incentive fee contract.

B. (U) PROGRAM CHANGE SUMMARY:

Hawk DEM/VAL:	FY1994	FY1995	FY1996	FY1997	TOTAL COST

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603863C (Proj: 2358)
PE Title: HAWK (U)

Previous President's Budget	29,629	26,800	23,000	0	79,429
Appropriated Value		26,800			26,800
Adjustments to Appropriated Value		0			0
Current Budget Submit	29,629	26,800	23,188	0	79,617

Change Summary Explanation:

Funding: This project was funded in PE 0604216C, project 2308 in the FY1995 President's Budget. The FY96 funding increase is for target costs in the FY96 testing. This was included in PE 0604216C, project 3300, during FY94 and is not an increase to total program cost.

Schedule: None.

Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:	Funding Dependency? (Yes[1]/No)
2160, TMD Existing Systems, 0603872C	Yes
3153, Architecture Analysis/BMC3 Initiatives, 0603872C	Yes
3251, Systems Engineering and Technical Support, 0603872C	Yes
3354, Targets, 0603872C	Yes
3359, System Test and Evaluation, 0603872C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603863C (Proj: 2358)
PE Title: HAWK (U)

	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
C1067, Aviation Radar Product Improvement Program, 0606226M	9,067	60	489	0	0	0	0	0	9,616
C1120, Air Defense Missile System, 0606223M	636	233	2,011	0	0	0	0	0	2,880
Related Procurement:									
Procurement, BMDO, HAWK/BMC3, 0208863C	0	3,804	5,106	20,430	0	0	0	0	29,492
Procurement, Marine Corps, TPS-59 Mods	0	0	0	12,453	16,478	0	0	0	28,931
Procurement, Marine Corps, ADCP	0	0	0	0	8,902	596	614	8,260	18,372

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603863C (Proj: 2358)
PE Title: HAWK (U)

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
TPS-59 Milestone III											X					
ADCP Milestone II						X										
ADCP Milestone III												X				
HAWK ECP Approval				X*												
Engineering Milestone																
TPS-59 PDR		X*														
TPS-59 CDR			X*													
ADCP PDR		X*														
ADCP CDR			X*													
T&E Milestone																
TPS-59 Development Tests										X	X					
TPS-59 Operational Tests										X	X					
ADCP Development Tests										X	X					
ADCP Operational Tests										X	X					
HAWK ECP Operational Eval				X*												

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603863C (Proj: 2358)
PE Title: HAWK (U)

Contract Milestone				
TPS-59 Contractor Tests	X	X	X	
ADCP Contractor Tests	X	X	X	
Other Program Events				
TPS-59 Mod Fielding				X
ADCP Fielding				X

Planned Milestones Beyond FY1997: None.

Program Management
PE 0605218C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 06 (Management)

PE:0605218C (Proj: 4000)
PE Title: Management (U)

Project Number / Title: 4000 Operational Support

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0605218C RDT&E	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides support in three basic areas: personnel and related support costs; funding to meeting fluctuation costs and contract terminations; and assistance required to fund support service contracts.

(U) Personnel & related support costs common to all BMDO projects include support of the Office of the Director, Ballistic Missile Defense Organization and his staff located within the Washington, D.C. area, as well as BMDO's Executing Agents within the US Army Space & Strategic Defense Command, U.S. Army PEO Missile Defense, U.S. Navy PEO for Theater Defense, U.S. Air Force PEO office, and the National Test Facility. This project supports funding for personnel salaries, benefits, and supportive costs such as rents, utilities, supplies, etc.

(U) The BMDO prioritizes funding within this project to meet operational, contractual, and statutory fiscal requirements. Operational requirements include reimbursable services acquired through the Defense Business Operating Fund (DBOF), such as accounting services provided by the Defense Finance and Accounting Service (DFAS). Contractual requirements include reserves for special termination costs on designated contracts and provisions for terminating other programs as required. BMDO has additional requirements to provide for foreign currency fluctuations on its limited number of foreign contracts. Finally, statutory requirements include funding for charges to cancelled appropriations in accordance with Public Law 101-510.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 06 (Management)

PE:0605218C (Proj: 4000)
PE Title: Management (U)

(U) Assistance required to support BMDO overhead management functions is contained in this project. This assistance ranges from operational contracts to fully support functions such as ADP operations, Access control offices, and graphics support, to supportive efforts required, as well as to supplement the BMDO government personnel. Typical efforts include cost estimating, security management, contracts management, strategic relations management and information management. These efforts include assessment of technical project design, development and testing, test planning, assessment of technology maturity and technology integration across BMDO projects; and support of design reviews and technology interface meetings. Program control tasks include assessment of schedule, cost, and performance, with attendant documentation of the many related programmatic issues. The requirement for this area is based on most economical and efficient utilization of contractors versus government personnel.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Through FY 1997 Plans:

- o Continue providing management and support for fixed costs such as civilian payroll, travel, rents & utilities and supplies.
- o The funding provided by this project has enabled and will enable the executing agents to centralize funding and management of these common and recurring operating costs.
- o Products are generated on a continuing basis

Acquisition Strategy: Centralized funding of management costs optimizes their value across the entire range of BMDO projects and allows for management of these costs by support functions. This strategy of centralizing management will continue to occur throughout this program. Certain BMDO functions, such as cost estimating, require the use of contractor support to perform independent estimates.

Contractors are used in other areas, such as ADP Operations, where government needs are most cost-effectively met by use of contractors.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	198,802	215,233	223,077	226,077	863,189
Appropriated Value		197,996			197,996
Adjustments to Appropriated Value		-34,790			(34,790)
Current Budget Submit	205,948	163,206	185,542	188,418	743,114

Change Summary Explanation:
Funding: Several management efforts were restructed in FY 1995 in order to align the type of work/costs into three areas as described above. Previously, the funds for these functions were combined with other work being accomplished in various projects. Additionally, other Government personnel are being transferred to other non-BMDO projects to downsize the number of personnel within the BMDO personnel and related account. BMDO's FY 1995 President's Budget submission of $215 million for management costs was reduced to $162 million. $197 million was appropriated in this account, which included $34.8 million for unrelated TMD targets efforts that have since been removed from this account.

Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 06 (Management)

PE:0605218C (Proj: 4000)
PE Title: Management (U)

Related RDT&E:
All BMDO projects in all BMDO PEs receive management support from this PE.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Other Program Events:																
BMDO PB Submission		X				X				X				X		
BMDO BES Submission				X				X				X				X
BMDO Report to Congress			X		X				X				X			
Other Program Events																
Cost Estimating Products	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Program Control Products	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Navy Lower Tier Missile Defense
PE 0208867C / 0603867C / 0604867C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603867C / 0604867C (Proj: 2263)
PE Title: Navy Lower (U)

Project Number / Title: 2263 Sea-based Area TBMD (Lower Tier)

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0208867CPROC	0	14,394	16,897	91,561	123,037	124,261	210,846	209,194	2,501M
0603867CRDT&E	150,446	139,676	0	0	0	0	0	0	347M
0604867CRDT&E	0	0	237,473	193,600	142,680	151,428	115,482	50,323	891M

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Navy Area Theater Ballistic Missile Defense (TBMD) project builds on the national investment in AEGIS ships, weapon systems, and missiles. Two classes of ships continue to be deployed with the AEGIS combat system: the CG-47 Ticonderoga-class cruisers and the DDG-51 Burke-class destroyers. Navy theater ballistic missile defense will take advantage of the attributes of naval forces including overseas presence, mobility, flexibility, and sustainability in order to provide protection to debarkation ports, coastal airfields, amphibious objective areas, Allied forces ashore, population centers, and other high value sites. Navy assets will provide an option for initial TBM defense for the insertion of additional land-based TBMD assets and other expeditionary forces in an opposed environment.

(U) This project provides for the following:

- Modifications to the AEGIS combat system (ACS) to include modifications to the command and decision system, the AEGIS display system, and the radar system (AN/SPY-1B/D).

- o Modifications to the Navy Standard Missile (SM-2 Block IV) and the AEGIS weapon control system with a Standard Missile (SM- 2 Block IV A) in FY 2000 capable of engaging TBMs in the endoatmosphere.
- o Fielding a user operational evaluation system (UOES) consisting of the SM-2 Block IV A and selected, limited non-tactical ACS modifications in FY 1998 if required to counter an existing threat.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY94 the program continued design of AEGIS Combat System (ACS) modifications and computer program development to accept external cueing, continued development/design for SM-2 Block IV modifications to provide for capability to intercept TBMs and continued risk mitigation efforts and flight test missile development.

(U) FY 1994 Accomplishments:

- o ($36.000M) Continued design of ACS modifications and computer program development to accept external cueing; initiated a request for proposal (RFP) for tactical AEGIS combat system modifications; demonstrated AEGIS cueing to Patriot system in consonance with the Joint Air Defense Operations/Joint Engagement Zone (JADO/JEZ) event; and developed a plan to demonstrate Patriot acceptance of remote AN/SPY-1 Radar TBM track data.
- o ($102.00M) Continued development/design of SM-2 Block IV modifications to provide for capability to intercept TBMs and continued risk mitigation efforts and flight test missile development.
- o ($12.446M) Initiated procurement of target missiles and continued development of flight test requirements (facilities, ranges, and plans).

(U) FY 1995 Plans:

- o ($22.300M) Complete design of initial ACS computer program modifications to enable TBMD detection, tracking and weapon processing to support an SM-2 missile with TBMD capability; conduct land-based and at-sea experiments to demonstrate automated acceptance of long-range (off ship) cueing and SPY radar acquisition using off-ship cueing sources such as external sensors, land-based radars, and other ship radars.
- o ($99.0M) Design and integration for SM-2 Block IV A missile,develop and fabricate risk reduction flight test missiles.
- o ($9.287M) Commence risk reduction flight tests at White Sands Missile Range (WMSR) to resolve issues of aerothermal blur, IR seeker performance, IR cover survivability and model validation.
- o ($4.400M) Conduct lethality testing and analysis.
- o ($3.389M) Procure target missiles.
- o ($1.300M) Continue system engineering and associated studies and analysis; conduct system level reviews.
- o ($14.394M) Procure ACS modifications for ships and development sites, and procure support/training equipment for shore facilities.

(U) FY 1996 Plans:

- o ($44.000M) Continue AEGIS computer system development; conduct system design review (SDR) and preliminary design review (PDR); conduct engineering development testing; and develop design specifications.
- o ($109.000M) Complete detailed missile design and conduct PDR.
- o ($73.100M) Continue flight test missile fabrication and complete White Sands Missile Range (WSMR) risk reduction flight tests.
- o ($12.530M) Continue Systems engineering and analysis and conduct Milestone IV DAB.
- o ($16.897M) Procure ACS modifications for ships and development sites, and procure support/training equipment for shore facilities.

(U) FY 1997 Plans:

- o ($31.000M) Continue development of tactical computer program; start development of computer program design specification.
- o ($144.500M) Continue missile engineering/manufacturing development. Conduct critical design review (CDR). Initiate fabrication of UOES\WSMR missiles. Initiate procurement of DT/OT flight test missiles.
- o ($10.000M) Continue systems engineering and analysis; define interface for TBMD-related upgrades to AEGIS to Joint Maritime Command Information System (JMCIS).
- o ($8.100M) Procure test targets and conduct test planning.
- o ($91.561M) Procure ACS modifications for ships and development sites, and procure support/training equipment for shore facilities.

Acquisition Strategy: This strategy consists of an Area TBMD Program evolving to a Theater-Wide Defense TBMD program. The Area Program will build on this force structure by modifying the existing SM-2 Block IV missile and AEGIS Combat System to achieve TBMD capability. Overall acquisition strategy is under development.

B. (U) PROGRAM CHANGE SUMMARY:

Navy Lower Tier Dem/Val:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	154,000	179,543	240,224	242,308	816,075
Appropriated Value		140,000			140,000
Adjustments to Appropriated Value		-324			(324)
Current Budget Submit	150,446	139,676	0	0	290,122

Navy Lower Tier EMD:	FY1994	FY1995	FY1996	FY1997	TOTAL COST

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603867C / 0604867C (Proj: 2263)
PE Title: Navy Lower (U)

Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	237,473	193,600	431,073

Change Summary Explanation:
Funding: This project evolved from Project 2213 in FY95 President's Budget. Congress directed a funding reduction of $40M in FY95.
Schedule: The Navy Area TBMD Program within the FY95 President's Budget supported a Unit Operational Evaluation System (UOES) capability in FY97 and First Unit Equipped (FUE) in FY99. The impact of the FY95 Congressional budget cut is a slip in both UOES and FUE dates by one year.
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:		Funding Dependency (Yes[1]/No)
*1155 Phenomenology	P.E. 0603872C	Yes
1161 Advanced Sensor technology	P.E. 0603872C	Yes
*1170 TMD Risk Reduction	P.E. 0603872C	Yes
*1266 Navy Theater-wide (Upper)	P.E. 0603868C	Yes
*2259 Israeli Cooperative Projects	P.E. 0603872C	Yes
*3157 Environmental, Siting, & Facilities	P.E. 0603872C	Yes

*3251 Sys Eng and Tech Suppt	P.E. 0603172C		Yes
*3261 BM/C4I DEM/VAL	P.E. 0603864C		Yes
*3265 User interface	P.E. 0603872C		Yes
*3352 Modelling & Simulation	P.E. 0603872C		Yes
*3354 Targets	P.E. 0603872C	Yes	
*3359 System Test & Evaluation	P.E. 0603872C		Yes
*3360 Test Resources	P.E. 0603872C		Yes
*4151 Personnel and Related Costs	P.E. 0605218C		Yes

* These projects provide essential technical engineering, and/or infrastructure support to TMD MDAP programs.
[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
- Milestone IV									x							
Engineering Milestone																
- ET&C CSEDS Demo						x										
- ET&C At-Sea Demo								x								
- ACS SDR (Tactical)									x							
- ACS PDR (UOES)											x					
- SM-2 BLK IVA PDR									x							

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603867C / 0604867C (Proj: 2263)
PE Title: Navy Lower (U)

- SM-2 BLK IVA CDR x
_ ACS PDR (Tactical) x
T&E Milestone
- SM-2 BLK IV A land-
based Risk Reduction flight tests at WSMR x x
Contract Milestone
- None

Planned Milestones Beyond FY1997:
- SM-2 BLK IV A development/operational flight tests at WSMR - FY1998
- SM-2 BLK IV A development/operational flight test at sea - FY2000
- ACS and SM-2 BLK IV A UOES (1 ship/35 missiles) - FY1998
- ACS Mod/SM-2 BLK IV A FUE - FY2000

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 04 - Dem/Val

February 1995

Project and Title - 2263 Sea Based Area TBMD

P.E. Number: 0603867C
P.E. Title: Navy Lower (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Program MGMT/Integration	605	0	0	0
b. System Engineering	17,985	38,435	0	0
c. Program Management	2,147	5,160	0	0
d. Program Support	1,896	7,505	0	0
e. Ship System MODS	17,205	0	0	0
f. Design & Analysis	78,270	30,620	0	0
g. Hardware Fab. & Proc.	10,000	23,265	0	0
h. Test & Evaluation	1,000	11,005	0	0
i. Test Equipment	1,400	5,110	0	0
j. Engineering Support	1,100	4,500	0	0
k. Travel	130	100	0	0
l. Developmental Test & Eval.	8,508	13,000	0	0
m. Operational Test & Eval.	0	0	0	0
n. Other/Miscellaneous	10,200	976	0	0
Total	150,446	139,676	0	0

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
MARTIN MARIETTA	CPFF					23,607	15,800	0	0	TBD	TBD
NSWC/DAHLGREN	WR/RCP					7,225	7,180	0	0		
APL/JHU	RCP					15,928	15,000	0	0		
HOLLOMAN AFB	MIPR					1,140	1,000	0	0		
RAYTHEON CORP.	CPFF					29,966	22,000	0	0		
HUGHES MSL SYSTEMS CORP.	CPFF					38,568	48,000	0	0		
MOTORLA	CPFF					4,162	2,000	0	0		
RFAS	CPFF					0	0	0	0		
MISCELLANEOUS	VARIOUS					6497	4,421	0	0		
Total Product Development						**127,093**	**115,401**	**0**	**0**		
RAYMOND ENGINEERING	CPFF					50	500	0	0		
NSWC/PORT HUENEME DIVISION	WR					60	160	0	0		
NAWC/POINT MUGU	WR					0	0	0	0		
VITRO	CPAF					2,100	1,400	0	0		
MISCELLANEOUS	VARIOUS					3,922	2,750	0	0		
Total Support & Management						**6,132**	**4,810**	**0**	**0**		
NAWC/WPNDIV-POINT MUGU	WR					2,675	2,343	0	0		
BMDO	PMA					4,142	3,713	0	0		
WHITE SANDS MISSILE RANGE	WR					300	2,950	0	0		
NSWC/PORT HUENEME	WR					240	640	0	0		
NAWC/CHINA LAKE	WR					3,400	2,400	0	0		
MISCELLANIOUS	VARIOUS					6,464	7,419	0	0		
Total Test & Evaluation						**17,221**	**19,465**	**0**	**0**		
Total						**150,446**	**139,676**	**0**	**0**		

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property											
Support & Mgmt. Property											
Test & Eval. Property											

Subtotal Product Dev.						127,093	115,401				
Subtotal Support & Mgmt.						6,132	4,810				
Subtotal Test & Evaluation						17,221	19,465				
Total Project						150,446	139,676	0	0	TBD	TBD

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 05 - EMD

February 1995

Project and Title - 2263 Sea Based Area TBMD

P.E. Number: 0604867C
P.E. Title: Navy Lower (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Program MGMT/Integration	0	0	1,500	1,000
b. System Engineering	0	0	62,918	48,707
c. Program Management	0	0	5,687	5,104
d. Program Support	0	0	8,285	7,496
e. Ship System MODS	0	0	0	0
f. Design & Analysis	0	0	37,979	8,577
g. Hardware Fab. & Proc.	0	0	80,749	88,102
h. Test & Evaluation	0	0	10,649	9,573
i. Test Equipment	0	0	5,803	5,206
j. Engineering Support	0	0	12,810	7,875
k. Travel	0	0	120	110
l. Developmental Test & Eval.	0	0	10,070	11,100
m. Operational Test & Eval.	0	0	0	0
n. Other/Miscellaneous	0	0	903	750
Total	0	0	237,473	193,600

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
MARTIN MARIETTA	CPFF					0	0	37,500	24,000	TBD	TBD
NSWC/DAHLGREN	WR/RCP					0	0	7,340	7,306		
APL/JHU	RCP					0	0	16,988	15,298		
HOLLOMAN AFB	MIPR					0	0	1,000	1,000		
RAYTHEON CORP.	CPFF					0	0	57,430	47,880		
HUGHES MSL SYSTEMS CORP.	CPFF					0	0	71,110	54,940		
MOTORLA	CPFF					0	0	7,716	8,468		
RFAS	CPFF					0	0	575	515		
MISCELLANEOUS	VARIOUS					0	0	15,104	9,896		
Total Product Development						**0**	**0**	**214,763**	**169,303**		
RAYMOND ENGINEERING	CPFF					0	0	710	670		
NSWC/PORT HUENEME DIVISION	WR					0	0	192	174		
NAWC/POINT MUGU	WR					0	0	192	174		
VITRO	CPAF					0	0	1,400	1,400		
MISCELLANEOUS	VARIOUS					0	0	3,190	2,930		
Total Support & Management						**0**	**0**	**5,684**	**5,348**		
NAWC/WPNDIV-POINT MUGU	WR					0	0	768	696		
BMDO	PMA					0	0	563	4,225		
WHITE SANDS MISSILE RANGE	WR					0	0	1,330	1,190		
NSWC/PORT HUENEME	WR					0	0	768	696		
NAWC/CHINA LAKE	WR					0	0	3,710	3,380		
MISCELLANIOUS	VARIOUS					0	0	9,887	8,762		
Total Test & Evaluation						**0**	**0**	**17,026**	**18,949**		
Total						**0**	**0**	**237,473**	**193,600**		

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property											
Support & Mgmt. Property											
Test & Eval. Property											

Subtotal Product Dev.					0	0	0	214,763	169,303		
Subtotal Support & Mgmt.					0	0	0	5,684	5,348		
Subtotal Test & Evaluation					0	0	0	17,026	18,949		
Total Project					0	0	0	237,473	193,600	TBD	TBD

Navy Upper Tier Missile Defense
PE 0603868C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603868C (Proj: 1266)
PE Title: Navy Upper (U)

Project Number / Title: 1266 Sea-based Theater-wide Defense (Upper Tier)

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603868C RDT&E	81,000	68,450	30,442	33,400	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Navy Theater-wide Theater Ballistic Missile Defense (TBMD) program will provide an upper tier, sea-based capability to counter the TBM threat. This program will build on the core sea-based program, the lightweight exo-atmospheric projectile (LEAP) technology efforts, and the existing AEGIS ships infrastructure. The current effort includes LEAP flight tests, an independent cost and operational effectiveness analysis, and force investigation studies including concept engineering. The program will also investigate the option of using a Theater High Altitude Area Defense (THAAD) missile variant. This project evolved from project 1216 in the FY95 President's Budget.

(U) Navy Theater-wide TBMD is a candidate to begin the Demonstration and Validation (Dem/Val) Phase in FY98 as one of the Advanced Capabilities (ACAP). This project will be funded as ACAP I in project number 2294 if selected for Dem/Val in FY98 or will continue in concept development as ACAP II or III in project number 1293.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603868C (Proj: 1266)
PE Title: Navy Upper (U)

In 1994, this project continued the Navy LEAP Technology Demonstration program moving towards two intercept tests in FY95 (FTV-3 and FTV-4). The activity was focused on the final development testing of the new Standard Missile third stage, integrated testing of the ship systems to support the intercepts, and demonstration of the Navy LEAP target as threat representative. Successful testing resulted in safety approval to bring the interceptor missiles aboard ship as well as missile and ship design validation.

(U) FY 1994 Accomplishments:

- ($35.000M) For the Standard Missile and ship system development, conducted a critical design review and completed design validation tests of LEAP modified Standard Missile; and conducted at-sea testing of a shipboard weapon system to support intercept tests.
- ($25.600M) For the kill vehicle assembly and test, completed the assembly and testing of two flight kill vehicles to support intercept tests (FTV-3 and FTV-4) and provided safety and functional inert test articles to support the safety approval process and missile checkout.
- ($ 5.500M) For the advanced propulsion development and demonstration, conducted final qualification tests for kick stage propulsion; and conducted a hover test of a Navy safe solid divert and attitude control system integrated with a kill vehicle.
- ($10.300M) For target fabrication and demonstration, mission and test support, conducted a successful target demonstration flight test (FTV-TD); completed the assembly and testing of three additional targets to support intercept flight tests; and conducted mission analysis and test planning for the first exo-atmospheric TMD intercept tests.
- ($ 4.600M) For the Navy Theater-wide TBMD Program, completed concept definition analysis; completed initial ORD development; solicited innovative/additional input from industry for consideration in the cost and operational effectiveness analysis (COEA); initiated planning for AEGIS/LEAP technology demonstration; continued AEGIS/THAAD compatibility studies; continued to support engineering trade-offs and studies; prepared for Navy Theater-wide TBMD Milestone II in FY98; and initiated C2 analyses for Navy theater defense.

(U) FY 1995 Plans:

- o ($30.000M) Complete flight demonstrations, analysis and closeout of LEAP flight test program paving the way for an advanced AEGIS operational system demonstration.
- o ($20.000M) Continue COEA and AEGIS/THAAD integration studies and evaluation of advanced technologies.
- o ($18.450M) Conduct engineering for the Navy Theater-wide TBMD program; conduct specific concept investigations and technology demonstrations.

(U) FY 1996 Plans:

- o ($15.942M) Continue Navy Theater-wide TBMD planning and studies.
- o ($10.500M) Continue engineering for the Navy Theater-wide TBMD program and continue specific concept investigations and technology demonstrations.
- o ($ 4.000M) Conduct C2 studies and demonstrations; evolve JMCIS TBMD module.

(U) FY 1997 Plans:

- o ($14.600M) Continue Navy Theater-wide Defense planning and studies.
- o ($12.000M) Continue engineering for the Navy Theater-Wide Area Defense program and continue specific concept investigations and technology demonstrations.
- o ($ 6.800M) Continue C2 studies and demonstrations; and continue the evolution of the JMCIS TBMD module.

Acquisition Strategy: The Navy acquisition strategy is to leverage the AEGIS ship anti-air warfare capability development by integrating TBMD capability through contracts with as yet undetermined prime contractors.

B. (U) PROGRAM CHANGE SUMMARY:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603868C (Proj: 1266)
PE Title: Navy Upper (U)

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	80,000	17,725	30,590	33,400	161,715
Appropriated Value		75,000			75,000
Adjustments to Appropriated Value		-6,550			(6,550)
Current Budget Submit	81,000	68,450	30,442	33,400	213,292

Change Summary Explanation:
Funding: This project evolved from project 1216 in the FY95 President's Budget. The $50M Congressional increase in FY95 will allow accelerated technology transfer from Terrier to AEGIS weapon systems.
Schedule: LEAP flight test demonstrations will slip into FY95 to permit expanded pre-flight ground assurance testing.
Technical: Additional engineering analysis (THAAD/AEGIS integration and Theater-wide concepts analysis for Navy and BMDO Capstone COEAs).

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
*1155, Phenomenology, PE 0603872C	Yes
*1161, Advanced Sensor Tech., PE 0603872C	Yes
*1170, TMD Risk Reduction, PE 0603872C	Yes
*2259, Israeli Cooperative Projects, PE 0603872C	Yes
2263, Navy Area TBMD, PE 0208867C/0603867C/0604867C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603868C (Proj: 1266)
PE Title: Navy Upper (U)

*3251, System Engineering and Technical Support, PE 0603172C	Yes
*3261, BM/C3I Dem/Val, PE 0603864C/0604864C	Yes
*3265, CINC TMD Assessment Program, PE 0603872C	Yes
*3352, Modeling and Simulation, PE 0603872C	Yes
*3354, Targets, PE 0603872C	Yes
*3359, System Test and Evaluation, PE 0603872C	Yes
*3360, Test Resources, PE 0603872C	Yes
4151, Personnel and Related Costs, PE 0605218C	Yes

* These projects provide essential technical, engineering, and/or infrastructure support to TMD MDAP programs.

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones																
- DAB Documentation																X
Engineering Milestones																
- Complete AEGIS/THAAD Integration Study						X										
- Complete Navy TBMD COEA									X							
- Complete BM/C3 Studies and Demonstrations																X

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603868C (Proj: 1266)
PE Title: Navy Upper (U)

T&E Milestones		
- TERRIER/LEAP Flight Test Demos		
>> FTV 3		X
>> FTV 4		X
>> KKV High Altitude Intercept of TBM like target	X	
Other Program Events		
- Complete Congressional Rqmts. of FY95 Approp. Conf.		X

Planned Milestones Beyond FY1997:

Milestone Decision 1Q/FY98

National Missile Defense (NMD)
PE 0603871C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603871C
PE Title: National Missile Defense (U)

Project Number and Title:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
1151 Sensors (Active and Passive)	130,768	107,142	102,675	88,920	64,927	59,923	39,411	35,400	Continuing
1155 Phenomenology Program	84,042	31,028	14,672	17,593	20,767	20,474	20,013	20,013	Continuing
1161 Advanced Sensor Technology	4,021	0	0	0	0	0	0	0	Continuing
1265 Boost Phase Interceptor	2,500	0	0	0	0	0	0	0	Continuing
1267 Ground-Based Interceptor	68,569	137,810	126,646	149,550	182,138	184,047	205,439	206,139	Continuing
1460 BMC3	23,702	27,900	33,538	36,213	38,213	41,213	41,213	43,124	Continuing
3152 NMD System Engineering	41,190	20,402	19,357	17,975	20,475	20,475	20,475	20,475	Continuing
3153 Arch, Analysis / BMC3 Initiatives	11,713	0	3,110	3,125	3,125	3,125	3,125	3,125	Continuing
3157 Environmental, Siting, & Facilities	0	0	1,345	1,351	1,401	1,404	1,409	1,409	Continuing
3160 Readiness Planning	7,924	13,470	14,469	17,302	18,840	19,202	18,757	20,157	Continuing
3265 User Interface	4,373	1,248	1,443	1,530	1,530	1,530	1,530	1,530	Continuing
3270 Threat and Countermeasures Program	0	0	8,272	8,312	1,663	1,663	1,663	1,663	Continuing
3352 Modeling & Simulations	78,017	19,000	15,779	26,834	15,855	15,855	15,855	15,855	Continuing
3354 Targets Support	40,893	0	0	0	0	0	0	0	Continuing
3359 System Test & Evaluation	14,878	14,100	17,904	18,382	18,382	18,382	18,382	18,382	Continuing
3360 Test Resources	24,229	11,558	11,411	11,951	12,025	12,025	12,200	12,200	Continuing
4154 Operations Fluctuation Account	13,154	3,330	0	0	0	0	0	0	Continuing
PE TOTAL	549,973	386,988	370,621	399,038	399,341	399,318	399,472	399,472	

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) In mid 1993, the Department of Defense conducted a Bottom-Up Review (BUR) to select the right strategy, force structure, and modernization programs for America's defense in the post-Cold War era. With the dissolution of the former Soviet Union (FSU), the threat to the U.S. homeland from a deliberate or accidental

ballistic missile attack by states of the former Soviet Union or the Peoples Republic of China (PRC) was judged to be highly unlikely. While the propensity of Third World countries to use long-range ballistic missiles may be increasing, the ability of such countries to acquire or develop such a capability over the next 10-15 years was considered uncertain.

(U) As a prudent hedge against this uncertainty, the Department chose to pursue a technology readiness strategy for National Missile Defense (NMD) that develops and maintains an ability to deploy ballistic missile defenses for the United States should a threat emerge. As planning for BMD progressed to support the FY94 budget and FYDP, discussions with the Under Secretary of Defense for Acquisition resulted in further program definition. As a result, the NMD Technology Readiness Program was structured to focus on demonstrating the resolution of technology "long poles" (e.g., the exoatmospheric kinetic kill vehicle) as a precursor to potentially fielding an objective National Missile Defense system capable of defeating existing strategic ballistic missile systems with high confidence. In addition, the Technology Readiness Program would develop and maintain evolutionary contingency deployment options to meet a ballistic missile threat to the U.S. if it emerged sooner than expected.

(U) The FY96/97 Budget submission supports this strategy to develop a national missile defense system that is: capable of contingency deployment within three years to provide a defense against simple threats; and, capable as technology progresses of meeting more stressing threats should they emerge. The BMDO has organized the NMD program to support development of the NMD system into two main areas: system development test and deployment planning.

SYSTEM DEVELOPMENT (U)

(U) The NMD system includes an interceptor element, sensor elements, and a battle management, command and control element. The system architecture and the trade studies which formed the architecture alternatives are dependent on the capabilities of sensor elements (Project 1151) to detect, identify, and track the threat such that the command and control system can target interceptors against it. The fundamental problem of selecting the right sensors, at the right costs, to provide detection, tracking, and sufficiently accurate position information for hand-off to the command and control and weapons systems encompasses a complex set of choices among passive and active sensors (and their mix), as well as specific technology choices for focal plane materials, optics, array structures, transmit/receive elements, power, conditioning, cooling, producibility, survivability, and more. The NMD program depends on a space-based passive sensor, the Space and Missile Tracking System (SMTS), and a ground based x-band radar (GBR) as the sensor elements required to address the full spectrum of potential threats.

(U) The NMD-GBR development builds upon the Theater Missile Defense GBR. To participate in NMD system integration testing, an initial NMD radar will be built at Kwajalein Missile Range as the NMD Radar Technology Demonstrator (RTD). In addition, in the event of an early contingency deployment, an initial over-the-horizon (OTH) track of the threat would depend on upgraded Early Warning Radars (UEWR) to commit interceptors. Resources have been allocated to demonstrate

a prototype EWR software upgrade for this contingency, but not to fund the actual upgrades, since the required modifications can be made in parallel with an NMD contingency deployment.

(U) In the near term, the interceptor front end, the exoatmospheric kinetic kill vehicle (EKV) is the most challenging component in the NMD system development. Project 1267, Ground-Based Interceptor (GBI) has mitigated EKV development risks by funding three contractors (down selected to two in FY94) to develop alternative technical solutions to non-nuclear hit-to-kill interception. A number of technology efforts have also been funded to provide further risk mitigation and technology insertion opportunities to leverage the program against both technical risks and potential changes in the threat. GBI builds upon the success of the Homing Overlay Experiment and the ERIS and LEAP technology programs and advances at a relatively modest risk to support a capable defense by exploiting to the fullest an architecture with the GBR and SMTS.

(U) The BMC3 Program (Project 1460) will use an evolutionary acquisition approach to incrementally prototype the BMC3 functionality required to integrate and demonstrate an NMD system in step with evolving NMD sensors and interceptor element capabilities. BMC3 prototypes will be integrated and demonstrated at the National Test Facility with USSPACECOM/NORAD user participation to refine and focus the BMC3 development and system behavior. NMD BMC3 supports the NMD command and control process required to provide human-in-control; develop, assess, and select missile defense strategies and tactics; fuse and correlate available sensor information; integrate and plan the complimentary coordination of NMD sensors and interceptors for maximum system performance; provide interfaces with existing and planned C3 systems; and, prototype and demonstrate tracking software for contingency upgrade of EWR to support NMD BMC3 operations.

(U) The inter-element relationship within the NMD architecture and the capability they offer against requirements is defined, analyzed, and supported by a continuous system engineering process. System Engineering (Project 3152) develops system requirements and flows them to the elements, interacting with and ultimately defining the architecture required to meet and defeat the threat. Systems engineering is an integral part of requirements definition, component performance verification, test planning and analysis, contingency deployment planning, and system integration. User Interface (Project 3265) provides feedback to the system and element designers from the user (USSPACECOM) via wargames. These exercises simulate real time system and threat engagement.

(U) Threat timelines are a pressing concern. Modern long range missile systems developed by the FSU and the PRC could be acquired by potentially hostile regimes that would challenge the U.S. in areas critical to U.S. interests. These systems already possess significant capability and their acquisition would leave little time to respond with a crash development program. The NMD program Threat and Countermeasures (Project 3270) continually assesses and updates the qualitative and quantitative threat, including actual and prospective technology migration, as well as the indigenous programs of technically immature countries. The primary purpose of this effort is to assure that NMD has the information required to measure the impact of changes in the threat on system requirements so that requirements and technical solutions can be continually updated.

(U) The NMD deployment capability is dependent on the demonstrated system performance of the integrated NMD element prototypes of the sensors, interceptors, and BMC3. Demonstration of this capability must substantiate a level of performance acceptable to the User community, instill confidence in the developer that the risks associated with the evolutionary development path remain within boundary conditions, and allow opportunity for interim contingency deployments. System operational demonstrations are prohibitive from a number of standpoints, not the least of which is cost. The Test and Evaluation program (Project 3359 and 3360) has been designed from the beginning to leverage the entire Department of Defense infrastructure, fund BMDO (TMD, NMD, and Technology) required improvements, and develop a simulation regime that reduces the cost of and dependence on live testing to demonstrate system performance. Realistic flight tests against threat representative targets are planned. Targets are developed, and analysis platforms positioned/developed to ensure the entire test environment can be captured and the data reduced. This information will refine the NMD system simulation called the Integrated System Test Capability fielded at the National Test Facility and at the Advanced Research Center. The NMD phenomenology program (Project 1155) provides background, signatures and measurement studies, test and experiment data reduction, and influences algorithm development required to operate NMD sensors and weapons.

DEPLOYMENT PLANNING (U)

(U) Deployment planning activities address User operational and system effectiveness requirements over the life cycle of the weapon system to meet the challenge for contingency deployment. The NMD program focuses efforts on the planning required to field a prototype system. Environmental siting, facilities assessment, modification, refurbishment, and meeting other beneficial occupancy issues are supported by this effort (Project 3157). Deployment Planning (Project 3160) is being conducted to identify the critical actions and timelines for fielding a contingency system and then focusing resources to reduce the time line and also reduce risks inherent in such a deployment. This is a new effort structured during the transition year (FY94) and ramped up in FY95 to support aggressive studies and planning required to provide confidence that a contingency deployment can be executed within the planning timeline and meet user requirements for operability and system effectiveness.

(U) In summary the program is structured within budget and ABM Treaty limitations to: develop and demonstrate, as soon as possible, the critical technologies needed to achieve a fully effective defense (the Objective Capability) against existing complex threats; develop and maintain, on the path to the objective capability, contingency deployment options based on technical progress achieved in the program at any point in time, and maintain effective interface with DoD and the USAF to ensure that the Space-Based Infrared (SBIR) program proceeds with both Tactical Warning/Attack Assessment(TW/AA) and ballistic missile midcourse track capabilities needed to achieve an effective defense against complex threats.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY1994 Accomplishments:

o NMD Technology Readiness Program:

(U) SYSTEM DEVELOPMENT: System development activities in 1994 focused on restructuring the NMD acquisition program into a technology readiness program.
(U) ($84,042) 1155 - PHENOMENOLOGY Phenomenology activities focused on operating COBRA JUDY and AST to collect radar and optical data, analyzing data, delivering target signatures handbooks, creating a debris/fragment signatures database, and improving modelling codes in support of U.S./U.K. analysis of data sets from joint experimental flight tests. More than 50 gigabytes of missile background data were distributed, and more than 3,000 gigabytes of missile background data archived.

(U) ($130,768) 1151 - SENSORS Work on the NMD-GBR Dem/Val radar was halted and the program was restructured into the NMD Radar Technology Demonstration (RTD). SMTS (BE) activities were focused on the continued development of the Flight Demonstration Satellite Vehicles (FDSV) and essential components for an objective SMTS (BE) system and risk reduction. MSX satellite integration and testing and ground system readiness testing and the FPA pre-pilot demonstration were completed.

(U) ($68,569) 1267 - GROUND-BASED INTERCEPTOR The GBI-X program was refocused on EKV activities. This included the down selection from three to two contractors for the EKV program, initiation of the integration of the EKV sensors for FY96 risk reduction flights, and continued PLV and launch complex activities.

(U) ($23,702) 1460 - BMC3 transitioned from acquisition to technology readiness. This refocused effort on development of prototyping and integration options. Developed and demonstrated interfaces with the NMD Integrated System Test Capability (ISTC) infrastructure to support IGT1 and 2. Demonstrated object oriented prototyping and user interface in JWID94. Provided user situational awareness displays in joint interoperability demonstrations. Conducted demonstrations, tests, and exercises, and facilitated user involvement in assessment of BMC3 prototypes at the NTF.

(U) ($41,190) 3152 - NMD SYSTEM ENGINEERING

Performed architectural definition and supporting analysis required to restructure program to a technology readiness effort. Identified and resolved integration issues via Technology Roadmap, System Maturity Matrix, and NMD System Engineering Notebook (NSEN). Integrated initial BM/C3 information architecture requirements, developed under project 1460, into system/element requirements. Reconciled ORDs with USSPACECOM and Service proponents. Developed requirements and implementation plan for NMD system simulations at NTF. Performed analysis and engineering integration in support of NMD demonstration program and prepared for Integrated Ground Tests (IGTs) 1 and 2.

(U) ($4,373) 3265 - USER INTERFACE Theater and strategic wargaming was conducted to refine Operational Requirements Documents (ORDs) and develop operational concept(s) of operation (CONOPs). Mission analysis for BMD was conducted.

(U) ($78,017) 3352 - MODELING AND SIMULATIONS Infrastructure for the NTF and the ARC to support NMD activities was provided. The NTF hosted BMC3 studies and Systems Engineering Studies.

(U) ($14,878) 3359 - SYSTEM TEST ENVIRONMENT Completed global environment and merged BMD BMC3 with ISTC global environment; developed independent test evaluation methodology; developed options for test center consolidation.

(U) ($24,229) 3360 - TEST RESOURCES Provided test facility infrastructure (digital emulation at KDEC,HWIL testing at KHILS, wind and shock tunnel testing); provided test range infrastructure, upgrades and documentation; provided test range instrumentation upgrades, data collection, and analyses.

(U) DEPLOYMENT PLANNING: Deployment planning activities in 1994 focused on restructuring the NMD acquisition program into a technology readiness program.

(U) ($7,924) 3160 - LOGISTICS READINESS SUPPORT Maintained the LWIR calibration facility and conducted annual review of BMD metrology program. Identified logistics supportability, producibility, and industrial base issues and developed mitigation strategies and plans. Initiated framework to develop contingency deployment planning process. Completed quick reaction deployment analysis of deployment of a NMD system capability. Provided specialty engineering support to the NMD element program managers.

(U) FY1995 Plans:

o ($386,988) NMD Technology Readiness Program:

(U) SYSTEM DEVELOPMENT: Important events occurring in FY95 include: the EKV Critical Design Review (CDR) and EKV down selection, the GBR-RTD Antenna Design Preliminary Design Review (PDR), the BMC3 Integrated Ground Test 2 (IGT2) and EWR experiment, and the SMTS/BE ATP, SDR, and PDR for the FDSV.

(U) ($31,028) 1155 - PHENOMENOLOGY Provide resource support to receive, archive, and distribute BMDO plume and background test data. Provide operating costs for COBRA JUDY and AST to collect radar and optical data, also one third the operating costs of the COBRA DANE system. Continue joint U.S./U.K. analysis of data sets.

(U) ($107,142) 1151- SENSORS Complete MSX satellite rework and integration, launch satellite, and begin MSX target and phenomenology data collection and analysis. Continue passive sensor component development and testing. Continue NMD-RTD antenna design and algorithm development, and procure long lead items. Continue joint U.S./U.K. analysis of data sets. Complete negotiations and sign an agreement with Russia on AGRE. Continue Kwajalein Missile Range (KMR) launch facilities preparation and support activities.

(U) ($137,810) 1267 - GROUND-BASED INTERCEPTOR Conduct EKV CDR and down select to single EKV contractor for EKV flight test. Acquire long lead hardware and perform PLV modifications for two boosters to launch two EKV sensors in FY97. Down select from two to one Pilotline Experimental Technology(PET) long wavelength infrared (LWIR) FPA contractor and from two to one Silicon Hybrid Infrared Intrinsic Long-wavelength Detectors (SHIELD) FPA contractor. Continue preparations to launch two EKV sensors in FY97 using the Payload Launch Vehicle (PLV) system.

(U) ($27,900) 1460 - BMC3 Integrate existing Site BMC3 prototype and demonstrator capability and CINC(formerly Command)BMC3 prototype to support Integrated System Tests and demonstrations. Award BMC3/SE&I contract. Provide BMC3 representation for participation in Integrated Ground Tests. Conduct the EWR experiment and NMD-TMD lower tier cooperative experiment based on the FY93 cued tracking demonstration. Prepare for and conduct BMC3 prototyping source solicitation for award in 4Q95. Establish and demonstrate BMC3 prototype integration methodology.

(U) ($20,402) 3152 - SYSTEM ENGINEERING Continue development, application, and maintenance of tools such as the Technology Roadmap, NMD Maturity Matrix (NMM), and NMD System Engineering Notebook (NSEN). Perform system analysis and issue resolution. Continue to perform program planning, requirements development, and systems integration.

(U) ($1,248) 3265 - USER INTERFACE Continue coordination and work with multi-service users to refine Operational Requirements Documents (ORDs) and

operational concept(s) of operation (CONOPs), and conduct theater and strategic wargaming and mission analysis for NMD.

(U) ($19,000) 3352 - MODELING AND SIMULATIONS Provide NMD share of total infrastructure for the NTF and the ARC and integration support. Provide NMD M&S oversight and support the independent verification and validation (IV&V). Provide civilian personnel consistent with NTBJPO manpower requirements.

(U) ($14,100) 3359 - SYSTEM TEST ENVIRONMENT Develop and integrate initial EKV models into ISTC framework; conduct EKV/BMC^3 integrated ground test; execute independent evaluation methodology and special studies.

(U) ($11,558) 3360 - TEST RESOURCES Provide ground test facility infrastructure for hardware-in-the-loop testing, wind and shock tunnel testing, hover test capability, command and control technology experiments and sensor tests; provide test range infrastructure; provide range instrumentation, upgrades, data collection.

(U) DEPLOYMENT PLANNING: Critical path analysis will determine deployment long poles. Industrial base analysis will identify production and manufacturing requirements. Logistics and specialty engineering will assure operational suitability. Update and modify environmental, siting and facilities annexes.

(U) ($13,470) 3160 - LOGISTICS READINESS SUPPORT Develop contingency deployment guidance and deployment execution plan. Conduct critical path analyses to determine deployment long poles. Conduct industrial base analysis for impacts on production and manufacturing requirements. Perform logistics and specialty engineering assessment of NMD elements to assure operational suitability. Identify and assess critical technology development requirements. Conduct system wide assessments of the programmatic, budget, system effectiveness, and risks of the NMD program.

(U) FY1996 Plans:

o ($370,621) NMD Technology Readiness Program:

(U) SYSTEM DEVELOPMENT: Important events occurring in FY96 include: the first and second EKV sensor flight tests are planned, GBI software design review, continue design and development of NMD-RTD system, the BMC^3 integrated ground test 3 (IGT^3), and the SMTS FDS CDR.

(U) ($8,272) 3270 - THREAT & COUNTERMEASURES Continue development of threat system characterizations and scenario descriptions to support NMD analysis, continue to update and produce threat modeling capability and threat tapes through the NTF, continue to conduct countermeasures parallel studies.

(U) ($14,672) 1155 - PHENOMENOLOGY Continue to provide resource support to receive, archive, and distribute BMDO plume and background test data and to upgrade data retrieval and data analysis tools. Provide AST operating costs to continue optical data collection. Continue algorithm and model development to include joint analysis of data sets.

(U) ($102,675) 1151- SENSORS Continue to collect MSX data and provide data and resulting analysis to SMTS and other BMDO and DOD customers. Continue passive sensor component development and testing. Continue NMD-RTD system design, deliver software Block 1, and fabricate pilot array. Conduct two AGRE launches and begin development of instrument payloads for third AGRE mission. Launch next Red Tigress mission. Deliver and integrate STRV-2 experiment.

(U) ($126,646) 1267 - GROUND-BASED INTERCEPTOR Integrate EKV sensors with PLV boosters in preparation for FY97 seeker flight tests. Acquire long lead hardware for FY98 kill vehicle flight test and interface with BMC^3 for 98 test. Start to fabricate EKV for FY98 kill vehicle flight test. Conduct MSLS demo launch and conduct target launch for two flight tests.

(U) ($33,538) 1460 - BMC3 Develop initial BMC3 demonstrator configuration. Provide an integrated BMC3 prototype for IGT-3 in FY96 and integrated flight test 1 and 2 in FY97. Provide BMC3 integration support to ground and flight tests in FY97. Continue EWR development and test of object tracking prototype software for BMC^3 tests and demonstrations.

(U) ($19,357) 3152 - SYSTEM ENGINEERING Finalize interface and configuration control requirements in support of early deployment option. Analyze/validate result of IGT-3; support preparations for IGT-4 and IFT-1. Update tools such as technology roadmap, NMM, NSEN. Continue to perform program planning, requirements development, and systems integration.

(U) ($3,110) 3153 - ARCHITECTURE ANALYSIS & BMC3 INITIATIVES Update architecture based on performance/evolving requirements, continue investigations of special topics and unique system concepts. Support refinement of NMD and TMD information architecture evolutionary development process for BMC3.

(U) ($1,443) 3265 - USER INTERFACE Continue coordination and work with multi-service requirements. Refine CONOPS and conduct strategic wargaming and mission analysis.

(U) ($15,779) 3352 - MODELING AND SIMULATIONS Provide NMD share of total infrastructure for NTF and the ARC/SC. The NTF will host BMC^3 integrated ground test 3, systems engineering studies to evaluate operation concepts and requirements for NMD, and NMD threat scenario generation by the special

program center. The ARC/SC conducts research and development activities for Army and ground based elements. This activity also provides M&S oversight and supports independent verification and validation (IV&V).

(U) ($17,904) 3359 - SYSTEM TEST ENVIRONMENT Integrate for testbed with ISTC. Conduct an integrated ground test with battalion BMC^3 and EKV interoperable representations. Execute independent evaluation methodology and process. Provide T&E technical support.

(U) ($11,411) 3360 - TEST RESOURCES Provide ground test facility infrastructure and upgrades for BMDO testing. Completion of the wide-based IR scene processor (WISP) at Kinetic Kill Vehicle Hardware in the Loop Simulation (KHILS) and completion of Aero Optical Evaluation Center. Provide test range infrastructure upgrades.

(U) DEPLOYMENT PLANNING: Continue critical path analysis to determine deployment long poles and logistics, and continue specialty engineering. Continue to update and modify environmental, siting and facilities annexes, execute FYDP NMD military construction and facility design and construction projects.

(U) ($1,345) 3157 - ENVIRONMENTAL, SITING, & FACILITIES Update and modify environmental, siting, and facilities annexes for the NMD contingency deployment plans. Conduct facility planning and preliminary design for NMD contingency deployment options. Execute and manage the FY96-00 NMD Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and activities with emphasis on the NMD Ground Based Radar Technical Demonstration Program facility project at U.S. Army Kwajalein Atoll, Marshal Islands.

(U) ($14,469) 3160 - LOGISTICS READINESS SUPPORT Update and modify NMD contingency development plans based on NMD readiness program developments. Execute pre deployment timeline reduction activities as determined from deployment critical path analyses. Perform site development activities to support early option deployment. Conduct logistics and specialty engineering assessments. Identify producibility and industrial base issues and develop risk mitigation plans necessary to reduce deployment lead time. Contribute to the development and transfer of critical manufacturing technologies. Conduct system wide assessments of the programmatic, budget, system effectiveness, and risks of the NMD program.

(U) FY1997 Plans:

o ($399,038) NMD Technology Readiness Program

(U) SYSTEM DEVELOPMENT: Important events in FY97 include fabrication, integration and test of critical active and passive sensor hardware and software,

EKV flight tests and data analyses, EKV/PLV booster hardware integration, and user assessments of BMC^3 software upgrades.

(U) ($8,312) 3270 - THREAT & COUNTERMEASURES Continue to develop/update threat system characterizations in terms of specialty threats, targets analyses, and operational threat environment intelligence assessments. Upgrade threat modelling capability and develop scenarios depicting employed threat systems to support NMD analysis.

(U) ($17,593) 1155 - PHENOMENOLOGY Perform data collection and sensor development efforts including use of high altitude aircraft to collect spectral data on natural backgrounds and signatures. Maintain BMDO data centers and demonstrate active and passive algorithm architectures on LDS testbed. Field test NMD-RTD discrimination and kill assessment algorithms.

(U) ($88,920) 1151- SENSORS Complete NMD algorithm and application and operation software development. Support IGT4 with NMD-RTD RDS and HWIL; conduct PDR and CDR; complete NMD-RTD facility construction. Continue live testing of coolers and thermal storage devices. Continue to collect background, target and surveillance data from MSX. Conduct third AGRE mission.

(U) ($149,550) 1267 - GROUND-BASED INTERCEPTOR Conduct EKV sensor flight tests and complete data analysis. Incorporate required changes in FY98 flight test. Fabricate and assemble test EKV components. Complete EKV/PLV booster hardware and software integration, flight qualification, and acceptance testing. Update and validate EKV sensor and Kill vehicle models and simulations. Complete brass board LADAR sensor components.

(U) ($36,213) 1460 - BMC3 Continue development of BMC^3 demonstrators (IFT-3). Conduct user assessments of BMC^3 prototype software. Continue BMC3 development and integration. Continue development and test of EWR object tracking prototype software.

(U) ($17,975) 3152 - SYSTEM ENGINEERING Finalize interface and configuration control requirements in support of mid-term deployment option. Provide analyses of integrated ground and flight tests. Update technical documentation baseline and National Test Facility system simulations.

(U) ($3,125) 3153 - ARCHITECTURE ANALYSIS & BMC3 INITIATIVES Provide assessment of baseline and contractor element designs to update architecture performance estimates; evaluate advanced technology concepts; develop and refine BMC3 information architecture and analyze implementation of software reuse.

(U) ($1,530) 3265 - USER INTERFACE Refine ORD documentation based on results of NMD threat assessment and mission analysis. Refine CONOPS and conduct strategic wargaming and mission analysis.

(U) ($26,834) 3352 - MODELING AND SIMULATIONS Provide NMD share of total NTF and ARC/SC infrastructure. This activity also provides M&S oversight and supports independent verification and validation (IV&V).

(U) ($18,382) 3359 - SYSTEM TEST ENVIRONMENT Interface ISTC with BMC3 Block I. Develop "mid-term" T&E documentation. Execute independent evaluation methodology and process. Provide T&E technical support.

(U) ($11,951) 3360 - TEST RESOURCES Provide ground test facility infrastructure and upgrades for BMDO testing. Provide test range infrastructure, upgrades, and environmental documentation. Provide range instrumentation, upgrades, data collection, and analyses for BMDO.

(U) DEPLOYMENT PLANNING: Conduct and update critical path analyses and contingency development plans to reflect changes in candidate systems and SMTS. Continue to update and modify environment, siting, and facilities annexes. Execute FYDP NMD military construction and facility design and construction projects.

(U) ($1,351) 3157 - ENVIRONMENTAL, SITING, & FACILITIES Update the environmental, siting, and facilities annexes for the NMD contingency deployment plans to reflect advances and changes in candidate systems. Continued facility planning for near term NMD deployment options. Plan, execute, and manage the FY97-00 NMD Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and activities. Prepare 35% facilities designs for initial contingency deployment facilities. Execute design and constructibility trade studies.

(U) ($17,302) 3160 - LOGISTICS READINESS SUPPORT Update contingency development plans to reflect NMD technical advances and changes in architecture. Conduct and update critical path analyses relative to development and deployment of SMTS. Conduct environmental impact analysis to support site activation, if necessary. Develop site pollution prevention plan. Execute selected pre-deployment activities where appropriate to prepare for a deployment decision. Continue logistics and specialty engineering assessments focused on the addition of SMTS to the NMD architecture. Develop and execute industrial base plans to apply critical manufacturing techniques for element development. Conduct system wide assessments of the programmatic, budget, system effectiveness, and risks of the NMD program.

Acquisition Strategy: While not an acquisition program, NMD does develop technologies and related hardware/ software for the purpose of demonstrating BMD capabilities. BMDO defines the NMD system architecture and design, integrates requirements and technology, and provides central management for all elements of the NMD system. The Services execute each of the NMD element programs with the exception of the integrating BM/C3 element which is executed by the BMDO.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603871C
PE Title: National Missile Defense (U)

B. (U) Program Change Summary:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	560,509	587,062	589,000	581,700	2,318,271
Appropriated Value		400,000			400,000
Adjustments to Appropriated Value		-13,012			(13,012)
Current Budget Submit	549,973	386,988	370,621	399,038	1,706,620

Change Summary Explanation:
Significant differences/Reductions

1151	Sensors	$12M
1155	Phenom	$13M
1267	GBI	$13M
1460	BMC3	$13M

Funding:

1151 Sensors: NMD-RTD program realigned to leverage off EKV flight test and TMD-GBR program. MSX dedicated target missions reduced from 2 to 1. Many passive sensor programs slipped.

1155 Phenomenology: Reduction in funding due to termination of BMDO sponsorship of COBRA JUDY.

1267 GBI: Decreased funding results in less risk reduction component technology.

1460 BMC3: Plans for service realignment of existing BMC3 capabilities and development of a BMC3 mission planner at USAKA, prior to transition to the BMC3/SEI contractor, will not be executed. Other projects receiving no money in NMD for FY95: Arch analysis, ENV siting, and Threat.

Schedule:

1151 Sensors: Failure within the cooling system for the infrared sensor which requires repairs caused a projected 4 month launch delay in MSX, which will delay delivery of data and analysis products. The schedule slip for SMTS(BE) caused some sensor component technology development schedules to slip.

1267 GBI: EKV CDR moved to 4Q95 for one of the two contractors due to extended contract negotiations. MSLS demo moved to 1QFY96 due to integration delays. This will not impact planned flight test schedule.

Technical: None.

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

Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603871C
PE Title: National Missile Defense (U)

C. (U) Other Program Funding Summary

Related RDT&E:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate
0602173C SPT TECH EXP DEV	70,160	84,005	93,308	105,313	105,003	100,397	95,568	93,669
0603173C SPT TECH ATD	252,862	134,402	79,387	87,823	57,823	57,823	66,323	66,323
0603861C THAAD SYSTEM DEM/VAL	710,093	651,901	576,327	72,188	0	0	0	0
0603863C HAWK DEM/VAL	29,629	26,800	23,188	0	0	0	0	0
0603864C TMD-BMC3 DEM/VAL	12,617	20,009	24,231	24,425	25,237	20,751	22,193	22,278
0603865C PAC3 DEM/VAL	77,584	0	0	0	0	0	0	0
0603867C NAVY L/T DEM/VAL	150,446	139,676	0	0	0	0	0	0
0603868C NAVY U/T DEM/VAL	81,000	68,450	30,442	33,400	0	0	0	0
0603869C CORPS SAM DEM/VAL	16,270	14,971	30,442	33,400	0	0	0	0
0603870C BPI DEM/VAL	37,022	40,000	49,061	44,300	66,300	72,300	0	0
0603872C OTHER TMD DEM/VAL	272,388	386,368	460,470	449,908	613,099	551,654	951,981	1,116,700
0604861C THAAD SYSTEM EMD	0	0	0	664,000	838,000	619,100	212,000	86,000
0604864C TMD-BMC3 EMD	0	534	14,301	17,976	25,977	20,861	29,201	29,314
0604865C PAC3 EMD	42,097	276,283	247,921	160,070	65,005	775	487	98
0604866C PAC3 RISK EMD	97,000	74,000	19,485	9,760	0	0	0	0
0604867C NAVY L/T EMD	0	0	237,473	193,600	142,680	151,428	115,482	50,323
0605218C MGMT	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestones				4Q[a]		2Q[b]			1Q[c]		3Q[d]			2Q[e]		4Q[f]
T&E Milestone						2Q[g]	3Q[h]		1Q[i/j]	2Q[k]			1Q[l]	2Q[m/n]		4Q[o]
Contract Milestone			3Q[o/p]		1Q[q]		3Q[r]									

Engineering Milestones

a	Complete MSX integration; complete STARS, ODES development
b	Complete redevelopment of NMD Systems Requirement Documents Maturity Matrix
c	Complete EKV critical design review capability
d	Complete NMD Technology Readiness System level-Interface Control Documents
e	NMD-RTD PDR
f	NMD-RTD-CDR

T&E Milestones

g	Integrated Ground Test 1
h	MSX Launch
i	Functional Interface Demo at ISTC
j	AGRE 1 Launch
k	AGRE 2 Launch
l	Conduct 1st EKV sensor flight
m	Conduct 2nd EKV sensor flight
n	AGRE 3 Launch/Launch STRV-2/on-orbit experiment tests

Contract Milestones

o	Down select to two EKV contractors
p	Complete Options Assessment Contracts
q	NMD RTD Contract Modification Complete
r	Award BMC3/SE&I

Planned Milestones Beyond FY 1997:

Conduct EKV flight test with BM/C3 on-line	2QFY98
Conduct EKV flight test with BM/C3 in line and RTD on-line	1QFY99
Conduct NMD system flight test with EKV, BM/C3 in-line, RTD in line, and MWIR SMTS on-line	1QFY00
MSX Spacecraft End of Life	3QFY00

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603871C
PE Title: National Missile Defense (U)

Conduct NMD system flight test with EKV and IFTU/TOM from BM/C3 GEP	4QFY00
Conduct NMD system flight test with EKV, BM/C3 in-line, RTD in-line, and MWIR SMTS on-line	1QFY01

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1151)
PE Title: NMD Tech (U)

Project Number / Title: 1151 Sensors (Active & Passive)

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	130,768	107,142	102,675	88,920	64,927	59,923	39,411	35,400	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, and Anti-ballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-based Radar (GBR), the Space and Missile Tracking System (SMTS) (Brilliant Eyes (BE) now executed as part of the USAF Space Based Infrared System), and Battle Management, Command, Control, and Communications (BM/C^3). This summary addresses only the GBR, the BE Probe studies, and supporting technologies.

(U) The NMD system requires a ground-based radar and space-based missile and tracking system to provide midcourse precision tracking, discrimination, and kill assessment data to the BM/C^3 element for committing and updating the interceptors. The NMD sensors program, restructured as a technology readiness program, will collect required data, demonstrate critical performance, and develop passive and active sensor system elements and components that will enable the NMD technology readiness program to address existing and future threats. Required data and functional operations will be demonstrated through technology demonstrations and prototypical element demonstrations. Integration with the interceptor and BM/C^3 elements will progressively be demonstrated through Integrated Ground Tests (IGTs) first using computer simulations and phasing in hardware-in-the-loop representations of the GBR and SMTS (BE) elements. By FY00, integrated flight tests will demonstrate NMD interoperability among the GBI

Exoatmospheric Kill Vehicle (EKV), BM/C^3, NMD-Radar Technology Demonstrator (RTD), and the SMTS (BE) Flight Demonstration System (FDS).

(U) National Missile Defense Radar Technology Demonstrator (NMD-RTD): As a primary fire control sensor for the NMD system, the radar performs surveillance, acquisition, track, discrimination, fire control support, and kill assessment. To support pre-commit, the radar will plan and schedule its sensor resources to search autonomously or in response to a cueing handover. The NMD-RTD will acquire, track, classify/identify and estimate object trajectory parameters. In post-commit, the radar schedules its sensor resources to continue tracking the target to provide an In-Fight Target Update (IFTU), and a Target Object Map (TOM) to the assigned interceptor. The NMD-RTD provides a low cost, capable sensor to fully test and validate the integrated operation of all prototype elements in a NMD system for hit to kill operation. Resolution of the critical radar issues will reduce design, fabrication, and test time associated with deploying an NMD-GBR in CONUS. Resolution of system integration issues will also substantially reduce deployment leadtime and risk for the NMD system.

(U) The NMD-RTD is an incremental program that leverages from developments under the TMD-GBR program to resolve the radar critical issues applicable to NMD. These critical issues are discrimination, target object map (TOM), kill assessment, and electromechanical scan. The program includes algorithm development, real-time software and hardware-in-the-loop (HWIL) simulations, and radar validation testing with other NMD elements. The alignment of the NMD-RTD program with the TMD-GBR Dem/Val program and the EKV flight tests has reduced overall program costs. However, the realigned schedule has increased the fiscal demands in FY96 in excess of the original NMD-RTD plan. The NMD-RTD will leverage from the TMD-GBR Transmit/Receive production line further reducing costs. FY96 activities concentrate on continuation of algorithm development, system analysis and design, and software and hardware simulation development activities begun in FY95. FY97 activities concentrate on completing design activities, validating software builds, and fabrication of the antenna subsystems. In FY98, the NMD-RTD will

convert existing TMD-GBR Dem/Val hardware into a larger, limited field-of-view unit with sufficient range to support NMD test requirements beginning in FY99.

(U) Midcourse Space Experiment (MSX): MSX will provide data on real midcourse targets against real backgrounds at realistic ranges for use in system ground demonstrations; demonstrate key functions such as acquisition, tracking, handoff and bulk filtering; provide multi-wavelength target phenomenology data for assessing optical discrimination algorithms; and demonstrate the capability to integrate key technologies into a working platform similar to proposed operational midcourse sensor designs. MSX will provide target signature data, statistically significant background data, functional demonstrations with post-test analysis, and technology demonstrations necessary to support achieving exit criteria for milestone decisions for a space-based tracking sensor and other infrared sensor/seeker systems. MSX will launch in 1995, and will perform a variety of experiments, including target observations, background observations, and surveillance demonstrations, during its five year life (18 month cryogen IR). MSX will observe one dedicated target mission, five sounding rockets (NMD/TMD combined experiments), and three cooperative AGRE launches. MSX data will flow to the users throughout the five year life of the program.

(U) MSX Targets: This program provides dedicated and cooperative targets for MSX orbital tests and for TMD/NMD joint experiments. These targets will be used to test the limits of a passive sensor to detect, track, and characterize both strategic and tactical threat ballistic missiles.

(U) Active Geophysical Rocket Experiment (AGRE): AGRE is a joint project involving both the Johns Hopkins University Applied Physics Laboratory (JHU/APL) and the Russian Academy of Sciences Institute for the Dynamics of Geospheres (IDG). The program has two objectives: first, to perturb and observe the effect on the nighttime atmosphere and ionosphere at 500 km by an impulsive high speed plasma jet; and second, to provide realistic national missile defense-type targets for observation by BMDO's Midcourse Space Experiment (MSX) satellite. The AGRE program will provide three large vehicle launches for observation

by MSX satellite. The four diagnostic payloads carried into orbit with the IDG's plasma jet generator will monitor the signatures of the atmospheric/ionospheric disturbance. Three of the payloads will be instrumented by IDG and one by JHU/APL. The MSX data will be analyzed and delivered to the Air Force's space-based tracking sensor program. The JHU/APL and Russian data analysis reports will also be submitted to the space-based tracking sensor program.

(U) Red Tigress: This program continues the data analysis and distribution from the Red Tigress II mission and develops and validates infrared and radar discrimination algorithms. The data analysis being performed is on the telemetry data collected by the sensors on-board the Red Tigress II craft. The next launch is planned for FY96.

(U) BE Probe studies: The minimum deployment time to fully deploy the objective SMTS (BE) system is about five years following a deployment decision around the turn of the century. Compared to the other three elements of the NMD system (radar, interceptor and BM/C^3) this leaves about two years in which the other elements are ready and full CONUS protection will not be available (without the SMTS (BE) constellation). To remedy this situation with a cost-effective solution, the BE Probe concept is being examined in which a rocket-borne probe sensor based on the SMTS (BE) FDS design could be deployed within three years of a deployment decision along with the other NMD elements as the SMTS (BE) development and deployment continues. The BE Probe would use the FDS track sensor design, but add LWIR capability, and many of the same subsystems. This reliance on the FDS allows the BE Probe to completely rely on the FDS development and require no near term funding to progress the design and provide this as a viable option for a midterm deployment. The BE Probe is only meant as a stop-gap measure and not an objective system capability. Starting in FY98, minor funding would be required to design the unique hardware and software for the BE Probe and ready the concept for development and deployment following a decision in late FY99.

(U) Passive Sensor Technology: A set of research and development efforts is being conducted for critical sensor components in support of over the horizon long wave infrared tracking and discrimination functions for midterm and objective NMD system. The

projects in optics, electronics, focal plane arrays (FPAs), long lifetime cryogenic coolers, and signal and data processing will develop state-of-the-art technologies for a space-based tracking sensor and EKV elements. The NMD architecture requires passive sensor components to operate in the space environment and view targets against the earth limb and space background. In particular, the high radiation levels and large temperature swings in space stress the ability of sensor components to perform to their requirements. The background noise of space is low, and FPAs are being developed with low noise to take advantage of this. The FPAs developed under this project are different from those developed under Project 1161 Advanced Sensor Technology, Project 1267 Ground Based Interceptor, and Project 1651 Innovative Science and Technology. Projects 1161 and 1651 are developing very advanced FPAs which are not mature enough to fit into the development schedule of the objective space-based tracking sensor system. Project 1267 is developing FPAs for interceptor environments (for the EKV), which have a higher background noise, and do not meet the low noise requirement for a space-based tracking sensor. Signal and data processors, and associated memories, will be developed in order to meet the high performance and reliability requirements in the harsh space environment. Cryocoolers are evaluated for vibration, cooling capability, life expectancy, reliability, and failure mechanisms. Focal plane arrays are tested for response, uniformity of response, harsh environment operation and recovery, dissipated heat, thermal response, and pixel operability. Optical components are evaluated for radiation and shock response, and optical performance. Contamination control devices are evaluated for keeping optical components clean from matter that degrades mirror and filter performance. Electronics components are tested for reliability, speed, and performance to determine any degradation from temperature and radiation effects. Certain commercial-off-the-shelf components are tested to determine whether they meet a space-based midcourse tracking sensor's requirements, thereby eliminating development costs of these components.

(U) STRV-2: STRV-2 is a BMDO multinational (US and UK)/multiagency (AF, NASA, and OSD) funded flight demonstration program in a similar orbital environment to the space-based tracking satellites. A UK developed MWIR system will obtain background/clutter data using filters supplied by the SMTS (BE) program office; a one-year mission duration and elliptical orbit (400-1800 km) will provide seasonal and altitude variations. Contamination, radiation damage to a space-based midcourse tracking sensor

focal plane array and microelectronics, advanced vibration isolation/suppression techniques, micrometeoroite and debris (MM&D) monitors, space environment effects on advanced materials, and the performance of a high bandwidth laser communications system will be evaluated. This program is in design hardware manufacturing and currently a candidate for Space Test Program (STEP) Mission 5.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Active and passive sensor technologies have progressed significantly in support of the restructured NMD readiness program. Passive sensor technology component testing remains on schedule allowing technology development to continue to the next phases in support of a space-based tracking sensor program objectives. Data reduction activities remain on schedule in support of NMD system development. Contract modification negotiations have been completed for the implementation of the NMD-RTD program. Memorandum of Understanding and Agreement for the STRV-2 program have been finalized and implemented.

(U) FY 1994 Accomplishments:

- ($79.366M) MSX: Completed satellite integration and testing. Completed ground system readiness testing. Provided lessons learned in experiment and operations planning, and sensor calibration, characterization and contamination control to a space-based midcourse tracking sensor.
- ($23.630M) NMD-RTD: Stopped work on NMD-GBR Dem/Val radar and began restructuring into NMD-RTD program. Continued solid state demonstration array risk reduction program, established pilot production lines for modules, and

completed design of demonstration array. Began modifying TMD-GBR algorithms for NMD-RTD. Began real-time software development and preliminary design for the NMD-RTD.

- o ($17.604M) Passive Sensor Components: Continued development of essential cooled telescope optic components for an objective space-based tracking system and as a risk reduction. One 150 Kelvin prototype cryogenic cooler, for medium wavelength infrared detectors and telescope optics, was completed. Prototype 60 Kelvin Stirling coolers (for detectors slightly longer wavelength than medium wave infrared) were fabricated, characterized, and modified. A reduced risk 60 Kelvin turbocooler was completed and delivered for testing. Lifetime is a key issue for coolers, and testing continues to determine their lifetime performance. One lot of LWIR HgCdTe test detector arrays from each of two contractors was processed, and one lot of VLWIR silicon FPAs was hybridized with readouts from each of two contractors. Tested a three color Mosaic Array Data Compression and Processing module suitable for on-FPA processing of a silicon FPA, making this module available for flight demonstration. Began development of a module suitable for HgCdTe FPAs which require more compact designs. Initiated advanced microelectronics packaging program and continued development, testing, and verification of reliable, radiation hardened, space quality, 32-bit processors. Developed 1 megabyte static random access memories, and various non-volatile memories. Developed and demonstrated initial design of 12-bit, 10 MHz analog-to-digital converter (ADC) and began associated precision voltage reference unit.
- o ($7.880M) Red Tigress and SPAS III: Continued Red Tigress II on-board sensor telemetry data distribution and analysis to develop and validate infrared and radar discrimination algorithms. Termination of the Shuttle Pallet Satellite (SPAS) III mission.
- o ($1.561M) STRV-2: International and interagency agreements MOU/MOAs signed. Program plan, schedule, payload module concept design and draft interface control documents completed. Integration team established and space test program candidacy secured.
- o ($0.157M) MSX Targets: Supported MSX target design.

(U) FY 1995 Plans:

- o ($45.114M) MSX: Complete rework and reintegration following infrared sensor failure. Launch satellite. Begin MSX target and phenomenology data collection by onboard sensors, and delivery of data and analysis products to the space-based tracking sensor program and other BMDO and DoD users. Observe MSX dedicated and cooperative target experiments.
- o ($22.000M) MSX Targets: Provide targets for MSX orbital test and for TMD/NMD joint experiments. The MSX dedicated target mission, using the STARS, will be launched from the Kauai Test Facility and delivers its payload into the Kwajalein Missile Range. The TMD/NMD joint mission experiments, launched from Wallops, will provide viewing and measurement opportunity for MSX.
- o ($22.000M) NMD-RTD: Develop NMD-RTD intelligence-based algorithms and design microdynamic discrimination, target object map, and mechanical/electronic scan control algorithms. Begin modifying the TMD applications and operations software for NMD uses. Leverage from TMD-GBR transmit/receive (T/R) module production for an NMD-RTD T/R module production line and order long lead items. Begin NMD-RTD antenna design and continue radar performance analysis. Begin adapting TMD-GBR Real-time Digital Software simulation to NMD-RTD use. Begin adapting TMD-GBR HWIL simulator for NMD-RTD use. Conduct environmental, facility, and siting analysis at USAKA. Deliver Facility Requirements Document. Begin Electromagnetic Radiation/Electromagnetic Interference (EMR/EMI) studies with Electromagnetic Compatibility Analysis Center. Begin developing Reliability, Availability, Maintainability (RAM) analysis.
- o ($11.282M) Passive Sensor Components: Initiate life testing of the 150 Kelvin cooler. Build and deliver two additional units. Continue life testing 60 Kelvin cooler. Initiate a two stage 35 Kelvin Stirling cooler program and continue a risk reduction 35 Kelvin pulse tube cooler program required for operation of the long wave infrared FPA. Design and build breadboard components for the two-stage Stirling cooler. Deliver three units for the pulse tube cooler. Test (radiometric and radiation) one lot of hybridized silicon FPAs for the VLWIR. Fabricate and deliver two development lots of LWIR HgCdTe. Test HgCdTe for radiometric response and operability. Two contractors carried due to difficulty in resolving material defects which reduce operability. Complete and test reliable, radiation hardened 12-bit, 10 MHz self-calibrating ADC chipset and

associated precision voltage reference unit. Develop, fabricate, and test high density, radiation hardened 1 Mbit SRAM devices. Test components under development, as well as commercial-off-the-shelf components that also may be used in space to characterize their performance, reliability, and any degradation due to total dose radiation effects.

- o ($4.046M) AGRE: JHU/APL will complete negotiations and sign an agreement with Russia on AGRE in 2QFY95. Beginning in FY95, development will start on the instrument payloads for the second launch and completed in 4QFY95.
- o ($2.500M) STRV-2: Complete detailed design. Payload module fabricated. Host S/C design and establish interface. Initiate experiments fabrication.
- o ($0.200M) Red Tigress: Delay data reduction, analysis, and distribution activities for the Red Tigress II mission until FY96. Starting in FY96, a reduced data reduction activity will continue to develop and validate infrared and radar discrimination algorithms. This program is a continuing US/UK cooperative experiment. The current funding in FY95 only shows the U.S. intention to continue this effort. Final cost for Red Tigress is being negotiated between the U.S. and the U.K.

(U) <u>FY 1996 Plans</u>:

- o ($37.782M) NMD-RTD: Code and validate NMD-RTD discrimination and kill assessment algorithms. Deliver Software Block 1 build which includes software for antenna mount control, RF emissions, and external communications. Test real-time software algorithms. Begin design modifications to Beam Steering Generator, Data Processor, Signal Processor, and Receiver Exciter/Test Target Generator. Complete modifications to TMD-GBR RDS simulation. Complete NMD-RTD HWIL simulation and support IGT 3. Procure remaining piece parts for NMD-RTD antenna including antenna mounts, radome, and antenna support equipment. Complete fabrication of T/R modules procured for NMD-RTD. Fabricate and integrate pilot array. Begin near field verification testing with pilot array. Conduct Facility 90% and Final Design Review. Award contract for facility and begin construction at USAKA.

- ($32.910M) MSX: Continue to collect background, target and surveillance data to satisfy the requirements levied by the BMDO system elements, and deliver this data and the resulting analysis to the space-based tracking sensor office and other BMDO and DoD customers.
- ($21.276M) Passive Sensor Components: Complete and characterize the two-stage 35 Kelvin Stirling cooler. Begin fabrication of prototype flight units for the two-stage 35 Kelvin Stirling and 35 Kelvin pulse tube cooler. Continue life testing of the 150 Kelvin cooler. Develop advanced, more efficient 60 Kelvin cooler and begin life testing. Restart effort to fabricate a 10K cooler for very long wavelength IR detectors. Fabricate two additional development lots of long wave infrared HgCdTe. Produce one additional lot of silicon detectors. Initiate investigation of alternative LWIR detectors to reduce risk. Initiate the development of a flight ready optics contamination control device for demonstration of extension of the space-based tracking sensor operational life. Initiate development of survivable, long life reflective and refractive optical coatings and filters necessary for a space-based tracking sensor operation in the harsh space environment. Initiate development of an all silicon carbide telescope for light weighting of a space-based tracking sensor design. Continue to develop, fabricate, and test advanced packaging, radiation hardened, space quality 32-bit processors, higher speed ADCs and precision voltage references, and high density, radiation hardened SRAM devices and non-volatile memories. Complete maintenance and enhancement phase for Reduced Instruction Set Computer Ada Environment (RISCAE). Develop ability to convert commercial electronic component designs to radiation hardened designs by using Electronic Design Automation tools.
- ($5.274M) AGRE: The development will start on the instrument payloads for the third launch and completed in 1QFY97. The integration of the first instrumented payloads on Russian boosters will be completed. Two launches will be conducted in FY96: the first, will be an uninstrumented test of the explosive type generator, and the second will have payloads instrumented by the Russians and JHU/APL. The data analysis from the missions will begin in FY96 and be completed in FY97. The JHU/APL data analysis reports will be submitted to the space-based tracking sensor office and contractors.
- ($2.488M) STRV-2: Deliver and integrate experiment. Complete full module qualification test. Deliver payload module to S/C integrators.

- o ($2.945M) Red Tigress: This funding is for the US/UK joint experiment called Red Tigress. The experiment will be an NMD and TMD sensor and phenomenology experiment. A launch is currently scheduled for 2QFY96.

(U) FY 1997 Plans:

- o ($43.000M) NMD-RTD: Complete NMD algorithm and application and operation software development. Support IGT 4 with NMD-RTD RDS and HWIL simulations. Test HWIL simulation against technical requirement document missions. Conduct Preliminary Design Review. Complete NMD-RTD antenna design. Conduct Critical Design Review and baseline NMD-RTD system design. Deliver Software Block Build 2 which includes software for calibration and diagnostics, waveforms and test assistance. Procure, fabricate, integrate and test Beam Steering Generator. Begin fabrication of antenna subsystems. Finish construction of NMD-RTD facility with a Beneficial Occupancy Date of 3QFY97. Deliver radome, antenna mounts, support equipment and PGU to USAKA for integration into facility. Begin modifications to existing TMD-GBR Dem/Val hardware for NMD-RTD uses.
- o ($22.220M) Passive Sensor Components: Continue life testing of the 150 Kelvin and 60 Kelvin coolers, life testing of the two-stage Stirling 35 Kelvin cooler and the 35 Kelvin pulse tube cooler. Complete thermal storage device. Continue to develop heat transfer devices. Continue effort to fabricate a 10 Kelvin cooler for operation of the silicon focal plane arrays for the very long wavelength infrared. Complete a system element producibility readiness demonstration program for the very long wavelength infrared HgCdTe and downselect to one contractor. Restart the very long wavelength infrared silicon detector program and fabricate two development lots. Continue development of a flight ready optics contamination control device for demonstration of extension of the space-based tracking sensor operational life. Continue program to develop survivable, long life reflective and refractive optical coatings and filters. Continue development of an all silicon carbide telescope. Initiate mirror surfacing effort to reduce mirror fabrication cost. Continue development of denser, radiation hardened memories and ADCs. Develop highly reliable non-volatile memories for critical components. Continue development of radiation hardened

32-bit processors for a space-based tracking sensor objective system. Continue radiation testing of electronics components, and development of Electronic Design Automation tools.

- o ($17.400M) MSX: Continue to collect background, target and surveillance data to satisfy the requirements levied by the BMDO system elements and meet exit criteria for design decisions, and deliver this data and the resulting analysis to the space-based tracking sensor program and other BMDO and DoD customers.
- o ($5.300M) AGRE: The integration of the second set of instrumented payloads on Russian boosters will be completed. The third launch will occur in 2QFY97. The data analysis from launches will be completed along with an exchange of data analysis reports with the Russians. The JHU/APL and Russian data analysis reports will be submitted to the space-based tracking sensor program and contractors.
- o ($1.000M) STRV-2: Launch STRV-2 and initiate data reduction. The STRV-2 will be launched on an Air Force Space Test Program (STEP) Mission 5.

Acquisition Strategy: This program focuses on providing advanced, integrated and proven radar and space-based passive infrared sensor elements for NMD. These objectives will be accomplished under continuing efforts, modifications to existing contracts, or through new MOU/MOAs.

BE Probe studies: Studies will be conducted under existing SMTS (BE) contracts.

NMD-RTD: The NMD-RTD is being procured as a member of the Ground Based Radar Family of Radars by the Army's Program Executive Office, Missile Defense for the BMDO. The Family of Radars acquisition approach emphasizes commonalty of hardware and software components that simultaneously satisfy TMD and NMD missions. A full and open competition resulted in the award of the GBR Family of Strategic and Theater Dem/Val Radars contract to the Raytheon Company on 17 September 1992. The contract contains the development and test of the NMD-GBR Dem/Val Radar (GBR-T) which was restructured into the NMD-RTD program in

FY94. The TMD-GBR Dem/Val provides the basis for the NMD-RTD program, and in turn, the NMD-RTD provides the technology, hardware, and software needed to resolve the critical developmental issues associated with a NMD-GBR. The facility for the NMD-RTD will be awarded in FY96 with construction beginning that year.

MSX: The MSX effort is performed under existing contracts with USU/SDL, JHU/APL, McDonnell Douglas, and NRC. The JHU/APL effort will transfer from the Navy's contract to a task order under the new BMDO JHU/APL contract.

Passive Sensor Components: The passive sensor component development and fabrication is performed by industry with cost plus fixed fee and award fee contracts that are awarded on a competitive basis. Initial testing is performed in contractor facilities, however, compliance testing is performed in Government labs. These components are high risk and there is no commercial market for them. The components with the highest risk, the 35 Kelvin coolers and long wavelength infrared HgCdTe FPAs, will be maintained as dual approaches in order to reduce the technical risk. The availability of the FPAs and electronics need to be assured when it comes time to procure the flight components.

AGRE: The primary contractor for AGRE will be JHU/APL in a task order under the new BMDO JHU/APL contract. The JHU/APL will contract with the Russians for the IDG's instrument payloads, and for the launch vehicles and launch services.

Red Tigress: The Red Tigress telemetry data distribution and analysis will be continued under an existing contract with the National Air Intelligence Center.

STRV-2: Program execution for STRV-2 consists of U.K. and U.S. contracts managed by UK/DRA to build the MWIR system. U.S. contractors managed by BMDO provide a composite structures module and space environmental effects test modules. JPL and PL are module integrators and co-manage the AF/NASA vibration isolation system in-house and contractual efforts. Radiation MM&D and the microelectronics testbed are JPL (funded by BMDO) and NASA in-house and subcontracted efforts. All contracts are currently in place and were awarded through full and open competition.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1151)
PE Title: NMD Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

This program represents the consolidation and realignment of the following PMAs/Tasks: 1101 (Passive Sensors) except A1106/07; A1102/06 (Large Radar Technology); 1104 (Signal Processing); A1106/04 (MSX), F1106/21 and 22 (MSX), N1106/11 (MSX), and S1106/25 (MSX); S1106/32 (Red Tigress); 1504 (Materials and Structures); A2104/37 (GBR RTD); and A3304/38 (MSX targets)

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	128,218	236,200	248,900	246,600	859,918
Appropriated Value		108,212			108,212
Adjustments to Appropriated Value		-1,070			(1,070)
Current Budget Submit	130,768	107,142	102,675	88,920	429,505

Change Summary Explanation:
Funding:

- SMTS (BE): Although BMDO requested funds for BE in BMDO's (President's Budget for FFY1994 and FY1995, no BMDO funds were authorized or appropriated for BE in either year, as the Congressional Appropriation for each year placed SMTS (BE) in an Air Force Program Element (PE 0603440F in FY94 and 0603441F in FY95). The integration of the SMTS (BE) program into the SBIRS has moved all outyear funding for SMTS (BE) from BMDO to the Air Force.
- NMD-RTD: As a result of the restructuring of the NMD-GBR program from an acquisition program to a technology readiness program $700M has been removed from the program funding between FY94 and FY99. Included in this reduction was

$25.0M for the GBR-T facility and $60.0M for the two dedicated radar targets. The NMD-RTD program has been realigned to leverage off the EKV flight tests and the TMD-GBR program. This has further reduced program costs, however, it has placed an increase on FY96 and FY97 fiscal demands in excess of originally planned.

- MSX Targets: Due to reductions in the overall targets budget in FY95, MSX dedicated target missions were reduced from two STARS/Operational Deployment Experiment Simulator (ODES) to one STARS/ODES and five joint TMD/NMD sounding rocket missions.
- Passive Sensor Components: Due to the schedule change for the space-based tracking system, the schedule for developing sensor components was slipped. This caused a reduction in the FY95 budget from $30.5M down to only $10.737M, which caused many programs to be suspended in FY1995. The Air Force is funding their highest priority projects in FY95 only and BMDO will continue funding these programs (through Project 1151) in the future. The remainder of the projects will grow beyond corporate internal funding and receive government funding again in FY96. Due to extremely limited funds this year, certain programs are being put off to the outyears. The optics and contamination control projects, as well as Electronic Design Automation tools will be initiated in FY96. Development of the 32-bit processors was partially funded by the Air Force this year. It will receive no BMDO funding through project 1151, but will be funded in the outyears.

Schedule:

- NMD-RTD: The NMD-RTD program has been realigned to leverage off the EKV flight tests and the TMD-GBR program. The NMD-RTD will use the 1QFY99 EKV flight test as a verification test instead of a FY00 dedicated radar flight test.
- MSX: A failure within the cooling system for the infrared sensor which requires repairs caused a projected six month launch delay, which will delay delivery of data and analysis products to the space-based tracking sensor program and other BMDO and DoD users.
- Passive Sensor Components: The schedule slip for the space-based tracking sensor program caused some sensor component technology development schedules to slip in the outyears.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1151)
PE Title: NMD Tech (U)

Technical:

- o Passive Sensor Components: The very long wavelength infrared silicon focal plane arrays has been postponed indefinitely. Without funding there is a potential that the United States will lose this capability. A defect reduction program to improve HgCdTe materials in order to meet space-based tracking sensor requirements has been dropped, relying on industrial internal funding. Lower priority cryogenic cooler efforts such as heat pipes and thermal storage devices are being delayed by one year. Alternative approaches to many of these technologies, as risk reduction efforts, will not be funded.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155 Phenomenology Program, PE 0603871C	Yes
1161 Advanced Sensor Technology, PE 0603871C	No
1267 Ground-Based Interceptor, PE 0603871C	No
1270 Advanced Interceptors, PE 0603871C	No
1460 Battle Management, Command, Control, and Communications, PE 0603871C	No
2154 Theater Missile Defense Ground-Based Radar, PE 0603872C	Yes
3152 NMD System Engineering, PE 0603871C	No
3157 Environmental, Siting & Facilities, PE 0603871C	No
3160 Deployment Planning, PE 0603871C	No
3251 System Engineering and Technical Support, PE 0603871C	No
3265 User Interface, PE 0603871C	No
3352 System Test Environment, PE 0603871C	No
3354 Targets Support, PE 0603871C	No

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1151)
PE Title: NMD Tech (U)

3359 System Test & Evaluation, PE 0603871C	No
3360 Test Resources, PE 0603871C, 0603873C	No
Space and Missile Tracking System, PE 0603441F	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone				X[a]								X[b]	X[c]			
T&E Milestone						X[f]	X[g]	X[h/i/j]	X[k]		X[l]	X[m]	X[n]	X[o]		
Tech Demo Milestone						X[q]		X[r]			X[s]	X[t]	X[u]	X[v]		
Contract Milestone				X[x]	X[y]		X[z]									

[a]Complete MSX integration; complete STARS/ODES development [b]NMD-RTD PDR
[c]NMD-RTD CDR [f]-IGT 1: Inter-element message transfer demo at Integrated System Test Capability (ISTC) [g]MSX Launch [h]MSX Dedicated Target Test [i]IGT 2: Functional interface demo at ISTC [j]AGRE 1 Launch [k]AGRE 2 Launch [l]IGT 3: On-line early

functional interoperability [m]AGRE 3 Launch [n]Launch STRV-2/On orbit experiment tests [o]IGT4: Expanded threat scenario with expanded functional interoperability [q]Test LWIR FPAs [r] Deliver rad-hard ADC; demonstrate RH-32 advanced demonstration module; test RAD 6000 single chip computer, deliver 1Mbit SRAM [s]Begin life testing 2nd 60K PSC [t]Complete Red Tigress II data analysis [u]MSX Cryogen End of Life [v]Deliver 3rd 60K PSC [x]MOU/MOA for STRV-2 signed [y]NMD-RTD Contact Modification Complete [z]US/Russia AGRE agreements signed

Planned Milestones Beyond FY1997:

o	Deliver survivable LWIR filters and coatings	2QFY98
o	NMD-RTD verification test (leverage from EKV flight test)	1QFY99
o	STRV-2 demonstrating thermal silicon carbide telescope	4QFY98
o	STRV-2 data demonstrating optical contamination control	2QFY99
o	Deliver LWIR focal plane arrays	3QFY99
o	Conduct NMD system flight test with EKV, BM/C3, NMD-RTD, and SMTS (BE) FDS	1QFY00
o	Downselect 35 Kelvin cooler based on life test data	1QFY00
o	MSX Spacecraft end of life	3QFY00
o	Complete cooler life tests	4QFY00
o	Conduct NMD system flight test with EKV, BM/C3, NMD-RTD, and SMTS (BE) FDS	1QFY01

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1155)
PE Title: NMD Tech (U)

Project Number / Title: 1155 Phenomenology Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	84,042	31,028	14,672	17,593	20,767	20,474	20,013	20,013	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstrator (NMD-RTD), the Space and Missile Tracking System (SMTS), and Battle Management, Command, Control and Communications (BM/C^3).

(U) Data collection platforms, data centers, and algorithm and model development provides the sensor developers (radar and electro-optical) with accurate target and signature data, at design wavelengths under varying and stressing atmospheric conditions, to ensure that critical evaluation data sets and design parameters can be generated. All aspects of target recognition are accomplished, to include acquisition, tracking, discrimination, handover, aimpoint selection, and kill assessment, all of which depend on the rapid distinction of incoming missile targets from natural and clutter backgrounds and/or penaids. Dedicated assets, facilities, and tools are required to collect, store and make available these critical data to all weapons systems developers.

(U) Activities under this project include collection of radar data on missile targets and intercept events for NMD-RTD and GBI discrimination and kill assessment algorithm development. Application of background data (Midcourse Space Experiment

(MSX) and Miniature Sensor Technology Integration (MSTI)) to GBI and SMTS to (a) evaluate algorithms which allow detection, tracking, and discrimination of strategic incoming targets from background clutter, and (b) upgrade background and target models and codes. Specific phenomenology signature models and integrated tools are developed, such as the Synthetic Scene Generation Model (SSGM) for a realistic evaluation of surveillance, acquisition, tracking, and discrimination techniques. Discrimination and kill assessment algorithms are developed and evaluated. The Lexington Discrimination System (LDS) is used to evaluate discrimination performance and serve as test bed for development of discrimination architectures. Storage, archiving and retrieval of data takes place in the BMDO-funded Background, Plume, and Missile Defense data centers.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The continuing mission of this project is to manage the data collection assets (Airborne Surveillance Testbed (AST), COBRA JUDY, and COBRA EYE); to collect, store, retrieve, and distribute critical data to BMDO users; and to apply resulting phenomenological data to develop and validate discrimination algorithms and architectures, and plume/background models, that directly support NMD systems development. This project identifies gaps in data base and recommends specific data collection events. This project monitors other BMDO data collection programs.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1155)
PE Title: NMD Tech (U)

(U) FY 1994 Accomplishments:

- ($6.000M) Data Centers and Management. Plume and Backgrounds Data Centers processed a total of 1000 requests from GBI and other programs for missile plumes and backgrounds data. More than 50 gigabytes of missile background data distributed, and more than 3,000 gigabytes of missile background data archived.
- ($57.550M) Data Collection Platforms. COBRA JUDY full operating costs and AST core operating costs to collect radar and optical data on missile targets. COBRA JUDY and AST collected data on the ODES Development Flight (ODF) mission. Mission costs for AST are provided by Project 1170. Provided for storage of COBRA EYE sensor system.
- ($20.492M) Algorithm and Model Development. Analyzed data from BMDO sensors (COBRA JUDY, COBRA DANE, AST, and High Altitude Observatory (HALO)) and developed optical and radar discrimination algorithms applicable to NMD-RTD, GBI, and SMTS. Delivered Target Signatures Handbook (Edition 3) used in development of signature codes. Created database of debris/fragment signatures. Continued natural background analysis of CIRRIS 1A mission data and delivered the data set to the Backgrounds Data Center. Released target optical signature, plume signature, and synthetic scene generation prediction and modelling codes to the BMDO user community. These codes were improved to allow personal computer use, improved viewing geometry options, and expanded terrain and cloud data base options, respectively. Supports U.S./U.K. analysis of data sets from joint experimental flight tests (e.g., Zodiac Beauchamp, Red Tigress) under U.S./U.K. Scientific Cooperative Research Exchange (SCORE) Program.

(U) FY 1995 Plans:

- ($1.784M) Data Centers and Management. BMDO data centers will receive, archive, and distribute BMDO plume and backgrounds test data for use by the NMD program offices and contractor community. Provides needed upgrades for data storage and retrieval to support NMD program offices. Also provides for tools and techniques to be used in the exploitation of MSX background data.

- o ($24.589M) Data Collection Platforms. COBRA JUDY full operating costs and AST core operating costs to collect on MSX Dedicated Targets (MDT) and MSX Theater Targets (MTT) test flights and other technology readiness target and threat replica programs. Mission costs for AST are provided by Project 1170. Provides one third operating costs of the COBRA DANE system. Maintains storage of COBRA EYE sensor system.
- o ($4.655M) Algorithm and Model Development. Develops, evaluates and implements radar discrimination algorithms to support NMD-RTD. Provides direct algorithm support to NMD-RTD prime contractor for implementing and testing discrimination algorithms. Prepares LDS testbed for GBI and SMTS element data streams and algorithms, allowing end-to-end NMD testing. Provides upgrades to the optical signatures code used for prediction of target and background irradiance in NMD scenarios.

(U) FY 1996 Plans:

- o ($2.351M) Data Centers and Management. BMDO data centers will receive, archive, and distribute BMDO plume, background, and signature test data for use by the NMD program offices and contractor community. Provides minimal upgrades to data retrieval and data analysis tools.
- o ($6.250M) Data Collection Platforms. AST core operating costs to continue optical data collection in support of GBI sensor flights and other technology readiness programs.
- o ($6.071M) Algorithm and Model Development. Continue development of radar and optical discrimination algorithms and architectures tailored to support NMD-RTD, SMTS and GBI capabilities. Demonstrate active and passive algorithm architectures of multiple targets and single sensors on LDS testbed. Selects and develops candidate algorithms for NMD-RTD field trials. Develop real-time algorithms for tumbling targets and high resolution imaging in support of NMD-RTD. Continue development and release of improved backgrounds and target phenomenology codes, including incorporation of Optical Signature Code (OSC) into Sensor Response Model to support analysis of GBI and SMTS capabilities. Develops integrated discrimination information for target designation. Continue participation in international technical exchange programs

(U.S./U.K. SCORE, NATO Extended Air Defense (EAD)/TMD Ad Hoc Working Group - Plume Phenomenology Expert Group (U.S., U.K., France, Canada), U.S./French Bilateral Group - Plumes, Backgrounds, and Reentry Signatures, U.S./Israeli TBM Signature and Phenomenology Research, and U.S./German Phenomenology Research) in the areas of optical and radar discrimination, reentry, and background and plume phenomenology.

(U) FY 1997 Plans:

- ($2.363M) Data Centers and Management. BMDO data centers will receive, archive, and distribute BMDO plume, background, and signature test data for use by the NMD program offices and contractor community.
- ($8.780M) Data Collection Platforms. AST core operating costs to collect optical data of GBI intercept tests. Additional funding is provided for expanded data collection and sensor development efforts including the use of existing high altitude aircraft to collect spectral data on natural backgrounds and signatures of ballistic missiles during their boost and mid-course phases of flight. These efforts also includes the development and testing of new long wavelength sensing techniques for discrimination on airborne and space borne platforms. The feasibility of placing an X-band high resolution radar on an aircraft to enable rapid response collection of radar track and image data will be evaluated.
- ($6.450M) Algorithm and Model Development. Demonstrate active and passive algorithm architectures of multiple targets and multiple sensors on LDS testbed. Candidate discrimination and kill assessment algorithms are field tested in the NMD-RTD for real-time verification. Real-time algorithms for battlefield learning, target object mapping, and aimpoint selection for GBI are demonstrated. Continued upgrades and deliveries of phenomenology background models and scene generation models. Continue participation in international technical exchange programs in the areas of optical and radar discrimination, TBM reentry, and background and plume phenomenology.

Acquisition Strategy: This project funds data centers, data collection platforms, and algorithm and model development through executing agents in the Air Force, Army, Navy and BMDO via existing contracts.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1155)
PE Title: NMD Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

This project represents the roll up of the following projects: 1105 (Discrimination) except for the TMD Countermeasures Program (TCMP) and Kill Assessment Program which are now part of Project 1170, part of project 1101 (Optical Signature Code), part of project 3300 (Data Centers and AST), and part of project 3152 (Technical Analysis).

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	86,643	43,582	29,686	27,086	186,997
Appropriated Value		34,475			34,475
Adjustments to Appropriated Value		-3,447			(3,447)
Current Budget Submit	84,042	31,028	14,672	17,593	147,335

Change Summary Explanation:
Funding: The reduction in funding from FY94 to FY95 is due to: 1) Project roll up described in the paragraph above, 2) NMD, TMD, and Technology began cost sharing the project, and 3) Funding constraints within the NMD program have forced reductions and terminations of planned NMD efforts in Algorithm and Model Development: plume and background phenomenology, Synthetic Scene Generation Model (SSGM), Optical Discrimination Algorithms (ODA), Unconventional Passive Discrimination (UPD), Combined Optical Measurements Experiment Team (COMET), and Phenomenology Scientific Advisory Group (PSAG).

The reduction in Data Collection Platform funding from FY95 to FY96 is due to the termination of BMDO funding for the COBRA JUDY. COBRA JUDY will be transferred to Air Force in FY96.

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PE:0603871C (Proj: 1155)
PE Title: NMD Tech (U)

The increase in Data Collection Platform funding from FY96 to FY97 is due to start of expanded data collection and sensor development efforts in support of GBI and NMD-RTD.

Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155 Phenomenology PE: 0603173C	Yes
1155 Phenomenology PE: 0603872C	Yes
1151 Sensors (Active/Passive) PE: 0603871C	No
1267 Ground Based Interceptor PE: 0603871C	No
1360 Directed Energy Programs PE: 0603173C	No
3360 Test Resources PE: 0603871C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Data Collection					(a)	(b)(a)		(a)		(a)						

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PE:0603871C (Proj: 1155)
PE Title: NMD Tech (U)

Algorithm and Model Development	(d)* (g)*	(c)*	(e)* (g)	(d)	(f) (g)	(e)	(d)	(f)	(c)	(d)

(a) Support MDT, MTT, GBI missions
(b) End BMDO sponsorship of COBRA JUDY system
(c) Delivery of CIRRIS 1A data
(d) NMD RTD - deliver software releases (radar discrimination algorithms)
(e) Midcourse Sensor Programs - deliver software releases (plumes, backgrounds, optical discrimination algorithms)
(f) GBI - deliver software releases (plumes, backgrounds, optical discrimination algorithms)
(g) Deliver new software releases (SSGM, OSC)

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1161)
PE Title: NMD Tech (U)

Project Number / Title: 1161 Advanced Sensor Technology

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	4,021	0	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This program develops and demonstrates survivability technologies to ensure that strategic ballistic missile defense elements can perform their mission in adverse environments and in the face of expected hostile threats. Approaches include: studies/analyses; defense suppression threat mitigation technologies development; survivability/operability demonstrations; and hardened technology integration. Specifically, the effect of low-power laser illumination on space-based MWIR and SWIR sensors will be evaluated. Technologies will be available for incorporation into NMD elements at EMD and will also provide near-term improvements to existing systems. Demonstrations will provide necessary risk reduction evidence to support milestone decisions. This program has been terminated in FY95 due to zero funding.

(U) This project in FY94 also provided funding for the Miniature Sensor Technology Integration (MSTI) technology development program. The MSTI program provides for the integration and demonstration of existing space-based surveillance systems and operational concepts in realistic scenarios. MSTI demonstrates off-the-shelf capabilities for quickly and relatively inexpensively addressing outstanding space-based infrared science and design issues confronting both the military and civilian remote sensing communities. Additionally, the MSTI program will explore the potential use of space-based sensors for environmental/ecological monitoring and for executing joint international space missions. Funds were provided to the MSTI program by this project in FY94 to

support survivability testing of the sensors on board the MSTI-3 payload. The MSTI program has been transferred to the Air Force in FY95. Funding support has been stopped.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY94, sea-based and joint BM/C3 systems for survivability evaluation were identified and test criteria were developed. Final development of sensor hardening technology continued for incorporation onto the MSTI 2/3 satellites. Support continued to develop guidelines for survivable system designs and integration of survivability enhancement options into systems. Finally, planning was initiated for joint international backgrounds observations and on-orbit demonstrations (MSTI). These efforts have been terminated in FY95 due to zero funding.

(U) FY 1994 Accomplishments:

- o ($0.550) Identified sea-based and joint service BM/C3 systems for survivability evaluation and developed survivability test criteria for sea-based and joint service BMD BM/C3
- o ($1.025) Continued final development of sensor hardening technology and began conduct of acquisition and tracking experiment on MSTI 2/3 satellites
- o ($1.171) Continued to support: system electromagnetic requirements evaluations, development of guidelines for survivable system design, integration of survivability designs into systems, and execution of survivability and operability demonstrations
- o ($0.575) SCORE program support and sensor survivability technology development

- o ($0.700) Assessed feasibility and began planning of joint international backgrounds observations and on-orbit demonstrations (MSTI)

(U) FY 1995 Plans:
- o MSTI program transferred to the Air Force
- o NMD Survivability program terminated

(U) FY 1996 Plans:
- o None

(U) FY 1997 Plans:
- o None

Acquisition Strategy:
- o None

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	3,321	3,000	3,000	4,000	13,321
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	4,021	0	0	0	4,021

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 1161)
PE Title: NMD Tech (U)

Change Summary Explanation:

Funding:	FY94:	Consolidation of projects; added $700K for MSTI support.
	FY95-97:	No activity due to zero funding.
Schedule:	None	
Technical:	None	

C. (U) OTHER PROGRAM FUNDING SUMMARY: None

D. (U) Schedule Profile MSTI program transferred to the Air Force in FY95.

Planned Milestones Beyond FY1997:

o None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1265)
PE Title: NMD Tech (U)

Project Number / Title: 1265 Boost Phase Intercept (BPI)

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	2,500	0	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Boost Phase Intercept (BPI) Technology Program funded and continuing under this project is designed to meet critical future active defense needs. The BPI program is developing new technologies to demonstrate a deterrent and counter in Theater Missile Defense (TMD) by intercepting a theater ballistic missile (TBM) in its boost phase of flight. Present BMDO/TMD architectures focus on midcourse and terminal defenses which allow fragments of the TBM and/or warheads to inflict potential damage on friendly areas. During a TBM's boost phase, the missile is readily visible, slow moving, and extremely vulnerable. Boost phase intercept of TBMs can cause missile debris to fall on enemy territory or to fall short of the intended target(s) and significantly reduce the number of TBMs in post-boost flight, thus thinning out the number of TBMs reaching subsequent defensive layers and reducing the burden on terminal defenses. Interceptor component technologies advanced through the BPI program have potential applicability and benefit to all endoatmospheric interceptors.

(U) The BPI program will integrate and demonstrate critical technologies culminating in BPI technology experiments. BPI experimental elements may include off-board sensor(s) that detect and track TBMs, launch aircraft, battle management (BMC^3), the missile, and lightweight endoatmospheric kinetic kill vehicles (KKVs). To achieve boost phase intercept, the interceptor missile and KKV may achieve hypersonic velocities within the atmosphere. The demonstrations will validate the solution to critical KKV technology associated with high-speed atmospheric flight and will provide: (1) new capabilities with reduced costs/risks compared to

current interceptor weapons systems, and enhancements to other interceptors under development; (2) reduction of technical risks and costs to support an acquisition program; and (3) technical solution to provide contingent residual boost phase intercept capabilities for theater defense. The program also will use existing contracts and technologies currently under development to reduce schedule and cost, and will be planned and conducted with BMDO, Air Force, Navy, and Army elements to maximize user interaction.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project has enabled BMDO to successfully integrate critical technologies which will serve the long-term interest of the Boost Phase Intercept program and to initiate designs which meet projected BPI requirements. Under program element 0603871C in FY94, advances in KKV technology, concept development, and test planning activities were conducted by BMDO with significant involvement from the Army.

(U) FY 1994 Accomplishments:

- ($1.5M) Continued fabrication of cooled windows.
- ($0.7M) Prepared test plans for testing cooled windows in aero-optic facility; program planning for BPI.
- ($0.3M) Continued plans for active RF component development for endoatmospheric applications.

(U) FY 1995 Plans: None.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1265)
PE Title: NMD Tech (U)

(U) FY 1996 Plans: None.

(U) FY 1997 Plans: None.

Acquisition Strategy: On-going, competitively-awarded, CPFF contracts for the kill vehicles were exercised for this activity The BMDO manages these contracts.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	2,500	0	0	0	2,500
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	2,500	0	0	0	2,500

Change Summary Explanation:
The BPI program was technically restructured after submission of the FY95 CDS for Project 1215 to reflect congressional guidance and the results of the OSD expert panel study on BPI/API. The current execution plan continues endoatmospheric kill vehicle technology development previously funded under Project 1209, and discontinues unmanned aerial vehicle (UAV) and UAV compatible missile activities and exoatmospheric flight tests reflected in the FY95 CDS plan. The revised demonstration plan is compatible with existing Air Force and Navy fire control and launch aircraft.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1265)
PE Title: NMD Tech (U)

Funding: None.
Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1265 Boost Phase Intercept PE#0603870C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile Project continues under Program Element 0603870C.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1267)
PE Title: NMD Tech (U)

Project Number / Title: 1267 Ground-Based Interceptor

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	68,569	137,810	126,646	149,550	182,138	184,047	205,439	206,139	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstrator (NMD-RTD), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control, and Communications (BM/C^3).

(U) The GBI project, structured as a technology readiness program, will continue to develop the required Exoatmospheric Kill Vehicle (EKV) such that a capable missile defense system could be deployed if and when required. Specifically, an EKV will be developed and flight tested for the NMD interceptor system which can accomplish intercepts of high speed, long range Intercontinental Ballistic Missile (ICBM) and Submarine Launched Ballistic Missile (SLBM) reentry vehicles (Rvs) in the midcourse of their trajectories. Since exoatmospheric intercept is the key to an effective NMD system, the project will develop an interceptor capable of acquiring a threat cluster from information supplied by midcourse sensors, selecting the RV, and destroying it by force of impact (kinetically). The interceptor must be capable of combining NMD sensor information with the scene its on-board seeker

observes and selecting the lethal object for its target. If insufficient information is available from the rest of the NMD system, the interceptor must also be able to determine the lethal object through on-board discrimination and target selection.

(U) To preserve a near term contingency deployment capability, the initial focus of GBI development will be the front end of the missile, the EKV. Development of a booster and the associated launch control equipment will be deferred until after FY00. Thus near term resources will be concentrated on the EKV, the most critical and most technically challenging part of the interceptor. In the interim, kill vehicle flight tests will be flown on-board the Payload Launch Vehicle (PLV), a booster made up of the Minuteman II second and third stages.

(U) The GBI project also includes risk reduction interceptor technology, targets for flight testing, and the necessary range support and facilities to conduct essential intercept flight testing. GBI risk reduction technology efforts enhance the baseline interceptor program. These technology efforts focus on critical components such as on-board seekers, hardened focal planes, light weight communications components, optical baffles, and flexseal booster nozzles. These items have payoff potential for improved military utility/capability. The time line for technology infusion is post-FY99, depending on the results of EKV testing. GBI test plans include cold chamber sensor measurements, simulations, hardware-in-the-loop (HWIL), and flight testing. The computer simulations and ground testing will make maximum use of data gathered in other BMDO interceptor, sensor, and phenomenology programs.

(U) The EKV sensor flight tests, scheduled in FY97, will mitigate EKV risk by demonstrating two things which cannot be duplicated on the ground: seeker operation in the tactical environment and target selection algorithm performance against realistic (vice electronically simulated) targets. The EKV intercept flights will incrementally demonstrate NMD system capability, beginning with a limited BM/C^3 operating on-line. The first test is scheduled in FY98. By FY00, the flight tests will demonstrate NMD interoperability between the EKV, in-line BM/C^3, NMD Radar Technology Demonstrator (RTD), and on-line medium wavelength infrared (MWIR) Space and Missile Tracking System (SMTS). Flight testing will prove the GBI's ability to intercept representative

targets under real engagement conditions, reliably and repeatedly. The interceptor must also be able to determine the lethal object through on-board discrimination and target selection.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) GBI, originally an acquisition program, has made the transition to a technology readiness program. The technology readiness approach is based on the successes of the earlier GBI-Experimental (GBI-X) program, including FY92-93 breadboard and brass board demonstrations of critical and/or contractor-unique kill vehicle components. The most important components demonstrated were focal planes, cryocoolers, and telescopes for the on-board seeker, and the software needed for target selection. In addition, the launch vehicle which will be used to fly the kill vehicle during exoatmospheric testing has undergone design modification to accept the EKV payload and test instrumentation. In parallel with these efforts, the supporting EKV technologies have demonstrated focal plane array (FPA) producibility, breadboard laser radar (ladar) components for discrimination of advanced or future threats, flexseal booster nozzles for the objective GBI booster, and advanced kill vehicle structure manufacturing techniques.

(U) FY 1994 Accomplishments:

- ($30.65M) Transitioned from GBI-X to EKV activities. Continued program risk mitigation efforts with three contractors for half of the fiscal year. In 3QFY94, performed down select from three to two contractors for the EKV program. Accomplished the BUR-directed refocus from NMD GBI acquisition to NMD interceptor technology readiness. Efforts included preparation

of the Technical Review Data Package used in the down select process, EKV design, subsystem testing, and development of final specifications and drawings.

- o ($14.1M) Initiated fabrication of the EKV sensors for FY97 risk reduction flights. Performed EKV sensor ground testing and cold chamber characterization for reference data and calibration. Performed HWIL and simulation activities in preparation for sensor flights.
- o ($8.9M) Continued PLV and launch complex activities. Completed destruct firing unit design qualification to support EKV sensor and kill vehicle launches. Planned for EKV sensor flights and interfaced with associate GBI-X contractors.
- o ($12.913M) Completed FPA pre-pilot demonstration. Demonstrated upgraded breadboard inertial measurement unit (IMU) which reduced EKV risk by providing an alternative technology path. Completed Long wavelength infrared Advanced Technology Seeker (LATS) first Technology Seeker Evaluation Unit, began second unit testing, and completed flight evaluation unit. Performed ladar power amplifier acceptance tests, designed and built preamplifier, completed breadboard ladar integration, and demonstrated 4 cm agile beam director for potential component infusion to allow a hedge against a reactive, mature threat and to assure robustness of the objective NMD system.
- o ($1.348M) Ended space communications component effort and accomplished transition to ground-based applications.
- o ($0.658M) Completed pathfinder booster nozzle pressure/vectoring bench test. Completed data analysis for flight visible waveband baffle. Prepared preliminary ground plane and electromagnetic interference shielding design in interceptor composite structures.

(U) <u>FY 1995 Plans</u>:

- o ($14.0M) Initiate government preparation for EKV seeker flights, including Kwajalein Missile Range (KMR) launch facility preliminary tasks and support activities.
- o ($78.0M) Complete fabrication and assembly of infrared FPA/cryocooler assembly, analog signal processor, and optics for EKV sensor flight tests by both contractors. Integrate, acceptance-test, and deliver sensor flight test units. Continue software

development, including validation and simulation updates; conduct HWIL simulations to qualify seeker for flight testing. Continue to develop EKV design, conduct 4QFY95 critical design review (CDR), and conduct a down select to a single EKV contractor for EKV flight testing. Continue multi-service participation in reviews and source selection activities.

- o ($28.0M) Continue preparations to launch two EKV sensors in FY97 using the PLV system. Acquire long-lead hardware and perform PLV modifications for two boosters. Upgrade command and launch equipment for EKV flight testing.
- o ($1.988M) Down select from two to one Pilotline Experimental Technology (PET) long wavelength infrared (LWIR) FPA contractor and from two to one Silicon Hybrid Infrared Extrinsic Long-wavelength Detectors (SHIELD) FPA contractor. Preserve remaining SHIELD and PET FPA efforts pending completion of the down select to a single EKV contractor. Terminate LATS effort.
- o ($1.0M) Design a 20/44 Ghz transceiver for interceptor-to-ground communications.
- o ($0.822M) Fabricate booster nozzle subassembly and conduct static pressure test.
- o ($15.0M) Continue development of targets to support EKV sensor flight tests in FY97. Complete development of Multi-Service Launch System (MSLS) booster system and prepare for MSLS demo launch in FY96.

(U) FY 1996 Plans:

- o ($30.3M) Integrate EKV sensors with PLV boosters and interface the missile with the test range. Acquire long-lead booster hardware for FY98 kill vehicle flight test and fabricate PLV upper stage. Interface with BM/C^3 element for FY97 flight test.
- o ($63.272M) Fabricate EKV seeker, avionics processor, structure, and propulsion subsystems for the FY98 kill vehicle flight test. Integrate hardware and software and conduct HWIL and simulations on the EKV flight test vehicle.
- o ($10.7M) Continue preparation for EKV seeker flights, including reactivation of KMR facilities and supporting activities.
- o ($7.464M) Resume FPA readout electronics and hardening design work. Resume LADAR sensor component breadboard development and testing as hedge for advanced threats.

- o ($2.488M) Reduce 20/44 Ghz transceiver size, weight, and power enroute to flight weight levels. Begin development of programmable modem and frequency hopping communications components for tactical encrypted communications requirements.
- o ($0.995M) Execute simulated high altitude booster nozzle static firing. Build infrared sensor baffle section prototypes. Fabricate composite multi-functional structure components using closed mold methods, and evaluate producibility parameters.
- o ($11.427M) Conduct MSLS demo launch. Complete target builds for FY97 seeker flights. Initiate target build for first EKV intercept mission in FY98.

(U) FY 1997 Plans:

- o ($42.0M) Conduct EKV sensor flight tests, complete data analysis, and incorporate any required changes in preparation for the FY98 flight test. Fabricate, assemble, and test EKV long-lead components for FY98 flight test. Interface with BM/C^3 and Radar elements for FY98 flight test.
- o ($37.4M) Continue EKV/PLV booster hardware and software integration, flight qualification, and acceptance testing. Acquire long-lead booster hardware for mid-term EKV flight tests.
- o ($37.6M) Update and validate EKV sensor and kill vehicle models and simulations based on seeker data. Refine program plan and kill vehicle technical requirements based on multi-service input and EKV flight test results.
- o ($7.15M) Begin radiation-hardened FPA and readout electronics production. Complete brass board LADAR sensor components.
- o ($3.7M) Deliver intermediate 20/44 Ghz receiver. Complete modem development. Continue frequency hopping communications component development. Transition to final phase of EKV transceiver packaging.
- o ($1.7M) Fabricate booster nozzle subassembly and conduct vectoring static tests. Build and deliver two infrared flight baffles. Qualification-test EKV closed mold multi-functional composite structure components.

- ($20.0M) Conduct target launches for two EKV seeker flights. Continue preparation for first EKV intercept mission. Also initiate targets development for NMD System Integration Tests.

Acquisition Strategy: GBI development parallels the overall NMD technology readiness program, which evolves incrementally over approximately three- to four-year time periods starting in FY95. The program builds on the technical progress from a number of programs over the last decade. They include the Homing Overlay Experiment (HOE), Exoatmospheric Reentry vehicle Interceptor Subsystem (ERIS), Space Based Interceptor (SBI), High Endoatmospheric Defense Interceptor (HEDI), Brilliant Pebbles (BP), and Lightweight Exoatmospheric Projectile (LEAP), Ground Based Interceptor-Experimental (GBI-X), and interceptor and sensor component technology programs. The strategy for the early time frame concentrates on resolving the unique and difficult technical issues of the front end of the interceptor (the EKV) and demonstrating early NMD intercept capability. It defers development of an optimized booster and launch equipment, which are not required for the early or mid-term EKV test program, and instead uses existing PLV boosters and launch equipment. The EKV program also initially concentrates on developing and planning for the capability for an early contingency deployment option which could be deployed in less than four years and which would provide good capability against simple threats. The most critical EKV issues include threat target selection/discrimination, and cost effective improvement of the engagement volume. Risk reduction in these areas will continue through improvements in on-board sensors, divert propulsion, and discrimination hardware and software by leveraging from other BMDO programs. The resulting EKV and subsystems will be extensively tested in ground tests (HWIL, cold chambers) and the designs validated in risk reduction fly-by sensor flights and intercept tests. The existing GBI-X Cost Plus Award Fee (CPAF)/Cost Plus Incentive Fee (CPIF) contracts were competitively awarded in October 1990 to work EKV technology. These contracts, along with the PLV contract, are the focus of meeting the early time frame objectives. A GBI-X down select from three to two EKV contractors, based on technical progress and design review, was conducted in FY94. A second down select is planned at the end of FY95 after CDR but before the EKV sensor flights due to limited resources. Both contractors will conduct sensor flight tests to collect data needed for discrimination algorithms and seeker characterization. However, only one contractor will fly the EKV intercept flight tests.

(U) New contract(s) are planned for development activities in the mid-term and/or objective time frames. Mid-term engineering efforts will increase EKV reliability and effectiveness. Integrated system flight testing starting in FY00 will demonstrate limited NMD capability and EKV/RTD/ BM/C^3/MWIR SMTS interoperability. The objective time period will systemize the EKV into a GBI by developing booster, launcher, and ground support interfaces to other elements of the NMD system, and integrating them with the EKV. Extensive integrated simulation activities, HWIL ground testing, and system intercept flight tests with SMTS are planned to obtain confidence in overall NMD system capability against the full spectrum of existing threats. Logistic, site planning, and manufacturing issues will be addressed to further reduce contingency deployment time lines. Supporting component technology development will continue to provide a hedge against unexpected threats or element unavailability in any time frame. Completion of each time frame results in the demonstration of a significant improvement in capability and a reduction in contingency deployment time lines.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	72,119	154,700	151,500	147,100	525,419
Appropriated Value		146,532			146,532
Adjustments to Appropriated Value		-8,722			(8,722)
Current Budget Submit	68,569	137,810	126,646	149,550	482,575

Change Summary Explanation:
Funding: Per BUR guidance, FY94 was a transition year, with GBI funding constrained to preserve critical efforts. FY95 marks the resumption of progress on NMD interceptor technology readiness. The funding growth is primarily due to increases in the interceptor targets budget to procure hardware for and conduct flight tests. The decreased adjustments in FY94-96 will result in less risk reduction component

technology efforts and a six month slip in the flight test schedule and subsequent activities, compared to the President's Budget. This increases program risk slightly and delays seeker hardening efforts required for a deployable system.
Schedule: EKV CDR moved to 4QFY95 for one of the two contractors due to extended contract negotiations. MSLS demo moved to 1QFY96 due to integration delays. This will not impact planned flight test schedule. Seeker flights moved to 1Q and 2QFY97 and EKV intercept flight moved to 2QFY98 due to OSD PDM 721 (FY96 reductions).
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:		Funding Dependency? (Yes[1]/No)	
1151	Sensors (Active & Passive)	PE 0603871C	No
1155	Phenomenology Program	PE 0603871C	No
1270	Applied Interceptor Materials & Systems Technology	PE 0603173C	No
1460	Battle Management, Command, Control & Communications	PE 0603871C	No
3152	NMD System Engineering	PE 0603871C	No
3157	Environmental, Siting, and Facilities	PE 0603871C	No
3160	Deployment Planning	PE 0603871C	No
3265	User Interface	PE 0603871C	No
3359	System Test and Evaluation	PE 0603173C	No
3360	Test Resources	PE 0603173C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1267)
PE Title: NMD Tech (U)

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone								4Q[a]								
T&E Milestone						2Q[b]		4Q[c]	1Q[d]				1Q[e]	2Q[f]		
Contract Milestone			3Q[g*]					4Q[h]								

[a] - Complete critical design review
[b] - Inter-element message transfer demo at Integrated System Test Capability (ISTC)
[c] - Functional interface demo at ISTC
[d] - Functional interface demo at ISTC
[e] - Conduct 1st EKV sensor flight
[f] - Conduct 2nd EKV sensor flight
[g] - Down select to two EKV contractors
[h] - Down select to one EKV contractor
* - Denotes completed milestone

Planned Milestones Beyond FY1997:

Conduct EKV flight test with BM/C3 on-line	2QFY98
Conduct EKV flight test with BM/C^3 in line and RTD on-line	1QFY99
Conduct NMD system flight test with EKV, BM/C^3 and RTD in line, and MWIR SMTS on line	1QFY00
Conduct NMD system flight test with EKV, BM/C^3 and RTD in line, and MWIR SMTS on line	2QFY00
Conduct NMD system flight test with EKV and In-flight target Update (IFTU)/ Target Object Map (TOM) from BM/C^3 Ground Entry Point (GEP)	4QFY00
Conduct NMD system flight test with EKV and IFTU/TOM from BM/C^3 GEP	2QFY01
Begin dedicated GBI booster fabrication and ground test	4QFY01
Conduct NMD flight test with EKV and IFTU/TOM from BM/C^3 GEP	4QFY01
Conduct NMD flight test with EKV and IFTU/TOM from BM/C^3 GEP	2QFY02

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1460)
PE Title: NMD Tech (U)

Project Number / Title: 1460 BMC3

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	23,702	27,900	33,538	36,213	38,213	41,213	41,213	43,124	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense Program's goal is to develop and maintain the option to deploy a cost-effective, operationally effective and ABM treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The National Missile Defense (NMD) system elements are the Ground Based Radar (GBR), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), the Ground Based Interceptor (GBI), and Battle Management, Command, Control and Communications (BMC3). This summary addresses only the BMC3 element. The BMC3 program was project number 2300 and 2304 prior to FY95. Projects 2300, 1403 (Computer Engineering), and 2304 (Software Engineering) were combined in FY95 to create project 1460.

(U) The mission of BMC3 is to integrate available NMD elements with current and planned command and control structures to provide a militarily effective NMD system. Since exoatmospheric mid-course intercept is the key to an effective NMD system, the BMC3 program will develop the capability to obtain information from sensors and supply sufficient target object map and in-flight target update information to the in-flight interceptor to permit successful destruction of a reentry vehicle (RV). The objectives of the BMC3 program are: (1) develop the processes, procedures and the functional software needed to demonstrate an early operational BMC3 capability and the integration of battle management, command and control and sensor data among, and between NMD elements and supporting external systems; (2) develop human-in-control and related functional capabilities required by the User; (3)

identify BMC3 technology, manufacturing, producability, and deployability long-poles and performance parameters to minimize these issues in the event of a contingency deployment decision; and, (4) support the development of mature operational requirements and concept of operation (CONOPS) which ensure the development of the desired end-to-end system behavior.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The BMC3 Program has successfully established the engineering foundation for system-level BMC3 and initiated its translation and refinement into an object-oriented, multi-dimensional NMD Domain Information Architecture (IA). This program established the BMC3 Element Support Center (BESC) at the National Test Facility (NTF) for rapid prototype development of BMC3 capabilities. FY93/94 demonstrations of BMC3 prototyping and general development concepts were successfully conducted at the BESC and demonstrated integration of independent BMC3 technology and prototyping projects previously delivered. Executed Options Assessment (OA) contracts that independently demonstrated best-commercial-practices for BMD integration and BMC3 development. In FY94 the program transitioned from an acquisition program to a technology readiness program with three streamlined areas of concentration: Site-level BMC3 (Site-level Operations and Integrated Engagement Planning); CINC-level BMC3 (NMD Command decision making, Course of Action/Mission/Task development, and Integrated Engagement Planning) and External Systems Interfaces; and BMC3 system-level integration. Primary focus was to maintain capabilities needed to support the technology readiness program at minimal levels. During FY95 a BMC3/SE&I contract is planned for award. This contract will provide: (1) NMD BMC3 development and integration, and NMD System Engineering and Integration for the Technology Readiness Program; and (2) TMD System Engineering and Integration. This project is directly supported by and sponsors the NMD BMC3 development and integration portion of this contract. R-2 Exhibits 3152 and 3251 address NMD and TMD SE&I, respectively.

(U) FY 1994 Accomplishments:

- ($4.097M) Site (formerly Battalion)/Fire Control: Developed and demonstrated BMC3 model interfaces with the NMD Integrated System Test Capability (ISTC) infrastructure.
- ($3.911M) Force Operations and External Interfaces: Provided User decision support situational awareness displays in joint interoperability demonstrations.
- ($15.694M) Integration: Completed Options Assessment (OA) contracts and incorporated results in NMD development package. Conducted demonstrations, tests, and exercises, and facilitated user involvement in assessment of BMC3 prototypes at the NTF. Participated in joint Warrior Interoperability Demonstration (JWID)-94. Refined NMD Domain Information Architecture (IA). Initiated contingency deployment planning process.

(U) FY 1995 Plans:

- ($5.855 M) Site/Fire Control: Integrate existing Site-level BMC3 and Engagement Planner prototype and demonstrator capability to support Integrated System Tests and demonstrations. Transition contractor-identified products to the Battle Management, Command, Control and Communications, and System Engineering and Integration (BMC3/SE&I) contractor upon contract award. Support Integrated NMD System Test and Evaluation and CDO planning.
- ($5.362 M) Force Operations and External Interfaces: Integrate existing CINC-level (formerly Command) BMC3 prototype and demonstrator capability to support Integrated System Tests and demonstrations. Transition contractor-identified products to the BMC/SE&I contractor upon contract award. Support Integrated NMD System Tests and CDO planning. Develop initial prototype Early Warning Radar (EWR) software. (NOTE: A software modification for BMC3 tests and demonstrations, not an EWR system upgrade.)
- ($13.403 M) Integration: Award BMC3/SE&I contract. Define BMC3 capabilities required for Integrated NMD BMC3 System. Provide this information to the BMC3/SE&I contractor. Configure BMC3 Element Support Center (BESC) at the NTF for operational prototype integration and User involvement. Begin initial BMC3 integration of current NMD elements,

relying heavily on non-developmental items. Provide BMC3 representation for participation in Integrated Ground Tests 1 and 2. Provide Baseline NMD Domain Information Architecture (IA). Project 3153 (BMC3 Initiatives) will provide support to the development and implementation of the IA. 3153 addresses BMDO Director-level mission area oversight to address and resolve BMDO-wide technical issues. Conduct critical path analyses to identify long-poles to determine risk and time reduction solutions that can be addressed prior to a contingency deployment decision that will shorten the post-decision deployment timeline.

- o ($3.280M) Computer Engineering: Conduct real-time missile tracking demonstration and data fusion, test automated quantification of BMC3 requirements. Conduct two demonstrations: EWR Experiment, and NMD-TMD lower tier BMC3 cooperative experiment based on the FY93 cued tracking demonstration. This effort ends in FY95. It was added to the BMC3 project for FY95. The results of the experiments and demonstrations will be incorporated into the BMC3 development effort.

(U) FY 1996 Plans:

- o ($22.825M) BMC3 Prototyping and Evaluation: This line combines the funding used for the Site/Fire Control, Force Operations and External Interfaces, and the BMC3/SE&I contract portion of the Integration lines shown in the FY95 Plans paragraph above. Develop the initial BMC3 Demonstrator configuration, which includes Site-level BMC3, Engagement Planning and CINC-level BMC3 subelements. Deliver and install required BMC3 to allow integrated operation of interceptor and surrogate sensor communications at USAKA. Develop initial configuration prototypes of interfaces with the ALERT System and EWR. Provide integrated BMC3 prototype for Integrated Ground Test (IGT)-3.
- o ($8.713M) BMC3 Integration: Continue BMC3 development and integration efforts. Plan for and conduct BMC3 test and evaluation and provide the BMC3 capability for IGT-3. Facilitate User involvement in assessment of BMC3 prototypes and CONOPS refinement. Continue critical path analyses to reduce risk and develop deployment decision response time reduction solutions in preparation for a Contingency Deployment decision.
- o ($2.000M) Early Warning Radar: Continue development and test of EWR object tracking prototype software to support

BMC3 tests and demonstrations.

(U) FY 1997 Plans:

- o ($26.125M) BMC3 Prototyping an Evaluation: Continue development of BMC3 Demonstrators. Provide integrated BMC3 prototype for IFT-1 and IFT-2. Conduct User assessments of BMC3 prototype software. Deliver and integrate initial configuration prototypes of interfaces with ALERT System and EWR. Provide integrated BMC3 prototype for IGT-4. Continue to provide BMC3 prototype support for the completion of IGT-3.
- o ($8.088M) BMC3 Integration: Continue BMC3 development and integration efforts. Plan for and conduct BMC3 test and evaluation, and provide the BMC3 capability for Integrated System Tests (IGT-3 completion, IGT-4 and IFTs-1&2). Facilitate User involvement in assessment of BMC3 prototypes and CONOPS refinement. Continue critical path analyses to reduce risk and develop deployment decision response time reduction solutions in preparation for Contingency Deployment decision.
- o ($2.000M) Early Warning Radar: Continue development and test of EWR object tracking prototype software to support BMC3 tests and demonstrations.

Acquisition Strategy: The BMC3 program is using an evolutionary acquisition strategy, an approach tailored for large software development programs. The approach capitalizes on current technology and uses proven, non-developmental items (both commercial-off-the-shelf (COTS) and government-off-the-shelf (GOTS) software and hardware) to reduce cost and schedule risks. A BMC3/SE&I contract, planned for award in 3QFY95, will provide the vehicle for development of the BMC3 system and for NMD System Integration. The effort performed in this contract will develop requirements, appropriate service BMC3 prototypes, and will provide for integration of NMD elements (GBI, GBR, SMTS). BMC3 development under this contract and funded by this project, is integrated with the overall NMD technology readiness program, which evolves incrementally over approximately three year time periods starting in FY95. The BMC3 program strategy is to concentrate on developing and planning for the capability to support early contingency deployment options which could be finalized and deployed in less than four years, and which would provide good

capability against simple threats. The BMC3 system will be extensively tested through integrated ground testing in FY95 and integrated flight tests beginning in FY96.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	23,411	59,213	59,213	59,213	201,050
Appropriated Value		27,718			27,718
Adjustments to Appropriated Value		182			182
Current Budget Submit	23,702	27,900	33,538	36,213	121,353

Change Summary Explanation:

The Difference between the President's Budget and current budget submissions will cause significant impacts to the BMC3 program. Technology Readiness Program development efforts must be curtailed causing increased technical and schedule risk.

Funding: EWR track capability planned to support IFT-1 will be cancelled. Earliest BMC3 on-line test of system kill capability will be IFT-3 in FY98. BMC3 demonstrator builds will be delayed 6 months. Increased NMD system integration risks due to BMC3 capability slippage behind EKV schedule. $21M in FY95 funds was transferred to the Ground Based Radar program. Projects 2300, 1403 and 2304 were combined to create project 1460, adding $3.493M to the FY95 program and $0.213M to the FY96 and FY97 programs. PBD-721 reduced FY96 BMC3 funding by $2.675M. Plans for Service refinement of existing BMC3 capabilities and development of a BMC3 Mission Planner at USAKA, prior to the transition of these capabilities to the BMC3/SE&I contractor, will not be executed due to further funding reductions. Funding for EWR prototype tracking software development was reduced from $2.0M to $1.0M. Emphasis will be on the integration of existing Service BMC3 capabilities to support Integrated System Tests and for transition to the new BMC3/SE&I contractor.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1460)
PE Title: NMD Tech (U)

Schedule: None.
Technical: Increased technical risk to BMC3 in-line capabilities to support IFT-4 in FY99.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)	
1151	Sensors (Active & Passive)	0603871C No
1267	Ground Based Interceptor	0603871216C No
2260	THAAD	0603861C/0604861C No
3152	NMD System Engineering	0603871C No
3160	Readiness Planning	0603871C No
3265	User Interface	0603871C No
3359	System Test and Evaluation	0603871C No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
T&E Milestones			X(a)		X(c)		X(e)				X(f)	X(g)		X(i)		
											X(h)----------X(h)					

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 1460)
PE Title: NMD Tech (U)

Contract Milestones X(b) X(d)
Other Program Events

(a) Joint Warrior Interoperability Demonstration (JWID)-94
(b) Complete Options Assessment Contracts
(c) Integrated Ground Test (IGT)-1 (Demonstration at ISTC)
(d) Award BMC3/SE&I
(e) IGT-2 (Demonstration at ISTC)
(f) Integrated Flight Test (IFT)-1
(g) IFT-2
(h) IGT-3
(i) IGT-4

Planned Milestones Beyond FY1997:

IFT-3 (Conduct EKV flight test with BMC3 on-line)	1QFY98
IFT-4 (Conduct EKV flight test with BMC3 in-line)	1QFY99
IFT-5 (Conduct NMD system flight test with EKV, BMC3 in-line, and RDT)	1QFY00
IFT-6 (Conduct NMD system flight test with EKV and IFTU/TOM from GEP)	1QFY01
IFT-7 (Conduct NMD flight test with EKV and IFTU/TOM from GEP)	3QFY01

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3152)
PE Title: NMD Tech (U)

Project Number / Title: 3152 NMD System Engineering

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	41,190	20,402	19,357	17,975	20,475	20,475	20,475	20,475	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost-effective, operationally effective and ABM Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground-Based Interceptor (GBI); the Ground-Based Radar (GBR), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control and Communication (BM/C3).

(U) This project provides the engineering, analysis, and documentation necessary: to translate user requirements into system and element requirements needed to build, integrate, and test the system; to evaluate alternative system architectures (combinations of system elements) for the purpose of selecting those that best meet program needs and constraints; to develop and evaluate various contingency deployment options as a hedge against the emergence of unexpected threats; and, to develop an investment strategy that leverages TMD developments and supporting technologies in a way that best utilizes scarce program resources. Funds are provided to develop system simulations at the NTF which support user concept of operation development and evaluation (wargaming), identifying C2 interfaces and interoperability issues, and modeling architecture alternatives. The project also includes survivability assessments.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3152)
PE Title: NMD Tech (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) A sound system engineering and integration process tailored to the unique demands of a technology readiness program was established and has started to yield the data products necessary to define, develop, test, and ultimately field - if the decision is made to do so - a national defense capability against ballistic missiles. In addition to ongoing activities such as requirements evolution, TMD technology sharing assessments, and architecture refinement, near-term plans include performing analyses and tradeoffs in support of integrated ground tests in FY95 and flight tests in FY96 (sensor) and FY97 (intercept).

(U) FY 1994 Accomplishments:

- ($14.700M) Performed architectural definition and supporting analysis required to restructure program to a technology readiness effort.
- ($14.692M) Identified and resolved NMD integration issues via Technology Roadmap, System Maturity Matrix and NMD System Engineering Notebook (NSEN).
- ($ 4.728M) Integrated initial BM/C3 information architecture requirements, developed under project 1460, into system/element Requirements.
- ($ 1.430M) Reconciled User Operation Requirements Document (ORDs) with USSPACECOM and Service proponents.
- ($ 2.100M) Developed requirements and implementation plan for NMD system simulations at NTF.
- ($ 3.540M) Performed analysis and engineering integration in support of NMD demonstration program. Prepared for

Integrated Ground Tests (IGTs) 1 and 2.

(U) FY 1995 Plans:

- ($ 4.520M) Assess evolving user requirements, resolve ORD issues with user and Services, develop system requirements, and develop element requirements in participation with the Services.
- ($ 4.462M) Continue to identify and resolve alternative architecture performance, system integration, and technology issues by developing, applying, and maintaining tools such as the Technology Roadmap, NMM, and NSEN.
- ($ 3.976M) Perform program planning, including cost/schedule/performance trades, investment strategy studies, and program resource allocation/management structure analyses.
- ($ 3.166M) Provide system analyses in support of contingency option development and planning.
- ($ 2.880M) Continue integration of BM/C3 Information Architecture into system requirements process, and implement system simulations/wargaming at the NTF.
- ($ 1.398M) Support Service analyses of IGT 1&2 results and preparations for IGT3, IFT1&2. Validate test results and update test requirements and documentation as appropriate.

(U) FY1996 Plans:

- ($ 5.705M) Continue to mature user requirements. Finalize interface and configuration control requirements in support of Early deployment option. Analyze and update alternative future contingency deployments.
- ($ 2.081M) Analyze and validate results of IGT3; support preparations for IGT4 and IFT1.
- ($ 5.587M) Update technical documentation baseline (Technology Roadmap, NMM, and NSEN) and NTF system simulations based upon test results to date.
- ($ 1.930M) Develop and integrate baseline system survivability requirements based upon FY94 assessments. Perform data

fusion trade studies to establish system requirements.

- o ($ 4.054M) Update program plans, including cost/schedule/performance trades, investment strategies, and program resource allocations.

(U) FY1997 Plans:

- o ($ 5.620M) Continue to mature user requirements. Finalize interface and configuration control requirements in support of Mid-Term deployment option. Analyze and update objective contingency deployment.
- o ($ 3.517M) Analyze and validate results of IGT4 and IFT1; support preparations for IFT2.
- o ($ 4.785M) Update technical documentation baseline (Technology Roadmap, NMM and NSEN) and NTF system simulations based upon test results to date.
- o ($ 4.053M) Continue to adjust program planning based on element program technical, cost, and schedule performance, technology progress and infusion, and NMD program resource allocations.

Acquisition Strategy: The NMD System Engineering function is provided through a combination of BMDO staff and contractor expertise. Contractor support will be competed through a full and open competition in 2QFY95 and awarded 3QFY95. This contract will provide: system engineering for the NMD program; NMD BM/C3 development (funded under project 1460); and, TMD system engineering (funded under project 3251). Anticipated size and complex nature of this system engineering/BMC3 contract precludes a small business set aside.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3152)
PE Title: NMD Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	35,530	21,987	21,987	21,987	101,491
Appropriated Value		19,412			19,412
Adjustments to Appropriated Value		990			990
Current Budget Submit	41,190	20,402	19,357	17,975	98,924

Change Summary Explanation:

(U) The FY1995 RDT&E Descriptive Summary (Project 3101, Engineering/Integration Support, dated February 1994) included both Theater Missile Defense (TMD) and National Missile Defense (NMD) engineering and integration activities. As part of a continuing BMDO initiative to better comply with Congressional direction and to improve BMDO internal management and accounting of TMD and NMD efforts, Project 3101 has been divided into two primary efforts -- Project 3251 TMD system engineering and Project 3152 NMD system engineering. Other smaller activities formerly a part of Project 3101 include: 2304 (System Software Engineering) which was integrated with BM/C3 Technologies in Project 1460; and Projects 3103 (Measurement Standards), 3104 (Logistics Integration), and 3105 (Producibility and Manufacturing) which were consolidated with NMD Deployment Planning under Project 3160.

(U) The two-thirds funding reduction from FY94 to FY95 and the outyears, reflects the program's transition from an acquisition to a technology readiness program and budget reductions. Approximately five percent of the NMD annual budget request is allocated to this project which is the program's primary source of technical description, analysis, integration, and risk assessment/mitigation. As such, the project shares data products with NMD projects: 1267 (Exoatmospheric Kill Vehicle), 1151 (GBR), 1460 (BM/C3), 3160 (Deployment Planning), 3180 (System Integration), and 3265 (User Interface).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3152)
PE Title: NMD Tech (U)

Funding: FY94 changes were as a result of implementing the DoD Bottom-Up Review (BUR), and restructuring NMD to a technology readiness program. FY95-97 changes are a result of completing the conversion to a technology readiness program.

Schedule: FY95-97 changes are the result of replacing NMD acquisition milestones/events with technology readiness events. Revised NMD funding and budget projections results in stretching the time between major events. (Section D)

Technical: Beginning in FY94, this project is restructured to focus on NMD in a technology readiness context while maintaining a contingency deployment option.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1151 Sensors (Active & Passive) 0603871C	No
1267 Ground-Based Interceptor 0603871C	No
1460 BM/C3 0603871C	No
3265 User Interface 0603871C	No
3160 Deployment Planning 0603871C	No
3153 Architecture Analysis and BM/C3 0603871C	No
3270 Threat and Countermeasures 0603871C	No
3252 Modeling and Simulations 0603871C	No

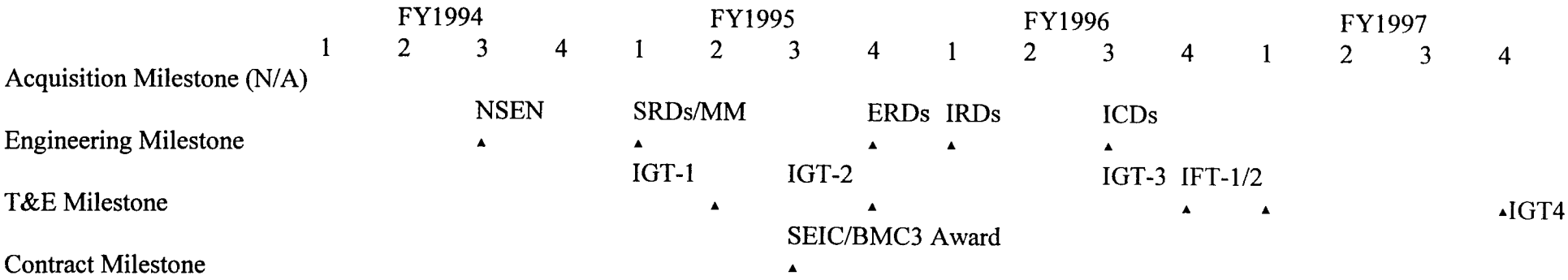
[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3152)
PE Title: NMD Tech (U)

D. (U) Schedule Profile



Schedule Legend:

NSEN	Complete Initial NMD Engineering Notebook (NSEN)
SRDs/MM	Complete redevelopment of NMD - System Req't Documents Maturity Matrix (1Q95)
ERDs	Complete NMD Technology Readiness Systems - Element Requirements Document (4Q95)
IRDs	Complete NMD Technology Readiness Systems level - Interface Requirements Document (1Q96)
ICDs	Complete NMD Technology Readiness System level - Interface Control Documents (3Q96)
IGT-1	Integrated Ground Test 1 (2Q95)
IGT-2	Integrated Ground Test 2 (4Q95)
IGT-3	Integrated Ground Test 3 (4Q96)
IFT-1	Integrated Flight Test 1 (1Q97)

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RDT&E Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3152)
PE Title: NMD Tech (U)

IFT-2	Integrated Flight Test 2 (1Q97)
IGT-4	Integrated Ground Test 4 (4Q97)
SEIC/BMC3	Award of SEIC/BMC3 contract (3Q95)

Planned Milestones Beyond FY 1997:
FY 98 Flight Test 3rd Qtr
FY 99 Flight Test 3rd Qtr

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3153)
PE Title: NMD Tech (U)

Project Number / Title: 3153 Architecture Analysis and BMC3 Initiatives

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	11,713	0	3,110	3,125	3,125	3,125	3,125	3,125	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project supports the creation for FY95 of two new offices within BMDO to ensure that appropriate issues relating to system architecture and BMC3 are addressed in a coordinated and synergistic manner across all BMDO NMD and TMD efforts. The new offices Architecture Integrator (DA), and the BMC3 Office (DB), report directly and independently to the BMDO Director (BMDO/D) to provide the necessary mission-area oversight of critical BMDO technical issues. Neither DA or DB efforts are funded via this Program Element during FY95. However, beginning in FY96, relevant DA and DB activities will be continued via this Program Element to address specific NMD requirements.

(U) In this project, BMDO supports systems analysis work to determine the expected operational performance and effectiveness of missile defense systems under development. Computer simulation models are developed and used to investigate architecture and system level capability and to resolve critical technical issues related to the development of specific elements of the architecture. Tradeoffs in alternative elements, specific designs, inventory and integration of systems are conducted in detail to determine the most cost effective approach for a particular missile defense mission. The work is performed on a continuing basis in order to determine the impact of changing threats, mission requirements, and advances in technology.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3153)
PE Title: NMD Tech (U)

(U) The work is sponsored by the BMDO Architecture Integrator (DA) and provides the Director and his Deputies an independent assessment of the expected effectiveness of major programs under development and requirements for supporting technology. The work is separated into two program elements, one for TMD and the other for NMD.

(U) In the program element described here, the focus is on NMD systems and technology. The primary thrust of the work is to investigate alternative architectures for the NMD mission. Single site (ABM Treaty compliant) and multiple site defense options are considered against a number of threats, ranging from a few Rvs launched from a third world nations to a complicated engagement of multiple/pen-aided missiles launched from Russia. Defenses based on different surveillance/tracking sensors including missile early warning assets is an important consideration, as is the design options for a highly capable interceptor missile. Important issues such as the tracking sensor to missile seeker target handover, midcourse RV/decoy discrimination, the effect of nuclear environments, etc. are investigated under this program element.

(U) Future DB efforts will provide for the mission-area oversight and coordination of all BMDO BMC3 development and acquisition activities in the role of senior advisor to the Director, BMDO. This effort will provide for the synergistic evaluation of relevant BMC3 technical issues; the formulation of appropriate plans, programs, and policies to facilitate the coordination of all BMD Advanced Development BMC3 research, development, and acquisition activities across TMD and NMD program activities; promote appropriate reuse strategies to maximize BMD reuse capabilities; and minimize the duplication of BMC3 research and development efforts across all NMD and TMD development efforts.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3153)
PE Title: NMD Tech (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:
Architecture Analysis (DA):

- ($ 11.713M) Analysis work was completed to support the current NMD program plan, including a thorough investigation of alternative missile interceptor designs. Analysis work was completed to show the capability and limitations of system alternatives driven by interpretations of the ABM treaty. The requirements for space sensors in the NMD architecture were evaluated. RV/decoy discrimination algorithms and target kill assessment techniques were investigated as part of a continuing response to excursion threats suggested by the BMDO Red Team.

BMC3 Initiatives (DB):

- Effort are not funded via this P.E. during FY94.

(U) FY 1995 Plans:

- This effort was not funded via this P.E. during FY95.

(U) FY 1996 Plans:
Architecture Analysis (DA):

- ($ 2.000M) The capability of an evolving NMD architecture (matched to threat advances over time) will be evaluated. Alternatives to defend Alaska and Hawaii (separate from CONUS defense) will be evaluated. A more thorough evaluation of the space tracking sensor (Space and Missile Tracking System) under development by the Air Force will be made as contractor specific designs are made available. RV/decoy discrimination techniques will continue to be evaluated. Application of advances in TMD components/ technology to NMD systems will be evaluated, especially in the design and development of

large phased array radars. Continuation of systems analysis work to evaluate architecture/system level issues as threats, missions, and development programs change. Examination of novel concepts for NMD proposed by members of the scientific community.

BMC3 Initiatives (DB):

- ($ 1.110M) Support development of mission-area policies, processes, and guidance to support the coordinated system-level implementation of a seamless development environment for BMD BMC3 software development from requirements through design and production of BMC3 executable code. Promote the implementation of emerging evolutionary development processes across the BMD Community; support BMDO efforts in the formulation, and implementation of advanced BMC3 research and development efforts appropriate to support evolving BMDO NMD and TMD BMC3 requirements. Efforts will include support in defining NMD and TMD BMC3 development process requirements; analysis and implementation of appropriate NMD/TMD software reuse capabilities and requirements consistent with BMDO requirements and DoD guidance and objectives; coordination in the analysis and implementation of various DoD initiatives and implications relating to BMDO NMD/TMD BMC3 development; support to NATO or other allied concerns outside the BMDO community in activities related to BMC3 development; ongoing support of BMC3 demonstrations relating to joint NMD/TMD inter-operability, JWID, BMC3 CONOPS, etc.; implementation of appropriate software engineering requirements across all BMDO BMC3 software development efforts including support of Software Engineering Institute (SEI) Software Capability Evaluations (SCEs) for BMDO source selection efforts; and provide the mission-area capability to address emerging BMC3 system requirements and concerns and facilitate their resolution in a synergistic environment across all NMD and TMD development efforts.

(U) FY 1997 Plans:

Architecture Analysis (DA):

- ($ 2.000M) Continuation of systems analysis work related to NMD issues.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3153)
PE Title: NMD Tech (U)

BMC3 Initiatives (DB):

- ($ 1.125M) Continuation of FY96 efforts related to NMD issues.

Acquisition Strategy: Systems analysis work under this project is done under contract. In November 1995, a two year contract for this work (with two, one year extension options) was awarded to a ten-member corporate team led by SPARTA, Inc., Laguna Hills, Calif under full and open competition. For BMC3 Initiatives efforts, expertise of Government, FFRDC, SEIC, and SETA personnel will be leveraged in the execution of project activities, utilizing existing contracts to the maximum extent possible. Specifically, USASSDC and USAF/ESC Government and contractor personnel are expected to lead Information Architecture and development efforts; existing and follow-on SETA and SEIC contracts will provide the core of technical expertise for a variety of BMC3 activities; and existing IDA contract vehicles will provide state-of-the-art technical expertise in Software Engineering and related technical areas. Additional contractor services will be procured if needed to meet emerging program requirements.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	11,000	0	0	0	11,000
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	11,713	0	3,110	3,125	17,948

Change Summary Explanation: Architecture analysis and integration efforts performed as part of this project were performed under PE 0603173C (Project 3153) in FY95. Prior to FY95 the work was reported under Project 3207. Beginning in FY96, activities comprising FY95 CDS Project 3153 will be funded and performed via a combination of both TMD and NMD Program Elements, as appropriate.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3153)
PE Title: NMD Tech (U)

Funding: Reflects reductions in funding directed by Congress.
Schedule: None. This project is not an acquisition program, but supports BMD long-term planning.
Technical: Reductions in funding result in a reduced level of effort.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
3153 Arch. Anal.& BMC3 Initiatives P.E. 0603872C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) SCHEDULE PROFILE

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
- Software Policy Update								x								
- BMD IA (CONOPS)					x											
- Software Engineering Documentation Updates						x			x							
T&E Milestone																
Contract Milestone																

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3153)
PE Title: NMD Tech (U)

- Award Arch. Analysis Support Contract		x										
Other Program Events												
- Annual Contract Program Review				x				x				x
- Tech. Analyses, Reports, & Briefings As Req'd.	x	x	x	x	x	x	x	x	x	x	x	x

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3157)
PE Title: NMD Tech (U)

Project Number / Title: 3157 Environment, Siting and Facilities

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C MILCON	2,977	530	832	974	631	688	547	547	Continuing
0603871C RDT&E	0	0	1,345	1,351	1,401	1,404	1,409	1,409	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstrator (NMD-RTD), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control and Communications (BM/C^3).

(U) This project provides environmental program guidance, environmental impact analyses and documentation, real property facility siting, and facility management and acquisition support for the National Missile Defense (NMD) system to maintain the option to deploy a cost-effective, operationally effective and ABM Treaty compliant system. The project plans, programs, budgets, and oversees the NMD facility acquisition through Military Construction (MILCON) and RDT&E construction projects to support the contingency deployment planning and readiness activities focused on critical path analyses to ensure minimum required lead time for site activation. The project provides guidance and leads BMDO NMD environmental compliance, pollution prevention, other

environmental efforts, and the Environmental Assessment and Environmental Impact Statement process for NMD activities. The project develops guidance for Executing Agents on facility siting, facility acquisition, and environmental matters to support the contingency deployment plan which is used to guide the ongoing NMD readiness program and to execute a limited NMD contingency deployment if needed. The project provides MILCON design funds to support design of BMDO's NMD major and minor MILCON projects.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments: Refer to Project 3157 (PE: 0603173C) for detailed accomplishments.

(U) FY 1995 Plans: Refer to Project 3157 (PE: 0603173C) for detailed plans.

(U) FY 1996 Plans:

- ($ 0.800M) Update and modify environmental, siting, and facility annexes for the NMD contingency deployment plans based on NMD readiness program developments. Develop siting, basing deployment plans, environmental compliance, environmental analysis, studies, and documentation for critical NMD contingency deployment options. Begin siting and environmental work for Objective System fielding.
- ($ 0.150M) Conduct facility planning and preliminary design for NMD contingency deployment options.

- o ($ 0.395M) Execute and manage the FY 96-00 NMD Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and activities. Emphasis is on the NMD Ground Based Radar Technical Demonstration Program facility project at U.S. Army Kwajalein Atoll, Marshall Islands. Manage Final Design Approval for NMD Radar Technology Demonstration Project, U.S. Kwajalein Atoll (Project Funded by Project 2154). Manage Award Contract for NMD Radar Technology Demonstration Project, U.S. Kwajalein Atoll (Project Funded by Project 2154)

(U) FY 1997 Plans:

- o ($ 0.700M) Update the environmental, siting, and facility annexes for the NMD contingency deployment plans to reflect NMD advances and changes in candidate systems. Support technology readiness programs with siting, environmental compliance, pollution prevention, studies, and environmental analysis and documentation. Program increases cover costs associated with maturing acquisition programs, planned fielding of systems, and test and evaluation programs.
- o ($ 0.125M) Continue facility planning for near term NMD deployment options to reduce NMD contingency deployment lead time.
- o ($ 0.526M) Plan, execute, and manage the FY 97-02 NMD Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and activities. Prepare 35% facilities designs for initial contingency deployment facilities. Execute design and constructibility trade studies. Complete Construction Surveillance for NMD Radar Technology Demonstration Project, U.S. Kwajalein Atoll (Project Funded by Project 2154). Complete NMD site-specific Environmental Impact Statement. Complete preliminary design (35%) for site-specific deployment.

Acquisition Strategy: BMDO contractor support (Currently under a small business Cost Plus Fixed Fee contract; this contract will be recompeted for similar contract-type award in FY 95) will be utilized for technical and overview assistance of Facilities, Siting, and Environmental activities. Other similar small business contracts, as well as full and open competition Cost Plus Fixed Fee and Fixed

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3157)
PE Title: NMD Tech (U)

Price contracts, by U.S. Army Space and Strategic Defense Command and the U.S. Army Program Executive Office-Missile Defense will be utilized for additional technical assistance for the development of Facilities, Siting, and Environmental documentation requirements. BMDO tasks the Services through Program Management Agreements to perform the required tasks in support of the NMD program. BMDO performs quarterly on-site reviews to verify and validate completed tasks.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	1,345	1,351	2,696

Change Summary Explanation:
Funding: None
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E: Funding Dependency ? (Yes[1]/No)

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3157)
PE Title: NMD Tech (U)

3160	Readiness Planning	0603871C	No
2154	Ground Based Radar	0603862C	No
1267	Kinetic Kill Vehicle	0603871C	No
3359	System Test & Eval	0603871C	No
3360	Test Resources	0603871C	No
1151	Sensors	0603871C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Other Program Events									Xa/Xb/Xc				Xd/Xe/Xf			

Xa Finalize Facility, Environmental, and Siting Annex for Contingency Deployment Plan (Plan funded by Project 3160)

Xb Manage Final Design Approval for NMD Radar Technology Demonstration Project, U.S. Kwajalein Atoll (Project Funded by Project 2154)

Xc Manage Award Contract for NMD Radar Technology Demonstration Project, U.S. Kwajalein Atoll (Project Funded by Project 2154)

Xd Complete Construction Surveillance for NMD Radar Technology Demonstration Project, U.S. Kwajalein Atoll (Project Funded by Project 2154)

Xe Complete NMD site-specific Environmental Impact Statement

Xf Complete preliminary design (35%) for site-specific deployment

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3157)
PE Title: NMD Tech (U)

Planned Milestones Beyond FY 1997:

Environmental, siting, and facility NMD deployment planning milestones track the NMD readiness program milestones:

Complete design on site-specific deployment facilities

Execute construction of site-specific deployment facilities should an end of FY 1997 decision be made

Continue to develop objective system plans should the FY 1997 decision not be made.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3160)
PE Title: NMD Tech. (U)

Project Number / Title: 3160 Deployment Planning

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	7,924	13,470	14,469	17,302	18,840	19,202	18,757	20,157	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense Program's goal is to develop and maintain the option to deploy a cost-effective, operationally effective and ABM Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground Based Radar (GBR), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control and Communications (BM/C3).

(U) The logistics readiness support will identify deployment activities and impacts on fielding an operationally effective, treaty compliant ABM capability within the shortest possible time. The near term program activities focus on critical path analysis to identify those activities providing the greatest time reduction potential. This effort not only identifies time reduction activities, but monitors those activities to ensure time reduction reality and it includes such items as state-of-the-art element/component insertion, producibility engineering, industrial base capacity assessment, specialty engineering. risk mitigation activities, development of site activation requirements, and supportability planning for schedule and affordability issues resolution. This information, and its relationship to the NMD program, is described in a contingency deployment planning document and includes all NMD architecture options. Yearly funding increases are necessary to resolve critical time line issues to include site design, environmental impact, and

MILCON as the NMD Readiness program reaches its first phase of maturity. The contingency deployment plan, updated annually, will guide the NMD Readiness Program and define the NMD Contingency Deployment System. Systems analysis efforts focus on NMD-wide assessments of budget formulation and execution, systems integration, and systems effectiveness. These assessments contribute to reducing NMD program risks and ensuring the availability of a cost effective ABM system. This effort also includes identifying and tracking the U.S. industrial base capabilities, as well as the support and training infrastructure needed for a potential NMD deployment. The operational suitability activities integrate specialty engineering functions at the Ballistic Missile Defense (BMD) level including producibility, acquisition logistics, training, etc, for NMD. Another emphasis of the program is to ensure that critical pacing of subsystems meet required performance criteria. This emphasis is currently in metrology, to generate measurement standards for long wave length infrared focal planes critical for both TMD and NMD components.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The initial study was completed that explores the time required and the costs associated with deploying a contingency NMD capability based on a 1997 deployment decision. This study consolidated data from multiple sources and identified preliminary critical path activities. Developed data to identify long poles that delay contingency deployment. Developed initial draft of the capstone contingency deployment basic plan and outlined planning process. Completed initial streamlining and standardization of ILS and Producibility infrastructure to drive down program costs and meet BMDO affordability objectives. Restructured BMDO supportability and producibility policies for consistency with DoD acquisition Directives and policy.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3160)
PE Title: NMD Tech. (U)

(U) FY 1994 Accomplishments:

- o ($0.309) Maintained the LWIR calibration facility. Conducted annual review of BMD metrology program.
- o ($0.248) Identified, logistics supportability, producibility and industrial base issues and developed mitigation strategies and plans.
- o ($7.367) Initiated framework to develop contingency deployment planning process. Completed quick reaction deployment analysis of deployment of a NMD system capability. Provided specialty engineering support to the NMD element program managers. Provided systems analysis support to NMD program for programmatic, technical, and budgetary issues.

(U) FY 1995 Plans:

- o ($5.130) Develop Contingency Deployment guidance and deployment execution plan. Conduct critical path analyses to determine deployment long poles. Develop decision support tools to assess deployment activities.
- o ($0.390) Conduct analysis of industrial production and manufacturing requirements. Perform logistics and specialty engineering assessment of NMD elements to assure operational suitability. Assess and identify critical manufacturing technology development requirements.
- o ($0.450) Develop Metrology Technology Standards and provide standards to commercial and DoD agencies for NMD program testing, development, production and support as funding permits. This effort leverages TMD investments.
- o ($7.500) Evaluate program to ensure adequate resources are applied against prototype development deployment long poles. Identify resource issues which impact lead time to deploy. Monitor/assess architecture engineering trades for changes to the baseline which impact cost, schedule, and performance of the overall system. Monitor/assess technology baseline; identify infusion opportunities which reduce leadtime to deploy; improve system effectiveness; and reduce prototype development deployment risk. Perform system wide assessments for program, budget, system effectiveness, and technology risks for the NMD system and Technology Support programs.

(U) FY 1996 Plans:

- o ($6.110) Update and modify NMD contingency deployment plans based on NMD readiness program developments. Execute pre-deployment timeline reduction activities as determined from deployment critical path analyses. Perform site development activities to support early option deployment. Conduct deployment logistics and sustainment support analysis for the early deployment option.
- o ($0.426) Complete characterization of LWIR detector transfer standards. Enhance capability for out-of-band blocking measurements on narrow band filters.
- o ($0.369) Conduct logistics and specialty engineering assessments for the NMD Readiness Programs. Identify producibility and industrial base issues and develop risk mitigation plans necessary to reduce contingency deployment lead time. Contribute to the development and transfer of critical manufacturing technologies.
- o ($7.564) Continue to evaluate Technology Readiness Program to ensure adequate resources are identified to reduce deployment long poles. Monitor/assess architecture engineering trades for changes to the baseline which impact cost, schedule, and performance of the overall system. Monitor/assess technology baseline; identify infusion opportunities which reduce leadtime to deploy; improve system effectiveness; and reduce prototype development deployment risk. Perform system wide assessments for program, budget, system effectiveness, and technology risks for the NMD system and Technology Support programs.

(U) FY 1997 Plans:

- o ($8.462) Update the contingency deployment plans to reflect NMD technical advances and changes in the architecture. Conduct and update critical path analyses relative to development and deployment of a midcourse tracking system. Conduct environmental impact analysis to support site activation if necessary. Develop site pollution prevention plan. Execute selected pre-deployment activities where appropriate to prepare for a deployment decision.
- o ($0.450) Initiate development of capability for IR spectral emissivity measurements.

- o ($0.390) Continue logistics and specialty engineering assessments focused on the addition of SMTS to the NMD architecture. Develop and execute industrial base plans to apply critical manufacturing techniques for element development.
- o ($8.000) Continue to evaluate Technology Readiness Program to ensure adequate resources are identified to reduce deployment long poles. Monitor/assess early capability architecture engineering trades impacting cost, schedule, and performance of the overall system. Monitor/assess technology baseline; identify infusion opportunities which reduce leadtime to deploy; improve system effectiveness; and reduce prototype development deployment risk. Perform system wide assessments for program, budget, system effectiveness, and technology risks for the NMD system and Technology Support programs.

Acquisition Strategy: This project uses the integrated expertise of BMDO and industry officials and developers to implement deployment readiness. The primary executing agent for this project is a Joint Service team comprised of the US Army National Missile Defense Project Office, the US Air Force Electronics Systems Center, US Air Force Space and Missile Center, US Space Command, Army Space Command, Air Force Space Command and Navy Space Command. This joint team is supported by competitively awarded existing and future SETA contracts.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	6,907	12,053	12,144	12,144	43,248
Appropriated Value		14,324			14,324
Adjustments to Appropriated Value		-0,854			(854)
Current Budget Submit	7,924	13,470	14,469	17,302	53,165

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3160)
PE Title: NMD Tech. (U)

Change Summary Explanation:
Program 3160 consolidates a number of homogeneous projects under single management at an overall lower cost to focus on reducing (1) the time to deploy a contingency system, and (2) the producibility and deployment risks. The FY95 projects that were consolidated include: 3103 Metrology; 3104 Integrated Logistics Support; 3105 Producibility and Manufacturing and 4402 System Analyses.

Funding: The FY95 President's Budget submission included activities in metrology, supportability, specialty engineering, industrial base assessment and systems analysis. Funding estimates for these activities is unchanged. The current budget submission reflects the additional funding for contingency deployment planning and systems analysis activities. Yearly budget increases reflect increased efforts in the contingency deployment time reduction program and preparatory actions to track with the evolution of the technology readiness program and to respond to a potential deployment decision after FY97.

Schedule: None.

Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)	
1151 Sensors (Active and Passive)	0603871C	No
1267 Ground-Based Interceptor (GBI)	0603871C	No
1460 Battle Management, Command, Control, and Communications (BMC3)	0603871C	No
3152 NMD Systems Engineering	0603871C	No

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3160)
PE Title: NMD Tech. (U)

3265 User Interface	0603871C	No
3359 System Test & Evaluation	0603871C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone									Xc					Xf	Xg	
T&E Milestone											Xd	Xd				
Contract Milestone									Xe							
Other Program Events						Xa/Xb				Xa/Xb				Xa/Xb		

Xa - Annual Industrial Base Assessment
Xb - Contingency Deployment Plan
Xc - GBI CDR
Xd - EKV Sensor Flights
Xe - EKV Downselect
Xf - NMD-RTD CDR
Xg - NMD-RTD BOD

Planned Milestones Beyond FY1997:
NMD Deployment planning milestones track the NMD Readiness Program milestones.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3265)
PE Title: NMD Tech. (U)

Project Number / Title: 3265 User Interface

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	4,373	1,248	1,443	1,530	1,530	1,530	1,530	1,530	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost-effective, operationally effective and ABM Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground-Based Interceptor (GBI); the Ground-Based Radar (GBR), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control and Communication (BM/C3).

(U) Development of an effective NMD program requires a close user interface to ensure user and developer consistency with respect to operational requirements, concepts of operation, and integration of multi-service systems. This project supports BMDO's NMD interface with the military operational community through integrated development of wargame simulations using NMD Models to evaluate operational requirements and concepts of operations. Analyses and simulations are performed to address system effectiveness of proposed NMD system architectures against near and far - term ballistic missile threats. Results support activities required for strategic gaming with CINCs to identify roles, missions, and requirements for NMD. Funds from this project are also provided to operational users for development and refinement of operational requirements and concepts of operation for employment of NMD. NMD wargames are the vehicle by which these concepts are integrated into the overall BMD system deployment strategy and planning. The approximately two-thirds funding reduction from FY94 to FY95 and the outyears, reflects the program's transition

from an acquisition to a technology readiness program and budget reductions. This project develops information critical to the successful accomplishment of several other NMD projects: 1267 (Exoatmospheric Kill Vehicle), 1151 (GBR), 1460 (BM/C3), 3152 (System Engineering), and 3160 (Deployment Planning).

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY94 much effort was devoted to refining operational requirements and concept of operations documents. Support included wargaming, CINC/services requirements definition of operational evaluation of R&D activities, and mission analysis for BMD. Support was also provided to the Army's operational concept development planning for User Operational Evaluation Systems (UOES). FY95 through FY97 activities will focus on NMD wargames, requirements documentation, and user concepts of operations (CONOPS).

(U) FY1994 Accomplishments:

- ($ 1.184M) Refined Operational Requirements Documents (ORDs).
- ($ 1.297M) Developed operational concept(s) of operation (CONOPS).
- ($ 0.532M) Conducted theater and strategic wargaming, including GLOBAL 94.
- ($ 1.360M) Conducted mission analysis for BMD.

(U) FY1995 Plans:

- o ($ 0.326M) Coordinate and work with the multi-service users to refine ORDs and provide input to the NMD Maturity Matrix (NMM).
- o ($ 0.514M) Coordinate and work with the multi-service user to refine NMD CONOPS based on results of the Early Warning Radar (EWR) experiments.
- o ($ 0.408M) Conduct strategic wargaming, and mission analysis for NMD.

(U) FY1996 Plans:

- o ($0.377M) Continue to refine ORDs based on results of NMD threat assessment and mission analysis.
- o ($0.595M) Refine NMD CONOPS using simulations and progress of BM/C3 and SMTS programs.
- o ($0.471M) Conduct strategic wargaming and NMD mission analysis to support deployment readiness.

(U) FY1997 Plans:

- o ($0.400M) Continue work with the multi-service users to refine ORDs based on results of NMD threat assessment and NMD mission analysis
- o ($0.630M) Refine CONOPS for NMD based on radar HWIL simulations testing and flight testing.
- o ($0.500M) Conduct strategic wargaming and mission analysis for NMD to support NMD deployment readiness.

Acquisition Strategy: This is a planning and analysis project most of which will be accomplished in-house with some limited support from competitively awarded contracts with industry.

B. (U) PROGRAM CHANGE SUMMARY:

FY1994	FY1995	FY1996	FY1997	TOTAL COST

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3265)
PE Title: NMD Tech. (U)

Previous President's Budget	4,373	1,530	1,530	1,530	8,963
Appropriated Value		1,530			1,530
Adjustments to Appropriated Value		-0,282			(282)
Current Budget Submit	4,373	1,248	1,443	1,530	8,594

Change Summary Explanation:
Funding: Funding was reduced for this task, consistent with the transition from an acquisition program to a technology readiness program.
Schedule: None.
Technical: In FY94 this project included theater efforts. In FY95 theater related user interface efforts are described in a separate project. This project includes user interfaces for an NMD contingency deployment only.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

Related RDT&E:		Funding Dependency? (Yes[1]/No)
Project 1267, EKV	PE 0603871C	No
Project 1151, Sensors	PE 0603871C	No
Project 1460, BMC3	PE 0603871C	No
Project 3152, System Engineering	PE 0603871C	No
Project 3160, Deployment Planning	PE 0603871C	No

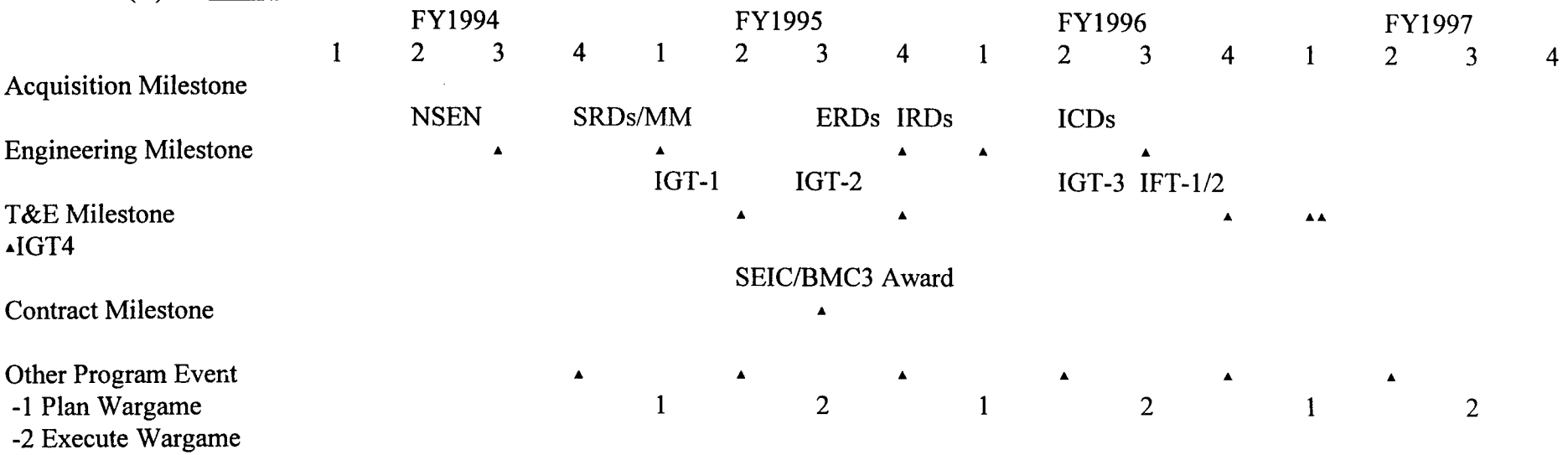
[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3265)
PE Title: NMD Tech. (U)

D. (U) Schedule Profile



NSEN - Engineering Notebook
SRDs/MM - System Req't Documents/Maturity Matrix
ERDs - Element Req't Document
IRDs - Interface Req't Documents
ICDs - Interface Control Documents

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3270)
PE Title: NMD Tech (U)

Project Number / Title: 3270 Threat and Countermeasures Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	0	0	8,272	8,312	1,663	1,663	1,663	1,663	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) Threat and Countermeasures Program. The BMDO National Missile Defense (NMD) Threat Program defines potential adversary military forces, principally theater strategic missiles: ICBMs and SLBMs which the Ballistic Missile Defense (BMD) system could confront. To accomplish this mission, BMDO has a threat development program which is based on Intelligence Community projections and is traceable to quantifiable analysis. The Program comprises three component task: Intelligence Threat, Countermeasures Integration, and System Threat Scenario Generation. This Project was previously funded under Project 3202, 3203, and 3206 in the FY95 President's Budget and is transitioning from Project 3270, PE0603173C.

(U) Intelligence Threat Task. The purpose of the Intelligence Threat task is to provide an Inteliigence Community-validated NMD threat description. The Intelligence Threat task divides the threat into four major categories: Operational Threat Environment, Targets, System Specific Threats (SST), and Reactive Threats. The Operational Threat Environment includes assessments of the ICBM and SLBM operational and technological environments and projects the effects of developments and trends on NMD mission capability. The Targets category includes a projection of foreign ICBM and SLBM threat systems and NMD countermeasures that enhance their performance. This includes force structure, performance characteristics, and sample signatures. System Specific Threat addresses threats to the NMD system including reconnaissance, surveillance, and target acquisition; lethal and non-lethal threats; and

regional integrated SST assessments. The Reactive threats are those that an adversary may develop as a result of deployment of a U.S. NMD system.

(U) System Threat Scenario Generation Task. The accurate specification and characterization of ballistic missiles and the appropriate development and integration of scenarios using these characterizations are critical to the analysis of alternative ballistic missile architectures, the performance assessments of potential technology applications, and the operational performance evaluations of candidate designs. This task provides baseline and excursion scenario descriptions in documentary and electronic form for use in NMD system and architecture analyses. These descriptions are the only approved threat employment portrayals authorized for acceptable BMDO analysis. This task:

(1) Identifies user needs for threat scenario descriptions.
(2) Identifies analyses needed to fully specify and characterize the threat missile systems, penetration aids, tactics, etc., and ensures the analyses is accomplished.
(3) Provides the analysis results to all interested agencies for review and comment.
(4) Addresses critical threat issues which arise during the analysis process.
(5) Ensures all supporting agencies' views on threat issues are fully aired.
(6) Reviews, approves, produces, and distributes all System Threat Scenario Descriptions.
(7) Produces threat computer electronic media and supporting documentation for use by the development and acquisition communities.

(U) Countermeasures Integration Task. The BMDO Countermeasure Integration (CMI) Program assists the NMD technology readiness program in developing technologies for national missile defense systems that are robust to potential countermeasures which are practical and within the means of anticipated adversaries. Included in this mission is CMI Program support to the NMD threat development process and advance warning to BMDO system designers. The BMDO CMI Program reviews NMD system concepts for

susceptibilities and identifies potential countermeasures, determines credibility through analyses and tests, characterizes credible NMD countermeasures by providing designs and performance parameters, informs intelligence and system threat developers of potential countermeasures, informs NMD system designers with advance warning of potential countermeasures, and assists NMD system designers in developing counter-countermeasures. Providing vulnerability and susceptibility information to the system designers early enables them to build robustness into their designs during the early stages of the system development process, a cost-effective means for providing a flexible high-performance design.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:
Not applicable

(U) FY 1995 Plans:
Not applicable

(U) FY 1996 Plans:
o ($2.003M) Intelligence Threat task: Specialty Threats, Targets Analyses, Operational Threat Environment Intelligence Assessments.

- o ($1.715M) System Threat Scenario Generation task: Continue the development of threat system characterizations and scenario descriptions in response to the analysis needs of the NMD system/element developers, Upgrade the threat modeling capability and produce electronic media threat tapes and supporting documentation through the NTF, Develop scenarios depicting employed threat systems to support NMD analysis.
- o ($4.554M) Countermeasures Integration task: NMD CM Red/Blue activities and Counter-countermeasure Parametric Studies, NMD CM technical experiments and evaluations, CM Skunkworks teams conduct CM concept, design, fabrication, and flight tests, Non-technical analysis, oversight, and database management.

(U) FY 1997 Plans:

- o ($2.013M) Intelligence Threat task: Specialty Threats, Targets Analyses, Operational Threat Environment Intelligence Assessments.
- o ($1.723M) System Threat Scenario Generation task: Continue the development of threat system characterizations and scenario descriptions in response to the analysis needs of the NMD system/element developers, Upgrade the threat modeling capability and produce electronic media and supporting documentation through the NTF, Develop scenarios depicting employed threat systems to support NMD analysis.
- o ($4.576M) Countermeasures Integration task: NMD CM Red/Blue activities and Counter-countermeasure Parametric Studies, NMD CM technical experiments and evaluations, CM Skunkworks teams conduct CM concept, design, fabrication, and flight tests, Non-technical analysis, oversight, and database management.

Acquisition Strategy: The acquisition strategy for the Threat Program is to ensure continuity in the threat development and scenario generation process. Funding is provided to Executing Agents who accomplish tasks under existing contracts (via MIPRS, SETAs, and FFRDCs).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3270)
PE Title: NMD Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	8,272	8,312	16,584

Change Summary Explanation:
Funding: This Project was Previously funded under Project 3202, 3203, and 3206 in the FY95 President's Budget. Funding for the CMI program is split between the TMD and the NMD Program Elements for a total of $18.303M.
Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1266 Sea-based Theater-wide Defense (Upper Tier) 0603868C	No
2154 TMD-GBR 0603861C	No
2257 PATRIOT 0208865C	No
2260 THAAD 0603861C/0604861C	No
2263 Sea-based Area TBMD (Lower Tier) 0603867C/0604867C	No

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3270)
PE Title: NMD Tech (U)

3352 Modeling and Simulations 0603216C/0603217C	No
3270 Threat and Countermeasures 0603872C/0603173C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
STAR Published								X								
CM Skunkworks																
Threat Scenario Generation (as required)																

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3352)
PE Title: NMD Tech (U)

Project Number / Title: 3352 Modeling and Simulations

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	78,017	19,000	15,779	26,834	15,855	15,855	15,855	15,855	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches and third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstator (NMD-RTD), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and the Battle Management, Command, Control, and Communications (BM/C3).

(U) This project provides for the development of validated models and simulation techniques and tools that are critical in assessing the performance capabilities of BMD systems. This is a highly complex problem requiring high-performance vector and parallel processing super-computers as well as scalar processors and advanced graphic workstations. This cost effective approach will reduce high cost missile test programs and will establish requirements for future technology. This capability is housed at the National Test Facility (NTF), and the Advanced Research Center/Simulation Center (ARC/SC). These facilities are capable of operating in a distributed integrated simulation environment and hosts modeling and simulation wargames that provide the analysis, integration, demonstration, and performance verification capability for BMD systems. These facilities are provided to all Services and procedures have been established that ensure efficient utilization and sound verification, validation, and accreditation.

(U) The funding for these facilities is distributed across three Program Elements (PEs) in FY95 (NMD,TMD, and Support Technology), and two PEs in FY96 and beyond (NMD,TMD). This cost sharing approach maximizes synergy and minimizes duplication of modeling and simulation resources. These PEs cover the total costs for operations and maintenance of these facilities which includes: computer hardware and software, communications networks, security, and other essential capabilities necessary to develop and operate reconfigurable, multiple experiment test bed environments. This document describes the NMD portion of funding for these activities.

(U) This project's effort provides super-computing resources at the NTF and integration support including operations and maintenance of the facility, computer hardware and software, communication networks, security, and other essential capabilites that support Ballistic Missile Defense.

(U) The project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project has developed and maintained the modeling and simulation capabilities of the NTF and ARC/SC facilities. In FY94, NMD research and development efforts conducted at the NTF include: NMD/TMD wargame, the evaluation and demonstration of a BMC3 prototype simulation for system level performance, and scenario development and technical excursions for threat generation. In FY94, NMD research and development efforts conducted at the ARC/SC include: modifications and enhancements of the Ground Based Radar Test Bed, and continued simulation planning efforts to support GBI ground and flight software development.

In the future these facilities will continue to utilize and enhance current tools while developing new modeling and simulation tools and techniques, and maintaining and upgrading super-computing hardware to meet the evolving needs of the NMD program.

(U) FY 1994 Accomplishments:

- o ($65.150M) Provided super-computing resources at the NTF which were utilized to develop BMC3 simulations to maximize system level performance of NMD elements (GBI,GBR,SMTS). BMC3 capabilities and prototypes to integrate engagement planning, site level and CINC level operations were initiated. Systems Engineering studies to evaluate operational concepts and requirements for NMD ground and flight tests were also executed at the NTF.
- o ($12.000M) Provided super-computing resources at the ARC/SC to develop and operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements.
- o ($0.867M) Provide the Navy personnel consistent with National Test Bed Joint Program Office (NTBJPO) manpower requirements.

(U) FY 1995 Plans:

- o ($13.100M) Provide super-computing resources at the NTF which will be utilized for BMC3 Integrated Ground Tests 1 and 2, and Systems Engineering studies to evaluate operational concepts and requirements for NMD ground and flight tests. Three wargames are planned using the Human-In-Control Test Bed (HICTB).
- o ($4.900M) Provided super-computing resources at the ARC/SC to develop and operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements. Development of a Real-time Digital Simulator for NMD-RTD based upon a previously established TMD based model will begin this year.
- o ($1.000M) Provide the Navy civilian personnel consistent with NTBJPO manpower requirements.

(U) FY 1996 Plans:

- o ($9.931) Provide super-computing resources at the NTF which will be utilized for BMC3 Integrated Ground Test 3, Systems Engineering studies to evaluate operational concepts and requirements for NMD, and NMD Threat Scenario Generation by the Special Program Center (SPC). Four wargames are planned using the HICTB.
- o ($2.936M) Provide super-computing resources at the ARC/SC to develop and operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements. NMD RTD hardware in the loop (HWIL) simulation will be developed and completed and available for Integrated Ground Test in the fourth quarter of this year.
- o ($2.663M) Provide NMD M&S oversight and support the independant verification and validation (IV&V), and head-to-head comparisons required for accreditation by the Services.
- o ($0.249M) Provide the Navy civilian personnel consistent with NTBJPO manpower requirements.

(U) FY 1997 Plans:

- o ($19.958M) Provide super-computing resources at the NTF which will be utilized for BMC3 studies to maximize system level performance of NMD elements (GBI,GBR,SMTS), Systems Engineering studies to evaluate operational concepts and requirements for NMD, and NMD Threat Scenario Generation by the SPC. Four wargames are planned using the HICTB.
- o ($3.426M) Provide NMD M&S oversight and support the independant verification and validation (IV&V), and head-to-head comparisons required for accreditation by the Services.
- o ($2.950M) Provide super-computing resources at the ARC/SC to develop and operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements. NMD RTD software and hardware configuration items will be validated using the Real-time digital and HWIL simulators in preparation for integration into the RTD system.
- o ($0.500M) Provide the Navy civilian personnel consistent with NTBJPO manpower requirements.

Acquisition Strategy: The tasks in this project have been met through full and open contractual competition to support NMD/TRP modeling and simulation requirements. Primary M&S support is performed at the National Test Facility, the Advanced Research Center/Simulation Center, and other testbed facilities. Overall BMDO M&S oversight is provided by BMDO/AQM. The operations and Maintenance (O&M) contractor at the NTF was previously Martin Marietta but a new O&M contract was awarded to Loral in 1QFY95. The ARC/SC O&M contract is a CPFF with COLSA first awarded in June of 1989.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	78,000	19,000	19,000	19,000	135,000
Appropriated Value		19,000			19,000
Adjustments to Appropriated Value		0			0
Current Budget Submit	78,017	19,000	15,779	26,834	139,630

Change Summary Explanation:
Funding: This project was formerly a subset of project number 3300 in the FY95 President's Budget. Previous President's Budget values state total M&S funding amounts which are now reported in three separate PE's (under this project 3352) to reflect funding by TMD, NMD, and Technology follow-ons. This explains the large differences between previous and current appropriated values. A large reduction in budget occurred between FY94 and FY95 because NMD and TMD began to share costs at the NTF and ARC/SC which were previously fully funded by NMD in FY94. The large increase in FY97 costs at the NTF is a result of a one year change in the distribution of funding responsibilities at the NTF between NMD and TMD. A corresponding one year reduction will be reflected in the TMD M&S CDS. Funding levels at the NTF and ARC/SC have been reduced resulting in single shift operation at both facilities.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 3352)
PE Title: NMD Tech (U)

Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1151, Sensors (Active & Passive)	PE 0603871C No
1267, Ground-Based Interceptor	PE 0603871C No
3270, Threat and Countermeasures	PE 0603871C No
3352, Modeling and Simulation	PE 0603173C Yes
3352, Modeling and Simulation	PE 0603873C Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone								A1								
T&E Milestones						B1		B2				B3				
Contract Milestone					C1											
Other Milestones					D1			D2								

A1 BMDO IVV&A Directive

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PE:0603871C (Proj: 3352)
PE Title: NMD Tech (U)

B1 BMC3 Integrated Ground Test 1
B2 BMC3 Integrated Ground Test 2
B3 BMC3 Integrated Ground Test 3
C1 (NTF O&M and R&D Contract Awarded)
D1 NMD/TMD Game 95-A (CENTCOM)
D2 NMD/TMD Game 95-B (EUCOM)

Planned Milestones Beyond FY1997: None

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3354)
PE Title: NMD Tech (U)

Project Number / Title: 3354 Target Support

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	40,893	0	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstrator (NMD-RTD), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), the Battle Management, Command, Control and Communications (BM/C3).

(U) Target and launch services are provided for the testing and evaluation of Ballistic Missile Defense (BMD) Technology Readiness Programs. As a part of the BMDO Consolidated Targets Program (CTP), this project provides threat-credible ballistic missile target system support to interceptor and sensor development and acquisition programs. The MSX and EKV programs require target system support to accomplish their planned test and evaluation. The MSX program intends to use the STARS target system launched from Barking Sands, Kauai; while the EKV program plans to use MMII equipped with the Multi-Service Launch System (MSLS), launched from Vandenberg AFB.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3354)
PE Title: NMD Tech (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

Accomplishments for FY94 include the completion of the STARS II with a demonstration launch in the 3QFY94 and continuation of the construction of targets to support the MSX and EKV projects.

(U) FY 1994 Accomplishments:
- o ($13,000M) Completed development, demonstration, and testing of the Strategic Target System II (STARS II)
- o ($9,893M) Continued target build for MSX and EKV. These targets consisted of reentry vehicles and penetration aids/decoys.
- o ($18,000M) Supported BMD targets infrastructure to include refurbishment of retired missile systems to be provided as GFE to construct target systems.

(U) FY 1995 Plans:
- o Starting in FY95 and beyond funding for targets are included in the appropriate NMD Technology Readiness projects.

(U) FY 1996 Plans: None

(U) FY 1997 Plans: None

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3354)
PE Title: NMD Tech (U)

Acquisition Strategy: US Army SSDC is BMDO Executing Agent. Sandia National Laboratory developed the STARS system and also provides for launch support at Barking Sands. The Air Force is responsible for the development and launch activities of the MMII/MSLS from Vandenberg AFB.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	38,035	4,000	10,000	10,000	62,035
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	40,893	0	0	0	40,893

Change Summary Explanation:
Funding: Starting in FY95 and beyond funding for targets are included in the appropriate NMD Technology Readiness projects. No impact to the Targets Program.
Schedule: None
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1267, Ground Based Interceptor, 0603871C	Yes

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PE: 0603871C (Proj: 3354)
PE Title: NMD Tech (U)

3157, Environmental, Siting & Fac, 0603871C	No
3359, System Test and Evaluation, 0603871C	No
3360, Test Resources, 0603871C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone			IOC (STARSII)						X (MSLS)							
T&E Milestone																
Contract Milestone																

Planned Milestones Beyond FY1997: NONE

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3359)
PE Title: NMD Tech (U)

Project Number / Title: 3359 System Test & Evaluation

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	14,878	14,100	17,904	18,382	18,382	18,382	18,382	18,382	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstrator (NMD-RTD, the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control and Communications (BM/C3).

(U) This effort provides for Test Readiness Program (TRP) planning oversight and coordination of integrated Test and Evaluation activities and inter-element, as well as inter-service Test and Evaluation efforts. Provides Independent Evaluation of systems technology programs and special reviews. This effort provides funding for the TRP Test and Evaluation Summary (TES) which outlines testing for the NMD TRP. It also provides funding for the Integrated System Test (ISTC) Development. This tool provides NMD system level Hardware-in-the-Loop (HWIL) testing. Another objective of this program is the execution of independent technical reviews, system analyses and performance evaluations which contribute to the development of the BMD family of systems and to the successful achievement of acquisition milestones. The performance evaluation has as its primary goals the identification and

understanding of system-level performance drivers and the mitigation of technical risk. Efforts include short-term special studies, focused technical investigations, and participation in test readiness reviews intending to ensure successful tests and experiments.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project and predecessor projects have been responsible for the establishment of NMD test plans and ISTC POP and ISTC/CTD demonstrations. This development represents the principal NMD test tool.

(U) FY 1994 Accomplishments:

- ($11,005M) Completed global environment and merge BMD BMC3 with ISTC global environment. Developed NMD Test and Evaluation Summary
- ($1,457M) Developed independent evaluation methodology. Conducted independent readiness review of the MSX spacecraft.
- ($1,458M) Provided T&E Technical Support. Reviewed, analyzed, and critiqued T&E Cost Analysis Requirements Document (CARD). Researched and analyzed BMD T&E projects for nomination and award as OSD sponsored Reliance Investment Projects. Researched, analyzed, and proposed options for consolidating BMDO Data Centers.
- ($0,958M) Final reports on sub-launched lethality efforts.

(U) FY 1995 Plans:

- o ($12,000M) Develop and integrate initial EKV models into ISTC framework. Conduct EKV/BMC3 integrated ground test. (Integrated Ground Test - 1 and IGT-2). Update ISTC global environment.
- o ($1,050M) Execute independent evaluation methodology and process. Conduct special studies on EKV Targets and Sensor Test Bed. Monitor technology maturation for possible incorporation into current acquisition programs.
- o ($1,050M) Provide T&E technical support. Review, analyze, and critique the BMDO/NMD T&E program. Research, analyze, and document NMD T&E issues and findings for the T&E Working Group and the T&E Steering Group.

(U) FY 1996 Plans:

- o ($14,180M) Integrate GBR testbed with ISTC. Conduct an integrated ground test with Battalion BMC3 and EKV interoperable representations. Conduct integrated sensor/EKV ground tests.
- o ($1,862M) Execute independent evaluation methodology and process. Conduct ad hoc special studies and analyses. Monitor technology maturation for possible incorporation into current Acquisition programs.
- o ($1,862M) Provide T&E technical support. Review, analyze, and critique the BMDO/NMD program. Research, analyze, and document NMD T&E issues and findings for the T&E Working Group and the T&E Steering Group.

(U) FY 1997 Plans:

- o ($15.000M) Interface ISTC with BMC3 Block 1 Develop "Mid-Term" T&E documentation. (EKV Radar and RKV-2) Conduct integrated tests (Integrated Flight Test-1 and IFT-2,) IGT-4)
- o ($1,691M) Execute independent evaluation methodology and process. Conduct ad hoc special studies and analyses. Monitor technology maturation for possible incorporation into current Acquisition programs.
- o ($1,691M) Provide T&E technical support. Review, analyze, and critique the BMDO/NMD T&E program. Research, analyze, and document NMD T&E issues and findings for the T&E Working Group and the T&E Steering Group.

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PE: 0603871C (Proj: 3359)
PE Title: NMD Tech (U)

Acquisition Strategy: This effort will utilize Service executing agents to construct a NMD system level HWIL capability (ISTC) and execute live flight tests used to validate the ISTC performance. The effort provides for BMDO to develop test plans (TES) to effectively test the NMD TRP. BMDO will also develop the HWIL ISTC specification to meet HWIL requirements necessary to execute tests defined in the TES. It also provides Service and system evaluation funding. Technical survey of all BMDO programs will be performed on an on-going basis in order to create and maintain the foundation of technical knowledge necessary to execute the independent evaluation process. Special studies and technical investigations will be conducted in response to emerging issues and concerns on an ad hoc basis. Performance evaluation is an on-going effort. In order to ensure an early estimate and timely updates, the processes will be executed on an iterative basis, with initial assessments expected to identify needed refinements in information or in the evaluation methodology. Subsequent iterations are expected to result in refined performance estimates and increased confidence in those estimates.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	15,673	17,100	17,100	18,100	67,973
Appropriated Value		14,100			14,100
Adjustments to Appropriated Value		0			0
Current Budget Submit	14,878	14,100	17,904	18,382	65,264

Change Summary Explanation:
Funding: System Test and Evaluation Activities, project 3359, were included in projects 1502 and 3300 in the FY95 President's Budget.
Schedule: none
Technical: none

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3359)
PE Title: NMD Tech (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1267, Ground Based Interceptor, 0603871C	No
1460, BMC3, 0603871C	No
1151, Sensors, 0603871C	No
3157, Environmental, Siting & Env, 0603871C	No
3354, Targets, 0603871C	No
3360, Test Resources, 0603871C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone (Build)						X[a]					X[b]			X[c]		
T&E Milestone (Tests)						X[d]		X[e]				X[f]	X[g]/X[h]			X[i]
Contract Milestone																
Other Program Events								X[j]				X[k]	X[l]			

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PE: 0603871C (Proj: 3359)
PE Title: NMD Tech (U)

X^a - ISTC/CTD
X^b - ISTC/EKV
X^c - EKV Radar
X^d - IGT-1
X^e - IGT-2
X^f - IGT-3
X^g - IFT-1
X^h - IFT-2
X^i - IGT-4
X^j - TES
X^k - EKV Brassboard Seeker
X^l - EKV-1

Planned Milestones Beyond FY1997: Support NMD System Test depicted in NMD program R-2.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3360)
PE Title: NMD Tech (U)

Project Number / Title: 3360 Test Resources

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	24,229	11,558	11,411	11,951	12,025	12,025	12,200	12,200	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The National Missile Defense (NMD) Program's goal is to develop and maintain the option to deploy a cost effective, operationally effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or third world attacks. The NMD system elements are the Ground Based Interceptor (GBI), the Ground-Based Radar Technology Demonstrator (NMD-RTD), the Space and Missile Tracking System (SMTS) (now executed as part of the USAF Space Based-Infrared System), and Battle Management, Command, Control and Communications (BM/C^3).

An essential part of achieving this goal is validation of developed system capability through integrated realistic system test and evaluation which reduces overall risk and increases confidence. This project provides for BMDO planning oversight and coordination of integrated Test and Evaluation activities and inter-element, as well as inter-service Test and Evaluation efforts and provides for test infrastructure for common ground test facilities, common range facilities and range instrumentation. The common ground test facilities include: the Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) at Eglin AFB, Fort Walton Beach, FL; the Hypervelocity Wind Tunnel Number 9 (Tunnel 9) at the Naval Surface Warfare Center, White Oak, MD; the National Hover Test Facility (NHTF) at Edwards AFB, CA; the Kinetic Energy Weapon Digital Emulation Center (KDEC) at U.S.Army Space and Strategic Defense Command, Huntsville, AL; the Aero-optical Evaluation Center (AOEC) located at Calspan Corp., Buffalo, NY; the

Center for Research Support (CERES) located at Falcon AFB, Colorado Springs, CO; the Army Missile Optical Range (AMOR) at the U.S. Army Missile Command, Huntsville, AL; the Portable Optical Sensor Tester (POST) and the Characterization of Low Background Mosaics (CALM) at Rockwell International, Anaheim, CA; the Naval Research and Development (NRD) facility located at the Naval Command, Control and Ocean Surveillance Center, San Diego, CA; and the infra-red and blackbody standards at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. The common range facilities include national ranges such as: the Kwajalein Missile Range (KMR) located in the Marshall Islands; the Eastern Test Range (ETR) located at Patrick AFB, Cape Canaveral, FL; and the Western Test Range (WTR) at Vandenberg AFB, Lompoc, CA. The range instrumentation includes special test equipment, data collection assets, and range instrumentation upgrades including: the High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor, based at Aeromet, Inc., Tulsa, OK; and the Rapid Optical Beam Steering (ROBS) system, based at White Sands Missile Range, Las Cruces, NM. These ground test, range and instrumentation assets provide valuable program risk reduction and test implementation capability in support of the National Missile Defense Technology Readiness test and evaluation program. The ground test facilities provide a cost effective method of testing and evaluating applicable component, sub-system and system level technologies. The common range facilities provide a cost effective method of flight testing missile and target components applicable to the NMD program. The range instrumentation provides a cost effective capability to collect target signature characteristics, phenomenology data, and target/interceptor diagnostics on flight tests. These facilities and capabilities support systems design, verification and validation of target realism, and the evaluation of test results. This project was a portion of Project 3300 in the FY95 President's budget and will be transitioned to Project 3360 (P.E. 0603871) and 3360 (P.E. 0603872) starting in FY96.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3360)
PE Title: NMD Tech (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:

- ($ 11.534M) Provided ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at the AOEC, hover test capability at the NHTF. Initial operating capability (IOC) of the full flight duplication capability at Tunnel 9. Limited command and control capability at the CERES. Design and planning of the Wide-Band IR Scene Projector (WISP) at the KHILS facility.
- ($ 3.650M) Provided test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of NMD and Technology Readiness range facilities, and associated range instrumentation sites.
- ($ 9.045M) Provided range instrumentation, upgrades, data collection, and analyses for BMDO testing including: deployment of Rapid Optical Beam Steering (ROBS) system, and data collecting and processing by the High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor.

(U) FY 1995 Plans:

- ($ 6.600M) Provide ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test capability at NHTF, command/control technology experiments from CERES, sensor testing at POST, CALM and NRD, and phenomenology characterization at AMOR and KHILS. Completion of the full flight duplication capability at Tunnel 9, and full command and control capability at CERES. IOC of the WISP at KHILS and IOC of AOEC.
- ($ 2.250M) Provide test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of NMD and Technology Readiness range facilities, and associated range instrumentation sites.

- ($ 4.708M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including: IOC of the Rapid Optical Beam Steering (ROBS) system, and data collecting and processing by the High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor.

(U) FY 1996 Plans:

- ($ 5.067M) Provide ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test capability at NHTF, command/control technology experiments from CERES, sensor testing at POST, CALM and NRD, phenomenology characterization at AMOR and KHILS, and primary infra-red standards at the NIST. Completion of the WISP at KHILS and completion of AOEC.
- ($ 2.985M) Provide test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of NMD and Technology Readiness range facilities, and associated range instrumentation sites.
- ($ 3.359M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including: the Rapid Optical Beam Steering (ROBS) system, and data collecting and processing by the High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor.

(U) FY 1997 Plans:

- ($ 5.650M) Provide ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test capability at NHTF, command/control technology experiments from CERES, sensor testing at POST, CALM and NRD, phenomenology characterization at AMOR and KHILS, and primary infra-red standards at the NIST.
- ($ 3.000M) Provide test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of NMD and Technology Readiness range facilities, and associated range instrumentation sites.

- ($ 3.301M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including: the Rapid Optical Beam Steering (ROBS) system, and data collecting and processing by the High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor.

Acquisition Strategy: In the selection and acquisition of ranges and test facilities the BMDO implements a Reliance process which a) maintains perspective of national technical test capabilities; b) is responsive to program requirements; c) uses existing test resources where possible; d) requires coordination prior to development of new resources; and e) consolidates management of existing resources where possible and practicable. This policy results in a variety of acquisition methods. Executing Agent Project Managers for the elements and tasks under this project include the three services and the BMDO, to take best advantage of existing strengths and capabilities. Service Project Manager organizations specifically include : the U.S. Army Space and Strategic Defense Command (USASSDC), the U.S. Navy Office of Naval Research, Navy Ballistic Missile Defense Technology and the U.S. Air Force Phillips Laboratory. The majority of the ground test facilities are government owned and operated, many with some degree of contractor support, which support multiple BMDO users. The ranges on this project supporting NMD are part of the DoD Major Range and Test Facility Base (MRTFB) (KMR, ETR, and WTR). The HALO and the IRIS sensor are operated by competitively awarded contracts. The ROBS laser radar was developed by a contractor who is providing continuing technical support through the initial check-out and operation.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	26,234	14,697	14,478	14,478	69,887
Appropriated Value		14,697			14,697

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3360)
PE Title: NMD Tech (U)

Adjustments to Appropriated Value		-3,139			(3,139)
Current Budget Submit	24,229	11,558	11,411	11,951	59,149

Change Summary Explanation:

Funding: Project 3360 has combined all of the projects which have previously been designated 3310, 3311, and 3313. The FY95 RDT&E Descriptive Summary of these previous projects were combined in CDS 3300 with other test and evaluation support projects.

Schedule:

Technical:

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1151, Sensors, 0603871C	No
1155, Phenomenology Program, 0603871C	No
1161, Advanced Sensor Technology, 0603173C	No
1265, Boost Phase Interceptor, 0603870C	No
1267, Ground Base Interceptor, 0603871C	No
1270, Advanced Interceptors, 0603173C	No
1360, Directed Energy, 0603173C	No
1651, Innovative Science and Technology, 0602173C	No
2358, HAWK System BMC3, 0603863C	No
3157, Environmental, Siting & Fac, 0603871C	No

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3360)
PE Title: NMD Tech (U)

3354, Targets, 0603871C	No
3359, System Test and Evaluation, 0603871C	No
3360, Test Resources, 0603872C, 0603173C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

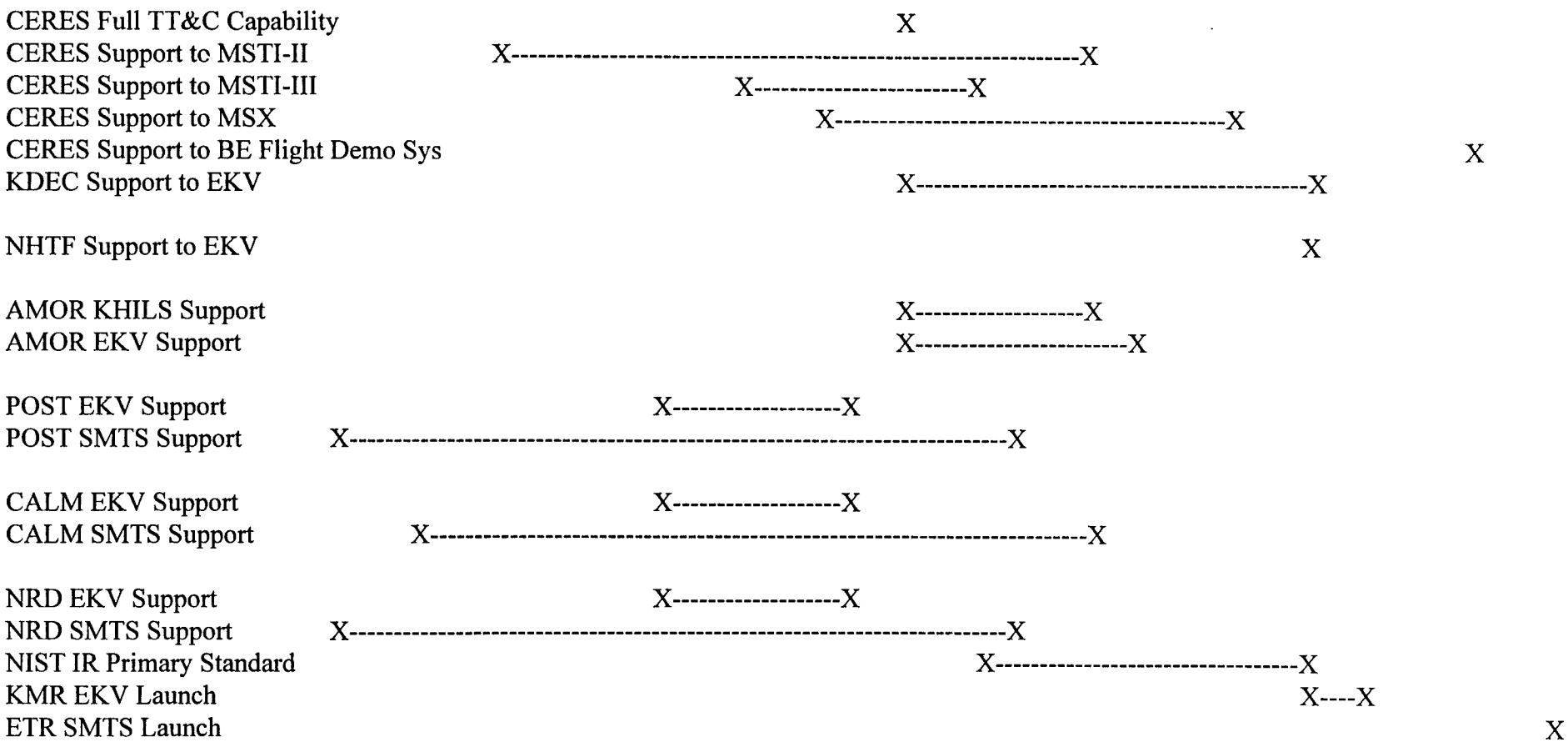
D. (U) Schedule Profile

Milestones	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
KHILS WISP IOC								X								
KHILS WISP FOC													X			
KHILS Support EKV											X	----------	----------	X		
Tunnel 9 Full Flight Dup IOC					X											
Tunnel 9 Phenomenology Support					X											
Tunnel 9 AIT Support								X	----------	X						
AOEC IOC							X									
AOEC FOC													X			
AOEC AIT Support						X	----------	----------	----------	----------	----------	X				
CERES IOC				X												

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3360)
PE Title: NMD Tech (U)



RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603871C (Proj: 3360)
PE Title: NMD Tech (U)

Milestones	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
WTR MSTI-II Launch			X													
WTR MSTI-III Launch							X									
WTR MSX Launch							X									
HALO/IRIS MSX Target Phenom							X									
HALO/IRIS EKV Launch										X	----	X				
HALO/IRIS Red Tigress Phenom										X						
ROBS Initial Deployment		X														
ROBS Test and Checkout	X	---------	X													
ROBS IOC						X										
ROBS FOC								X								
ROBS Sensor Test Bed														X		

Planned Milestones Beyond FY1997: Continued BMDO required range resources upgrades.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603871C (Proj: 4154)
PE Title: NMD Tech (U)

Project Number / Title: 4154 Operations Fluctuation Account

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603871C RDT&E	13,154	3,330	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides funding to meet operational, contractual, and statutory fiscal requirements. Operational requirements include reimbursable services acquired through the Defense Business Operating Fund (DBOF), such as accounting services provided by the Defense Finance and Accounting Service (DFAS). Contractual requirements include reserves for special termination costs on designated contracts and provisions for terminating other programs as required. BMDO has additional requirements to provide for foreign currency fluctuations on its limited number of foreign contracts. Statutory requirements also require funding for charges to cancelled appropriations in accordance with Public Law 101-510. This project also provides the capability for maintaining the funding for new initiatives or execution facts of life changes that are not specifically know at this time.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:

- o Funding is used on as needed basis.
- o Funding for this project has enabled and will enable BMDO and BMDO's executing agents to centralize funding for these types of activities where they can relate to various different technology programs. This optimizes their value across the entire range of BMDO projects and allows for management of these costs centrally. This strategy of centralized management will continue to occur throughout this program.

(U) FY 1995 Plans:

- o Funding is used on as needed basis.
- o Funding for this project has enabled and will enable BMDO and BMDO's executing agents to centralize funding for these types of activities where they can relate to various different technology programs. This optimizes their value across the entire range of BMDO projects and allows for management of these costs centrally. This strategy of centralized management will continue to occur throughout this program.

(U) FY 1996 Plans:

- o Funding is used on as needed basis.
- o Funding for this project has enabled and will enable BMDO and BMDO's executing agents to centralize funding for these types of activities where they can relate to various different technology programs. This optimizes their value across the entire range of BMDO projects and allows for management of these costs centrally. This strategy of centralized management will continue to occur throughout this program.

(U) FY 1997 Plans:

- o Funding is used on as needed basis.
- o Funding for this project has enabled and will enable BMDO and BMDO's executing agents to centralize funding for these

types of activities where they can relate to various different technology programs. This optimizes their value across the entire range of BMDO projects and allows for management of these costs centrally. This strategy of centralized management will continue to occur throughout this program.

Acquisition Strategy: This project is centrally funded within the management account starting in FY95.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	28,545	0	462	462	29,469
Appropriated Value		0			0
Adjustments to Appropriated Value		3,330			3,330
Current Budget Submit	13,154	3,330	0	0	16,484

Change Summary Explanation:
Funding: Changes reflect activity since January 1994 FY95 President's Budget
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY
All BMDO projects in this PE receive support from this project.

D. (U) Schedule Profile Not Applicable

Other Theater Missile Defense Activities
PE 0603872C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603872C
PE Title: Other Theater Missile Defense (U)

Project Number and Title:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
1155 Phenomenology Program	2,861	40,348	44,011	52,777	60,684	59,661	58,855	59,065	Continuing
1161 Advanced Sensor Technology	3,024	2,739	3,782	3,800	3,694	3,586	3,607	3,586	Continuing
1170 TMD Risk Reduction	14,295	25,550	46,458	40,000	40,831	28,590	28,715	28,826	Continuing
1293 Advance Capability 2/3 Concept Design	0	0	0	0	35,494	37,937	23,669	23,857	Continuing
2160 TMD Existing System Modifications	20,004	15,701	26,869	25,000	14,583	14,537	0	0	Completed
2259 ACES / ADP	64,771	48,068	56,558	44,200	47,539	51,849	52,075	52,277	Continuing
2294 Advanced Capabilities -- Acquisition	0	0	0	0	99,649	93,551	480,632	640,615	Continuing
3153 Arch, Analysis / BMC3 Initiatives	0	4,820	9,330	9,375	9,114	9,086	9,125	9,161	Continuing
3157 Environmental, Siting, & Facilities	0	0	4,036	4,054	4,097	4,084	4,108	4,123	Continuing
3160 Readiness Planning	0	1,146	1,951	1,960	1,906	1,900	1,908	1,915	Continuing
3251 Systems Engineering and Technical Support	33,372	53,207	47,836	56,926	66,714	59,375	67,991	70,276	Continuing
3265 User Interface	10,574	12,603	16,843	16,926	11,594	11,558	16,608	16,653	Continuing
3270 Threat and Countermeasures Program	0	0	24,810	24,931	31,580	31,580	31,580	31,580	Continuing
3352 Modeling & Simulations	31,475	64,801	70,521	57,486	61,990	59,181	60,023	60,257	Continuing
3354 Targets Support	43,051	64,042	26,091	29,900	40,637	20,704	47,695	47,880	Continuing
3359 System Test & Evaluation	34,042	27,758	47,137	46,720	48,056	29,667	29,896	30,978	Continuing
3360 Test Resources	14,919	25,585	34,237	35,853	34,937	34,808	35,494	35,651	Continuing
PE TOTAL	272,388	386,368	460,470	449,908	613,099	551,654	951,981	1,116,700	

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

Theater Missile Defense programs, projects, and activities in Advanced Development that have as a primary objective the development of technologies capable of supporting systems, components, and architectures that could produce highly effective defenses against theater missile threats. Includes manpower authorizations and the associated costs specifically identified and measured to the performance of these programs.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603872C
PE Title: Other Theater Missile Defense (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:
(U) FY 1994 Accomplishments: See individual R-2 project summaries.
(U) FY 1995 Plans: See individual R-2 project summaries.
(U) FY 1996 Plans: See individual R-2 project summaries.
(U) FY 1997 Plans: See individual R-2 project summaries.

Acquisition Strategy: See individual R-2 project summaries.

B. (U) Program Change Summary:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	268,657	438,681	447,392	444,100	1,598,830
Appropriated Value		381,931			381,931
Adjustments to Appropriated Value		4,437			4,437
Current Budget Submit	272,388	386,368	460,470	449,908	1,569,134

Change Summary Explanation:

Funding: See individual R-2 project summaries.
Schedule: See individual R-2 project summaries.
Technical: See individual R-2 project summaries.

C. (U) Other Program Funding Summary

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Demonstration/Validation)

Program Element Number: 0603872C
PE Title: Other Theater Missile Defense (U)

Related RDT&E:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate
0602173C SPT TECH EXP DEV	70,160	84,005	93,308	105,313	105,003	100,397	95,568	93,669
0603173C SPT TECH ATD	252,862	134,402	79,387	87,823	57,823	57,823	66,323	66,323
0603861C THAAD SYSTEM DEM/VAL	710,093	651,901	576,327	72,188	0	0	0	0
0603863C HAWK DEM/VAL	29,629	26,800	23,188	0	0	0	0	0
0603864C TMD-BMC3 DEM/VAL	12,617	20,009	24,231	24,425	25,237	20,751	22,193	22,278
0603865C PAC3 DEM/VAL	77,584	0	0	0	0	0	0	0
0603867C NAVY L/T DEM/VAL	150,446	139,676	0	0	0	0	0	0
0603868C NAVY U/T DEM/VAL	81,000	68,450	30,442	33,400	0	0	0	0
0603869C CORPS SAM DEM/VAL	16,270	14,971	30,442	33,400	0	0	0	0
0603870C BPI DEM/VAL	37,022	40,000	49,061	44,300	66,300	72,300	0	0
0603871C NMD DEM/VAL	549,973	386,988	370,621	399,038	399,341	399,318	399,472	399,472
0604861C THAAD SYSTEM EMD	0	0	0	664,000	838,000	619,100	212,000	86,000
0604864C TMD-BMC3 EMD	0	534	14,301	17,976	25,977	20,861	29,201	29,314
0604865C PAC3 EMD	42,097	276,283	247,921	160,070	65,005	775	487	98
0604866C PAC3 RISK EMD	97,000	74,000	19,485	9,760	0	0	0	0
0604867C NAVY L/T EMD	0	0	237,473	193,600	142,680	151,428	115,482	50,323
0605218C MGMT	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971

D. (U) Schedule Profile
See individual R-2 project summaries.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1155)
PE Title: Other TMD (U)

Project Number / Title: 1155 Phenomenology Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	2,861	40,348	44,011	52,777	60,684	59,661	58,855	59,065	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides direction (in response to Theater Missile Defense (TMD's) radar and electro-optical signature needs) and associated sensor costs for the Cobra Judy and Airborne Surveillance Testbed (AST) data collection platforms. This project funds the operating costs of the Cobra Judy radar platform and the core operating costs of the AST optical data collection platform. The mission signature requirements are provided either directly by various projects or through the Target Signature Working Group (TSWG). This project manages the facilities (data centers) that are needed to store and make available the critical data to the TMD user community. This project provides for radar and optical algorithm and model development to aid in the rapid distinction of incoming missile targets from natural and clutter backgrounds and/or penaids.

(U) Activities under this project include the tasking and direction for the collection of radar and optical data on TMD missile targets and intercept events to satisfy the needs and requirements levied through the TSWG (Project 1170) and by the various project offices. Discrimination algorithms that are specific to TMD applications are developed and evaluated. The Lexington Discrimination System (LDS) is used to evaluate discrimination algorithm performance and serve as a test bed for development of discrimination architectures. Storage, archiving and retrieval of data takes place in the BMDO-funded Background, Plume, and Missile Defense data centers.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1155)
PE Title: Other TMD (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The continuing mission of this project is to manage the data collection assets (Airborne Surveillance Testbed (AST), Cobra Judy and Cobra Eye); to collect, store, retrieve, and distribute critical data to BMDO users; and to apply resulting phenomenological data to develop and validate discrimination algorithms and architectures, and plume/background models, that directly support TMD systems development. This project identifies gaps in the database and recommends specific data collection events. This project monitors other BMDO data collection programs.

(U) FY 1994 Accomplishments:

- ($2.861M) Data Centers and Management. Missile Defense Data Center processed a total of 500 requests from THAAD/GBR and other TMD programs for missile hardbody and signature data. More than 250 gigabytes of signature data distributed, and more than 1,000 gigabytes of missile signature data archived.

(U) FY 1995 Plans:

- ($2.557M) Data Centers and Management. BMDO data centers will receive, store, archive, and distribute BMDO missile hardbody and signature test data for use by the TMD program offices and contractor community. Provides needed upgrades for data storage and retrieval to support TMD program offices.
- ($32.412M) Data Collection Platforms. Cobra Judy operating costs and AST core operating costs to collect radar and optical data on Storm and Hera test targets, THAAD flight test vehicles, THAAD intercept events, Navy lower tier Block IVA and

LEAP tests, Countermeasures Hands-On Program (CHOP) Skunkworks missile launches, and other technology readiness target and threat replica programs. Mission costs for AST provided by Project 1170. Maintains storage of Cobra Eye sensor system.

- o ($7.204M) Algorithm and Model Development. Develop, implement, and test real-time TMD infrared/radar algorithm architectures for threat typing, discrimination, target object map generation, and aimpoint selection. Continue development and application of new techniques including image analysis, radar cross-section polarimetric analysis, and data fusion. Hosts TMD-GBR prime contractor's radar discrimination architecture on LDS testbed for independent verification and validation. Upgrades LDS testbed to demonstrate active algorithm architectures of multiple targets and single sensors. Performs simulation and analysis of THAAD Dem/Val scenarios, and develops and tests optical discrimination and aimpoint algorithms to aid THAAD contractors in validating their optical discrimination algorithms. Develop initial capability for reentry hardbody breakup and debris for discrimination needed for target handoff. Integrates above-the-horizon/below-the-horizon background models to include updating PLEXUS 3.0 code by incorporating clouds, atmospherics, terrain and celestial backgrounds models.

(U) FY 1996 Plans:

- o ($7.053M) Data Centers and Management. BMDO data centers will receive, archive, and distribute BMDO background, plume and missile signature test data for use by the TMD program offices and contractor community. Provide minimal upgrades to data retrieval and data analysis tools.
- o ($18.747M) Data Collection Platforms. AST core operating costs to continue optical data collection in support of THAAD intercept events, Capricorn Blue, the TMD Critical Measurements Program (TCMP) campaign, and other technology readiness programs.
- o ($18.211M) Algorithm and Model Development. Develop, refine, and demonstrate active and passive algorithm architectures of multiple targets and single sensors on LDS testbed. Develop multi-sensor data fusion algorithms which perform efficient

data resource allocation. Use LDS to develop and evaluate real-time algorithms for tumbling targets and high resolution imaging in support of THAAD/GBR. Perform statistical evaluation of radar/optical discrimination algorithms using field test data. Continue simulation/analysis of THAAD Dem/Val optical discrimination and aimpoint algorithms, and finalize prototype algorithms (target selection, aimpoint selection, and kill assessment) for THAAD objective system. Complete and distribute MOSART 2.0 (low altitude atmospheric structure model) to TMD system designers. Develop integrated handover/discrimination information for aimpoint selection using interceptor foreground and integrated RF hardbody and radar plume signatures for early detection of TBMs. Continue participation in international technical exchange programs (U.S./U.K. Scientific Cooperative Research Exchange (SCORE) Program - Target Signatures & Backgrounds Panel, NATO Extended Air Defense (EAD)/TMD Ad Hoc Working Group - Plume Phenomenology Expert Group (U.S., U.K., France, Canada), U.S./French Bilateral Group - Plumes, Backgrounds, and Reentry Signatures, U.S./Israeli TBM Signature and Phenomenology Research, U.S./German Phenomenology Research) in the areas of optical and radar discrimination, reentry, and background and plume phenomenology.

(U) FY 1997 Plans:

- (\$7.088M) Data Centers and Management. BMDO data centers will receive, archive, and distribute BMDO background, plume, and missile signature test data for use by the TMD program offices.
- (\$26.339M) Data Collection Platforms. AST core operating costs for continued optical data acquisition of THAAD intercept events, Navy Lower tier Block IVA tests, and PAC-3 tests. Additional funding is provided for expanded data collection and sensor development efforts including the use of existing high altitude aircraft to collect spectral data on natural backgrounds and signatures of ballistic missiles during their boost and mid-course phases of flight. These efforts also includes the development and testing of new long wavelength sensing techniques for discrimination on airborne and space borne platforms. The feasibility of placing an X-band high resolution radar on an aircraft to enable rapid response collection of radar track and image data will be evaluated.

- ($19.350M) Algorithm and Model Development. Demonstrate active and passive algorithm architectures of multiple targets and multiple sensors on LDS testbed. Demonstrate real-time algorithms for battlefield learning, target object mapping, and aimpoint selection for PAC-3, THAAD/GBR, and Corps SAM. Field candidate algorithms for real-time verification. Continue support to TMD programs in sensor design, discrimination, aim point selection, and algorithm development. Continue development and release of improved backgrounds codes for THAAD. Integrate radar ground clutter model for TMD-GBR and Corps SAM. Continue participation in international technical exchange programs in the areas of optical and radar discrimination, TBM reentry, and background and plume phenomenology.

Acquisition Strategy: This project funds data centers, data collection platforms, and algorithm and model development through executing agents in the Air Force (Phillips Laboratory and Arnold Engineering Development Center), Army (Space and Strategic Defense Command), Navy (Naval Research Laboratory) and BMDO (Institute for Defense Analysis) via existing contracts.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	3,000	58,011	38,125	38,125	137,261
Appropriated Value		49,420			49,420
Adjustments to Appropriated Value		-9,072			(9,072)
Current Budget Submit	2,861	40,348	44,011	52,777	139,997

Change Summary Explanation:
Funding: This project represents the realignment/consolidation of the following projects from the FY95 President's Budget: 1105 (Discrimination) except for TCMP and the Kill Assessment Program which are now part of Project 1170, part of Project 1101 (Optical

Signature Code), part of Project 3300 (Data Centers and AST), and part of Project 3152 (Technical Analysis). The increase in funding from FY94 to FY95 is due to: 1) Project roll up described in the paragraph above, 2) TMD began to contribute to the cost sharing of this project, and 3) reductions and terminations of planned TMD funding for efforts in Algorithm and Model Development.

The increase in Data Centers and Management funding from FY95 to FY96 is due to (1) an increase in the TMD proportion of the cost sharing, and (2) restoration of funding to planned levels. The reduction in Data Collection Platform funding from FY95 to FY96 is due to the termination of BMDO funding for Cobra Judy. Cobra Judy program will be transferred to the Air Force in FY96. The increase in Algorithm and Model Development funding from FY95 to FY96 is due to (1) the increase in the TMD proportion of the cost sharing, (2) the shifting of funding responsibility from Technology to TMD and NMD cost sharing.

The increase in Data Collection Platform funding from FY96 to FY97 is due to start of expanded data collection and sensor development efforts that support TMD programs.

Schedule: None

Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155, Phenomenology, 0603173C	Yes
1155, Phenomenology, 0603871C	Yes
1170, TMD Risk Reduction, 0603872C	Yes
2154, TMD-GBR, 0603862C/0604862C	Yes
2257, PAC-3, 0603865C/0604865C	Yes

2260, THAAD, 0603861C/0604861C	Yes
2262, Corps SAM, 0603869C	Yes
1266, Navy Theater-wide TBMD, 0603868C	Yes
2263, Navy Area TBMD, 0603867C/0604867C	Yes
3360, Test Resources, 0603872C	Yes
3359, System Test & Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Data Collection			(a)*		(a)	(a)	(b)									
Algorithm Development		(c)*			(d)			(c)	(e)	(d)		(c)		(c)	(d)	

(a) Support THAAD test flight program
(b) End BMDO sponsorship of COBRA JUDY system
(c) THAAD - deliver software releases (backgrounds, optical discrimination algorithms)
(d) TMD-GBR - deliver software releases (radar discrimination algorithms)
(e) Navy Area TBMD (Lower Tier) - deliver software releases (optical/radar discrimination algorithms)
(e) Corps SAM, Navy Theater Wide (Upper Tier) - deliver software releases (plumes, backgrounds, optical/radar discrimination algorithms)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 1161)
PE Title: Other TMD (U)

Project Number / Title: 1161 Advanced Sensor Technology

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	3,024	2,739	3,782	3,800	3,694	3,586	3,607	3,586	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) Survivability (TMD)

(U) The goal of this program is to develop and demonstrate survivability technologies to insure that ballistic missile defense systems can perform their mission in all required environments. Ballistic missile defenses must be able to operate in disturbed environments and against countermeasure rich threats. The requirements for this Survivability program are: define, develop and demonstrate survivability enhancement options for theater missile defense systems; develop and transfer survivability enhancement option (SEO) technology base to research and development centers and laboratories; provide risk reductions to support THAAD/GBR Milestone II.

(U) This program develops and demonstrates survivability technologies to ensure that Theater Missile Defense (BMD) elements can perform their mission in all expected hostile threats. Approaches include: studies/analyses; defense suppression threat mitigation technologies development; developing enhanced shelters applying camouflage, concealment and deception (CCD), SEO development; Electromagnetic Environmental Effects (E3) engineering support, survivability/operability demonstrations, development of issue resolution approaches, development of Anti-Radiation Missile (ARM) Countermeasure Evaluator (ACE), and hardened technology integration. Technologies will be available for incorporation into missile defense systems at EMD and will also provide near-term

improvements to existing systems. Demonstrations will provide necessary risk reduction evidence to support THAAD System milestone decisions.

(U) This project is assigned to the Budget Activity and Program Element Codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY94, this program developed tools to evaluate TMD-GBR performance under defense suppression threats, and in hostile environments. These evaluations will support the THAAD/GBR Milestone II decisions. The Anti-radiation Missile Countermeasure Evaluator operational capability was completed. Countermeasures for precision guided missiles and cruise missiles continued to be developed. Camouflage, concealment and deception techniques applied to the TMD-GBR were evaluated for effectiveness in battlefield conditions. Requirements for the TMD-GBR to be protected against electromagnetic environmental effects were reviewed, and criteria were identified.

(U) FY 1994 Accomplishments:

- ($1.620M) Completed ACE development and conducted initial Hardware in the loop electronic counter-countermeasure/Decoy survivability enhancement option assessment
- ($0.900M) Completed SEO definition for TMD user operational evaluation system (UOES)
- ($0.504M) Completed E3 criteria for TMD-GBR and THAAD

(U) FY 1995 Plans:

- o ($1.689M) ACE. Upgrade ACE with additional threat modeling. ACE combines the desirable effects of low-cost digital simulations and actual hardware testing of actual ARM hardware in open and closed-loop flight simulations. ACE will be used to develop initial ARM ECCM techniques for GBR and PATRIOT.
- o ($0.800M) CCD. The multi-spectral signature of the deployed TMD-GBR system will require application of extensive CCD technologies which have been developed by the Army Labs. This program will publish initial CCD signature suppression and conventional hardening SEO design guidelines. In addition, it will develop an enhanced shelter proof of principle test, and conduct a SAR countermeasures proof of principle test.
- o ($0.100M) E^3. GBR transmit/receive modules and antenna elements cannot be shielded. This program will provide E^3 guidelines which detail the effects of electromagnetic threats to the TMD-GBR. This program will also test the UOES T/R modules to EMP and HPM conditions to evaluate their susceptibility to these environments.
- o ($0.150M) Technology assessments, program reviews, and technical assistance.

(U) FY 1996 Plans:

- o ($2.000M) ACE. Use ACE to evaluate the performance effectiveness of GBR BM/C3 in hostile environment.
- o ($1.200M) CCD. Conduct CCD countermeasures tests and ballistic hardening trades to optimize and allocate SEOs across the reconnaissance, surveillance, tracking, acquisition (RSTA) threat.
- o ($0.582M) Conduct analysis of vulnerability to precision guided munitions, and analysis of PGM SEO designs.

(U) FY 1997 Plans:

- o ($2.700M) Conduct ACE evaluation of Corps SAM countermeasures
- o ($1.000M) Conduct PGM SEO Proof of Principle test
- o ($0.100M) Upgrade E^3/NBC guidelines

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 1161)
PE Title: Other TMD (U)

(U) Acquisition Strategy The survivability technology program supports the tailored and streamlined acquisition strategy employed by the element acquisition managers. Survivability technologies chosen for evaluation/development will be based on requirements. Within the executing agents, free and open competitive contracts will be used to the maximum extent possible to accomplish specific work packages in accordance with field laboratory acquisition procedures. Contract proposals will be evaluated according to innovative technology approaches, responsiveness to program requirements, quality of proposed deliverables, and cost.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	3,024	4,900	3,800	3,800	15,524
Appropriated Value		3,000			3,000
Adjustments to Appropriated Value		-0,261			(261)
Current Budget Submit	3,024	2,739	3,782	3,800	13,345

Change Summary Explanation:
Funding: This project was funded under Program 1501 in the FY95 Presidents budget. For FY95, Congress appropriated $3M, but also reduced RDT&E funding. $216K is this project's share of the undistributed reduction.

Schedule: The program plan has been modified to account for the reduced program, as well as for the 1Q97 schedule slip of the THAAD milestone.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 1161)
PE Title: Other TMD (U)

Technical: none

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency?(Yes[1]/No)
2154 TMD Ground Based Radar PE 0603861C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY94				FY95				FY96				FY97			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones													Xm			X^p
Engineering Milestones								X^b		X^d					X^g	
T&E Milestones																
Contract Milestones																
Other Program Events						X^a		X^c		X^e	X^f				X^h	X^i

a ACE eval of BMC3
b CCD shelter POP
c E3-GBR susceptibility Guide
d ACE test of BMC3 SEO suite
e SEO design to counter PGM

f	CCD SEO test/trades
g	CCD SEO POP
h	ACE eval of Corps SAM
i	E3 guidelines update
m	THAAD Milestone II
p	PAC 3 Milestone III

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1170)
PE Title: Other TMD (U)

Project Number / Title: 1170 TMD Risk Reduction

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	14,295	25,550	46,458	40,000	40,831	28,590	28,715	28,826	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project is the primary BMDO risk mitigation program addressing TMD target/threat signature (and the signature-to-system interface) issues for all TMD systems. This project consists of four programs: TMD Critical Measurements Program (TCMP) which builds, flies, observes, and analyzes targets with signature characteristics similar to those anticipated on foreign threats; the Target Signature Measurements Program which observes and directs the analysis of signatures from BMDO test targets (Storm, Hera, etc.) to obtain target signature truth data, and which exploits other similar threat signature opportunities; the Focal Plane Array Flight Test Program which flies an airborne sensor package carrying a THAAD type focal plane array to directly observe BMDO interceptor targets to obtain representative seeker data; and the Kill Assessment Program which investigates target intercept phenomenology. In all cases, the target signature truth data and the analyses address the specific areas of discrimination, target object map handover, aim point selection, and kill assessment. The core sensor costs used in this project to collect target signature and truth data will be provided under projects 1155 and 3360. This project will be used to fund the specific sensor tasks for each mission.

(U) TMD Critical Measurements Program. This program supports the risk mitigation efforts in TMD signatures. TCMP is a flight test program where threat representative targets are flown at the Kwajalein Missile Range (KMR) in order to observe typical threat-like objects in flight with a sophisticated suite of sensors. These sensors give both target truth data and representative signature data as seen by TMD system sensors. The TCMP program performs the analysis on the data obtained in these flights. In all cases, the target

and threat truth data and the analysis address the specific areas of discrimination, target object map handover, aim point selection, and kill assessment. The hardware, flight instrumentation and analysis of the TCMP flights are all included in the TCMP budget. TCMP-II will consist of four flights in the third quarter of FY96.

(U) Kill Assessment. This program is developing the technical basis that will lead to a battle management decision capability for the TMD architecture. This capability will enable the battle manager to respond nearly "real-time" following a target intercept engagement to either proceed with a cease fire or to order a second shot and/or to cue the lower tier for appropriate action. This kill assessment capability will also help measure defense system effectiveness and identify threat warhead type. In support of this shoot-look-shoot doctrine, the program is conducting a series of specialized sensor data collections of TMD interceptor tests, follow-on data analysis, and algorithm development. The most challenging aspect is gathering enough pertinent data from various types of intercept scenes to identify and evaluate those observable characteristics that will correctly serve this decision process. Since opportunities to observe actual TMD missile intercepts are rare, more emphasis in this two year old program is being made on ground test measurements.

(U) Focal Plane Array Flight Tests. This program will provide for the integration, testing, calibration, and mission support of an airborne optical infrared (IR) sensor using a focal plane array (FPA) similar to the THAAD seeker. The sensor fabrication is complete and will be placed on the high altitude observatory (HALO) aircraft to assist in assessing the platinum silicide (PtSi) FPA performance against TMD-like targets. The sensor will take optical measurements on various TMD tests to include the THAAD Dem/Val. The sensor data will support seeker algorithm and modeling development efforts leading to a more robust system performance capability. This program also supports performance enhancements and survivability issues of the PtSi FPA in direct support of the THAAD seeker.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1170)
PE Title: Other TMD (U)

(U) Target Signature Measurements. This program is the source of direction and funds for per mission costs to acquire truth data using sophisticated sensor platforms (Airborne Surveillance Testbed, HALO, Sealite Beam Director, etc.) on BMDO interceptor target flights (Lance, Storm, Hera, etc.). These data are then utilized by the acquisition programs, by the Target Signatures Working Group (TSWG), and by the Targets Program to establish the in-flight signature characteristics of these targets for use in target hardware development and interceptor algorithm assessment.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 accomplishments included completing the TCMP Campaign I final report and beginning planning for the next TCMP campaign. A comprehensive data base of optical and radar signatures was compiled during FY 1994 and continues to be updated with each mission. The Airborne Optical Sensor design was completed and fabrication of the sensor was initiated during FY 1994. Target signature measurements of foreign TBMs were also conducted during FY 1994.

(U) FY 1994 Accomplishments:

- ($1.945M) Prepared TCMP Campaign I final report; prepared TCMP Campaign II test plan; began design and fabrication of the Fly Along Sensor (FAS) for support of aim point selection efforts.
- ($2.35M) Collected pulse doppler radar data during sled tests at Holloman AFB, collected multi-spectral (radar and optical) data during ERINT, PATRIOT and Navy LEAP tests; supported Lexington Discrimination System (LDS)/Optical Discrimination Algorithm (ODA) kill assessment algorithm development.

- o ($6.7M) Initiated design and fabrication of airborne optical sensor for TMD phenomenology data collection efforts.
- o ($3.3M) Conducted radar cross section (RCS) measurements on foreign TBMs and TBM targets at TBM wavelengths of interest; supported measurement cost for airborne sensors for data collections during major TMD tests.

(U) FY 1995 Plans:

- o ($17.315M) Continue preparation and planning for TCMP Campaign II experimental flight test to include testing of the FAS; purchase and test TCMP flight hardware; begin planning for TCMP Campaign III experimental flight test.
- o ($3.647M) Develop radar and optical algorithms for real-time kill assessment testing; implement radar and optical kill assessment algorithms and data base on LDS test bed; continue sensor data collection efforts and analyze live fire intercept tests for kill assessment.
- o ($2.338M) Complete fabrication of airborne optical sensor for TMD phenomenology data collection; initiate support for data collection missions using the optical sensor; enhance PtSi Focal Plane Array performance and survivability.
- o ($2.250M) Measure optical and RF signatures of Storm and Hera targets for use by all TMD programs.

(U) FY 1996 Plans:

- o ($32.458M) Conduct TCMP Campaign II experimental flight test; analyze, and report test results; complete TCMP Campaign III experimental flight test plan.
- o ($7.0M) Continue radar/optical kill assessment algorithm development; downselect, transfer, and incorporate into the TMD major defense acquisition programs (MDAP) prototype kill assessment techniques for test and evaluation.
- o ($4.0M) Use airborne optical sensor to collect IR data during available flight test, enhance sensor and focal plane array performance in support of TMD interceptors.
- o ($3.0M) Continue to collect data to characterize Storm and Hera targets; collect data on Capricorn Blue flights.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1170)
PE Title: Other TMD (U)

(U) FY 1997 Plans:

- o ($25.0M) Continue preparation and planning for TCMP Campaign III with an expected launch date during the first quarter, fiscal year 1998.
- o ($9.0M) Continue to analyze sensor data of intercept tests and transfer kill assessment technology to TMD MDAPs; evaluate and upgrade, as required, kill assessment algorithm performance.
- o ($5.0M) Continue electro-optical infrared development for missile seekers and continue TMD phenomenology data collection efforts using airborne sensor.
- o ($1.0M) Continue target measurements and observe and characterize THAAD limited user tests.

Acquisition Strategy: The programs in this project are specifically addressing risk areas for TMD systems. Use of Government labs and existing facilities is stressed. Contracting actions for specific hardware devices and flight missions are accomplished by BMDO and SSDC using standard contracting procedures.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	13,700	30,500	46,000	38,000	128,200
Appropriated Value		28,000			28,000
Adjustments to Appropriated Value		-2,450			(2,450)
Current Budget Submit	14,295	25,550	46,458	40,000	126,303

Change Summary Explanation

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1170)
PE Title: Other TMD (U)

Funding: This project was funded under PE 0604216C project numbers 1105 and 1106 in the FY1995 President's Budget. Funding constraints in FY95 required reducing funds for this project. Due to the reduced funding level, TCMP Campaign II is now scheduled for 3Q/FY96 vice 2Q/FY96. Funds were increased in FY96 and FY97 in order to allow for TCMP Campaign III to remain in 2Q/FY98.
Schedule: TCMP Campaign II scheduled for 3Q/FY96 vice 2Q/FY96.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155, Phenomenology Program, 0603872C	Yes
1293, Advanced Capability Concept Development, 0603872C	Yes
2154, TMD-GBR, 0603862C/0604862C	Yes
2260, THAAD, 0603861C	Yes
2294, Advanced Capability Dem/Val, 0603872C	Yes
3251, Systems Engineering and Technical Support, 0603872C	Yes
3261, BM/C3I, 0603864C/0604864C	Yes
3354, Targets, 0603872C	Yes
3360, Test Resources, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 1170)
PE Title: Other TMD (U)

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
Complete Optical Sensor (OS)					X											
Begin OS Aircraft Integration																
T&E Milestone																
TCMP I Final Report X*																
Collect Flight Test Data				X*	X	X	X	X	X	X	X	X	X	X	X	X
OS Data Collection						X	X	X	X	X	X	X	X	X	X	X
Contract Milestone																
Other Program Events																
Measured Foreign TBM RCS			X*													
TCMP Campaign II											X					
Deliver THAAD Algorithms				X												

Planned Milestones Beyond FY1997:

Conduct TCMP Campaign III	2Q/FY98
Kill assessment Efforts	Continuing
Phenomenology Efforts	Continuing

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 1293)
PE Title: Other TMD (U)

Project Number / Title: 1293 Advanced Capability Concept Development Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	0	0	0	0	35,494	37,937	23,669	23,857	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The advanced capability programs are required to counter the theater missile threat that is anticipated to exist in the 2010 to 2015 timeframe. These capabilities will provide improved theater missile defense above and beyond the core program's capabilities.

(U) Today, there are three pre-Milestone 1 programs: 1) Navy Theater Wide TBMD, 2) Corps SAM, and 3) Boost Phase Intercept. Beginning in FY 1998, each of the three programs will transition into one of two new projects: Advanced Capability Concept Development Program (1293) or Advanced Capability DEM/VAL Program (2294).

(U) During FY 1998, one program will proceed into the next acquisition phase under the Advanced Capability DEM/VAL Program (2294) and the two remaining programs will continue as concept development programs under the Advanced Capability Concept Development Program (1293). Of the two concept development programs, one will proceed into the next acquisition phase in FY 2000, again under the Advanced Capability DEM/VAL Program (2294) while the remaining program will continue in concept development until FY 2004. At that point a decision will be made to move the remaining program into the next acquisition phase under the Advanced Capability DEM/VAL Program (2294). As a program transitions into Advanced Capability DEM/VAL Program (2294) the exact acquisition phase will depend upon the selected program.

(U) This time phased implementation approach is consistent with future military needs and available resources. The first program to enter the Advanced Capability DEM/VAL Program (2294) will then be designated as Advanced Capability I (ACAP I) in FY 1998, the second program as Advanced Capability II (ACAP II) in FY 2000, and the final program as Advanced Capability III (ACAP III) in FY 2004.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments: No programs will transition into this project until FY1998.

(U) FY 1995 Plans: None

(U) FY 1996 Plans: None

(U) FY 1997 Plans: None

(U) Acquisition Strategy:Today, there are three pre-Milestone 1 programs: 1) Navy Theater Wide TBMD, 2) Corps SAM, and 3) Boost Phase Intercept. Beginning in FY 1998, each of the three programs will transition into one of two new projects: Advanced Capability Concept Development Program (1293) or Advanced Capability DEM/VAL Program (2294).

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 1293)
PE Title: Other TMD (U)

(U) During FY 1998, one program will proceed into the next acquisition phase under the Advanced Capability DEM/VAL Program (2294) and the two remaining programs will continue as concept development programs under the Advanced Capability Concept Development Program (1293). Of the two concept development programs, one will proceed into the next acquisition phase in FY 2000, again under the Advanced Capability DEM/VAL Program (2294) while the remaining program will continue in concept development until FY 2004. At that point a decision will be made to move the remaining program into the next acquisition phase under the Advanced Capability DEM/VAL Program (2294). As a program transitions into Advanced Capability DEM/VAL Program (2294) the exact acquisition phase will depend upon the selected program.

(U) This time phased implementation approach is consistent with future military needs and available resources. The first program to enter the Advanced Capability DEM/VAL Program (2294) will then be designated as Advanced Capability I (ACAP I) in FY 1998, the second program as Advanced Capability II (ACAP II) in FY 2000, and the final program as Advanced Capability III (ACAP III) in FY 2004.

The exact acquisition strategy will depend upon the programs which transition into this project in FY1998.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	0	0	0

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 1293)
PE Title: Other TMD (U)

Change Summary Explanation:
Funding: This project was funded under PE 0604216C project number 2215 in the FY1995 President's Budget.
Schedule: None
Technical: None

C. OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155, Phenemenology Program, 0603872C	Yes
1170, TMD Risk Reduction, 0603872C	Yes
1265, Boost Phase Intercept, 0603872C	Yes
1266, Navy Theater Wide TBMD, 0603868C	Yes
2262, Corps SAM, 0603869C	Yes
2294, Advanced Capability Dem/Val Program, 0603872C	Yes
3153, Architecture Analysis/BMC3 Initiatives, 0603872C	Yes
3251, Systems Engineering and Technical Support, 0603872C	Yes
3261, BM/C3I, 0603872C	Yes
3270, Threat and Countermeasures Program, 0603872C	Yes
3359, System Test And Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

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PE: 0603872C (Proj: 1293)
PE Title: Other TMD (U)

D. (U) Schedule Profile

Planned Milestones Beyond FY1997:

Select ACAP I	1Q98
Select ACAP II	1Q00
Select ACAP III	1Q04

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 2160)
PE Title: Other TMD (U)

Project Number / Title: 2160 TMD Existing System Modifications

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	20,004	15,701	26,869	25,000	14,583	14,537	0	0	Completed

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Theater Missile Defense (TMD) program is structured to field a defensive capability against theater ballistic missiles as quickly as possible by upgrading existing active defense systems while developing more advanced TMD capabilities. As such, TMD improvements can be made incrementally.

(U) This project provides the enhancement of warning and surveillance capabilities, including fixed and mobile tactical processing of launch detection data (from the Defense Support Program (DSP), space early warning systems, or other means) and netted surveillance to support intercepts and broader defense coverage.

(U) This project implements non-major defense acquisition programs modifications to current and existing warning and surveillance systems that result in fielded improvements to TMD capabilities. This project consists of three programs; Cueing and Netting, Talon Shield, and the Extended Airborne Global Launch Evaluator (EAGLE).

(U) Cueing And Netting. Cueing and Netting is a program developing software and hardware modifications for PATRIOT which will allow PATRIOT to receive and process cueing data from theater sensors such as the Joint Tactical Ground Station (JTAGS) and the AN/TPS-59. These cues allow early track initiation and allow planning for multiple shot engagements.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 2160)
PE Title: Other TMD (U)

(U) Talon Shield. Talon Shield processing equipment, located at Falcon Air Force Base, receives and processes DSP and other national intelligence data on TBM events to provide timely warning of TBM launch point, time, and azimuth, and impact point prediction to tactical units. Processing equipment is located at the NTF. This program is related to Army JTAGS and Air Force ALERT programs.

(U) EAGLE. The EAGLE is developing and fielding a TBM detection, tracking, and cueing system aboard Air Force E-3 AWACS aircraft. Consisting of a passive infrared search and track (IRST) sensor and an eye-safe laser-ranger, EAGLE provides precise cues to deployed TMD-GBR and SPY-1 fire control radars, as well as early, highly accurate improved estimates of TBM launch points and impact points. EAGLE's precise tracking begins before booster burnout and continues through the early post-boost phase of missile flight. Against long-range TBMs, EAGLE will track inflight missiles prior to their detection by surface-based radars, which are constrained by viewing limitations imposed by curvature of the earth. EAGLE target cues will be much more accurate than those available from Talon Shield or JTAGS, which do not support extended range, single-beam radar acquisition of long-range TBMs. EAGLE's highly accurate prediction of a TBM's future trajectory makes it unnecessary for fire control radars to search for the missile, enabling the radars to acquire the TBM earlier, at longer range, using a single, precisely pointed radar beam. This longer range acquisition permits earlier launch of interceptors, yielding a dramatic increase in the defended area (footprint) for THAAD and SM-2/Blk IVA.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Cueing and Netting. A tactical demonstration of JTAGS and the TPS-59 cueing of the PATRIOT MPQ-53 radar was conducted at White sands Missile Range (WSMR) during FY94.

(U) Talon Shield. Talon Shield development testing for DSP inputs was completed during FY94. The baseline hardware and software configuration was provided to the Air Force for implementation under the ALERT program.

(U) EAGLE. The EAGLE program conducted studies of E-3 AWACS TMD capability and potential TMD laser range/trackers. These efforts verified the technical feasibility and the TMD force multiplier potential of fielding TBM detection, tracking, and cueing sensors on Air Force E-3 AWACS aircraft.

(U) FY 1994 Accomplishments:

- ($2.639M) Cueing and Netting. Analyzed results of MPQ-53 cueing demonstration at WSMR; developed tactical cueing program plan; Initiated Current Systems Improvement Program (CSIP); Analyzed three proposed improvements to existing systems as part of CSIP.
- ($16.488M) Talon Shield. Completed Talon Shield DSP development tests; Prepared to begin Air Force Talon Shield (ALERT) operations.
- ($0.877M) EAGLE. Completed E-3 AWACS TMD capability study. Demonstrated substantial TMD fire control radar performance enhancements are achievable with EAGLE target cueing. Completed TMD Laser Ranger evaluation. Confirmed operational adequacy of available laser ranger technology for TBM detection and tracking, given laser power and pulse rate, calculated two-way transmission losses due to atmospheric scattering and turbulence, detection sensitivity, position determination accuracy, and pointing accuracy and stability. Identified and evaluated alternative sensor configurations and sensor-aircraft integration options.

(U) FY 1995 Plans:

- o ($.998M) Cueing and Netting. Conduct MPQ-53/JTAGS tactical cueing demonstration; begin final tests of cueing software.
- o ($3.974M) Talon Shield. Begin Air Force Talon Shield (ALERT) operations; make key Talon Shield improvements; purchase second Talon Shield processing string for classified sensor data; support concept of operations tests.
- o ($9.4M) EAGLE. Release request for proposals and award the contract for the EAGLE system prime contractor (system integrator); complete System Requirements Review.
- o ($1.329M) EAGLE. Confirm sensor field of regard requirements using real-time, interactive theater air defense simulations at the Air Force Theater Air Command and Control Simulation Facility (TACCSF); refine specification of operational, technical performance and interface requirements for providing target cues to TMD-GBR and SPY-1 fire control radars, and supporting TMD BMC3 with TBM launch estimates and impact point predictions; demonstrate operational utility, and support joint service integration planning, using surrogate sensor platform (e.g., Airborne Surveillance Testbed, Cobra Ball) participation in field exercises; conclude memoranda of agreement (MOA) with foreign governments detailing foreign participation in component or subsystem design, development, and fabrication; employ ARPA's Airborne Infrared Measurements System (AIRMS) test aircraft to collect flight test data (under operating conditions comparable to those expected for the AWACS EAGLE sensor system) that are appropriate to demonstrate the planned AWACS EAGLE concept of operations, and perform studies and analyses of TBM IR detection and tracking issues relevant to the definition of AWACS EAGLE technical requirements and concept of operations.

(U) FY 1996 Plans:

- o ($1.99M) Cueing and Netting. Conduct operational MPQ-53/TPS-59/JTAGS tactical cueing demonstration and analyze results.

- o ($4.976M) Talon Shield. Complete Talon Shield processor and calibration upgrades; fully demonstrate added capability of DSP processing of classified sensor data.
- o ($19.0M) EAGLE. Complete sensor preliminary design review (PDR) and system critical design review (CDR); finalize system design; commence sensor rapid prototyping; complete fabrication of sensor components and integrate sensor subsystems; conduct tests in contractor laboratories to characterize component, subsystem, and integrated system performance under controlled conditions; and initiate ground field tests at various locations throughout the United States to further characterize sensor performance in more realistic but less controlled environments.
- o ($0.903M) EAGLE. Continue demonstration of EAGLE operational utility, and support of EAGLE joint service integration planning, using surrogate sensor platform participation in field exercises; complete joint service specification of operational procedures for providing target cues to TMD-GBR and SPY-1 fire control radars, and supporting TMD BMC3 with TBM launch point estimates and impact point predictions.

(U) FY 1997 Plans:

- o ($4.0M) Talon Shield. Continue Talon Shield test and evaluation activities; demonstrate fusion and processing of other intelligence data.
- o ($21.0M) EAGLE. Prior to prototype integration on the AWACS TS-3 test aircraft, fully characterize sensor performance under conditions more characteristic of the system operational environment (e.g., in the presence of atmospheric turbulence) by conducting integrated system flight tests on an airborne laboratory against TBM targets of opportunity and surrogate targets at ranges beyond earth limb; integrate the EAGLE sensor aboard the TS-3 aircraft.

Acquisition Strategy: Cueing and Netting and Talon Shield. Modifications to existing systems will be developed as engineering changes to those systems and will follow the acquisition strategy for those systems' engineering change proposals (ECP).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 2160)
PE Title: Other TMD (U)

(U) EAGLE. The majority of EAGLE funding available under this project will be provided to the Air Force Electronic Systems Center, the program Executing Agent, to fund the award of a planned sole source contract to the Boeing Company, to serve as the prime contractor and system integrator, for design, development, fabrication, delivery, integration, and testing of the EAGLE prototype sensor into a system that is fully integrated into the E-3 mission systems. Assuming a favorable EAGLE production decision, ESC will award a contract in 4Q/FY98 for a transition to production, beginning 1Q/FY99, of objective EAGLE sensor systems and the integration of the production sensors aboard operational Air Force E-3 AWACS aircraft.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	20,366	22,000	27,000	25,000	94,366
Appropriated Value		14,971			14,971
Adjustments to Appropriated Value		730			730
Current Budget Submit	20,004	15,701	26,869	25,000	87,574

Change Summary Explanation:

Funding: This project was funded under PE 0604216C project 1106 in the FY1995 President's Budget. Due to reduced funding, the EAGLE contract award was delayed from 2Q/FY95 to 3Q/FY95 and the scope of the Talon Shield integration efforts with classified sensors was reduced.

Schedule: EAGLE contract award delayed from 2Q/FY95 to 3Q/FY95.

Technical: None.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 2160)
PE Title: Other TMD (U)

C. OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
2154, TMD-GBR, 0603864C/0604864C	Yes
2257, PATRIOT, 0604865C	Yes
2260, THAAD, 0603861C/0604861C	Yes
2263, Navy Area TBMD, 0603867C/0604867C	Yes
2358, HAWK System BM/C3, 0603863C	Yes
3251, Systems Engineering and Tech Support, 0603872C	Yes
3261, BM/C3I, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
EAGLE TMD Study		X*														
EAGLE Ladar Eval			X*													
EAGLE SRR								X								
EAGLE SDR									X							
EAGLE PDR										X						
EAGLE CDR											X					

Talon Shield Processor Mods														X						
EAGLE Install On TS-3																	X			
T&E Milestone																				
Talon Shield Op Testing Complete	X*																			
Talon Shield T&E Complete																			X	
EAGLE Ground Lab Tests										X	X	X								
EAGLE Field Ground Tests												X	X	X						
EAGLE Air Lab Tests														X	X					
EAGLE Prototype Flight Tests																			X	X
Contract Milestone																				
EAGLE Release RFP			X																	
EAGLE Award Contract						X														
Other Program Events																				
Cueing Demo X*				X																
Talon Shield Begin ALERT Opns		X*																		
EAGLE Negotiate Intl Participation	X*	X*	X	X	X															

Planned Milestones Beyond FY1997:

EAGLE Contingency Deployment Availability	1Q/FY98
EAGLE Complete Prototype Flight Tests	3Q/FY98
EAGLE Refine Prototype Design	1Q/FY98 - 3Q/FY98
EAGLE Acquisition Decision	3Q/FY98
EAGLE Award Production Contract	4Q/FY98

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

Project Number / Title: 2259 Israeli Co-Operative Projects

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	64,771	48,068	56,558	44,200	47,539	51,849	52,075	52,277	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) These projects include the Arrow Continuation Experiments (ACES) Project, the Arrow Deployability Project (ADP), the Israeli Test Bed (ITB), the Israeli System Engineering and Integration (ISE&I) Project, and the Israeli Co-Operative Research and Development project. The U.S. derives considerable benefits from its participation in the Arrow/ACES Projects. Primary benefits are gains in U.S. technology and data base information that will reduce risks in U.S. TMD development programs. The U.S. could also benefit from the eventual presence of an anti-missile defense system in Israel, through the potential contribution to the deterrence of future tactical ballistic missile (TBM) conflicts in that region the potential contribution to a more robust defensive response if deterrence fails.

(U) ACES is a U.S.-Government of Israel (GOI) initiative to assist the GOI development of an anti-tactical ballistic missile (ATBM) interceptor, to provide the basis for an informed engineering and manufacturing decision for an ATBM defense capability and to provide the U.S. with technology information and data. ACES is a follow-on to the Arrow Experiments project that developed the preprototype Arrow I interceptor. The first phase of ACES, completed in the third quarter FY 94, featured critical lethality tests using the Arrow I interceptor with the Arrow II warhead. The second phase of ACES consists of the design, development and test of the Arrow II interceptor. If successful, the Arrow II will satisfy the Israeli requirement for an interceptor for defense of military assets and population centers and will support U.S. technology base requirements for new advanced antitactical ballistic missile technologies that could be incorporated into the U.S. two-tier theater missile defense (TMD) system.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

(U) After U.S. planning activities in FY 94, the Arrow Deployability Project (ADP) in FY 95 will start to pursue the research and development of technologies associated with the deployment of the Arrow Weapon System and to permit the Government of Israel to make a decision on its own initiative regarding deployment of this system without financial participation by the U.S. beyond the R&D stage. This effort will include three system-level flight tests of the U.S.-Israeli cooperatively developed Arrow II interceptor and launcher supported by the Israeli-developed fire control radar and battle management control center. Studies will be done to define interfaces required for Arrow Weapon System interoperability with U.S. TMD systems, lethality, kill assessment and producibility. Prior to obligation of funds to execute ADP R&D efforts, the President must certify to the Congress that a Memorandum of Agreement (MOA) exists with Israel for these projects, that each project provides benefits to the U.S., that the Arrow missile has completed a successful intercept, and that the Government of Israel continues to adhere to export controls pursuant to the Missile Technology Control Regime (MTCR). Subsequent U.S.-Israeli cooperative R&D on other ballistic missile defense concepts would occur in the future.

(U) The Israeli Test Bed (ITB) Program is a cooperative effort between the U.S. and the GOI. The ITB is a medium-to-high fidelity theater missile defense simulation that provides the capability to evaluate potential Israeli missile defenses, aids the Israeli Ministry Of Defense (IMOD) in the decision of which defense systems to field, provides insights into man's role in TMD, and trains personnel to function in a TMD environment. A structured set of joint U.S./Israeli experiments is being executed to evaluate the role of missile defenses in both mature and contingency Middle East theater operations. This funding also provides for a portion of the operation and maintenance of the ITB and planned enhancements. Completed experiments identified additional enhancements needed to improve the ITB as an analysis tool. The enhancements incorporated in the ITB to date include an adaptive radar simulation, an improved threat model and a Boost Phase Intercept (BPI) simulation. The BPI enhancement benefits the Israeli BPI study. The planned Adaptive Battle Management Center (BMC) enhancement will benefit the U.S. by enabling the ITB to simulate a wide variety of command and control and interoperability issues.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

(U) The Israeli System Engineering and Integration (ISE&I) continues to provide analyses and Arrow Weapon System architecture options in support of the Israeli Missile Defense System. The specific activities that comprise the SE&I effort are: Arrow Weapon System Design, ACES Conformance, ITB Conformance, Hyper Velocity Weapon System Study, Lethality Study, Kill Assessment Study, and analysis of experiments conducted on the HYBRID model to address the complex multi-parameter problems that arise in TMD systems analysis. The ISE&I effort provides support to the ITB project by serving as the on-site monitor of ITB enhancement efforts, responding to problems encountered in the experiments effort, obtaining or developing needed algorithms and schemes for accomplishing various defensive tasks, serving as the liaison between the ITB effort and the ACES Project, and serving as the expert on Israeli defensive strategies and plans. The ISE&I effort also provides expert assessments and analysis of radar-related modeling issues.

(U) The Israel Cooperative Research and Development Project will advance emerging TMD technologies to the technology demonstration phase to provide for the defense of the State of Israel, support U.S. technology base needs for these technologies, and pursue interoperability with U.S. TMD systems. Candidate technologies today are the continuation of the electro-thermal gun experiments and advancement of the Israeli Boost Phase Intercept concept. Efforts in this area will not begin until FY 1997. This timing provides for maturation of U.S. requirements for these areas of TMD technologies.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Since program initiation in 1988, Israel successfully improved the performance of its pre-prototype Arrow I interceptor to the point it achieved successful intercept and target destruction occurred. Arrow II design and component testing progressed to the successful

demonstration of the new warhead, electro-optical seeker, radar fuse, first stage booster, sustainer booster, launcher canister and launcher. Negotiations are underway for the new Arrow Deployability Project and for the Congressionally-required Presidential certification.

(U) The Israeli Test Bed became operational in the second quarter of FY 92. The ITB experiments validated the performance of the prospective near-term Israel Theater Missile Defense System. It provided valuable insight into the potential role of Human-In-Control of a TMD system. Also, the U.S. Test Bed Products Office at the Strategic and Space Defense Center benefited from the application of ITB Program experience to the United Kingdom and the U.S. Extended Air Defense Test Bed (EADTB) Projects.

(U) The ISE&I Project activities demonstrated that defense of the State of Israel from tactical ballistic missile (TBM) attacks is feasible and cost-effective. The ISE&I effort analyzed and addressed numerous TMD system issues including human-in-control, resource allocation, and threat analysis. The U.S. benefited from the architecture analysis work, including identification and progress toward resolution of critical TMD system issues such as kill assessment and the lethality study of a novel interceptor warhead.

(U) FY 1994 Accomplishments:

($56.424M) Arrow Continuation Experiments (ACES)

- o Successfully intercepted a surrogate target carrying a simulated chemical bulk warhead with an Arrow I interceptor.
- o Completed risk reduction experiments for the Arrow II interceptor.
- o Conducted electro-optical seeker survivability tests.

($3.500M) ACES Support

- o Continued to provide Arrow data for risk reduction in the THAAD and SM-2 Block IVA programs.

($1.500M) Arrow Deployability Project Support

- o Negotiated mutually beneficial tasks.

- o Collected RF and optical signature data from the successful Arrow I intercept to prepare the Presidential Certification.
  ($1.115M) Israeli Test Bed (ITB)
- o Completed Israeli TMD systems engineering Human-In-Control experiments of TBM defense architecture elements.
- o Completed initial study of Israeli-developed concepts for boost phase intercept (BPI) and implemented BPI simulations in the ITB.
  ($0.927M) Israeli System Engineering and Integration Study (ISE&I)
- o Conducted preliminary Lethality analysis from results of Arrow I intercept test and Arrow II warhead tests.
- o Conducted analysis of ITB Human-In-Control experiments.
- o Completed analysis of high velocity guns as a point defense adjunct to a terminal TMD system.
  ($1.305M) Israeli BPI Study
- o Final report delivered.
- o Executive Summary Report delivered.
- o Identified unmanned BPI platform potential.

(U) FY 1995 Plans:
($29.367M) Arrow Continuation Experiments (ACES) and Support

- o Complete Arrow II interceptor design, development and fabrication.
- o Initiate Arrow II interceptor flight tests.
- o Continue to transfer Arrow data for risk reduction in the THAAD and SM-2 Block IVA programs.
- o Develop and use high fidelity seeker models to analyze seeker performance.
  ($15.000M) Arrow Deployability Project and Support
- o Procure long lead items.
- o Initiate interoperability studies.
- o Negotiate memorandum of agreement (MOA).

- o Complete and provide the Presidential certification to Congress.
  ($2.236M) ITB
- o Award contract for continuation of ITB effort.
- o Initiate Adaptive Battle Management Center enhancements.
  ($1.465M) ISE&I
- o Analyze technical issues associated with TMD system performance including Kill Assessment and Lethality.
- o Evaluate the performance of the near-term TMD against near-term and evolutionary threats.

(U) FY 1996 Plans:
($27.314M) ACES and Support
- o Complete four (4) flight tests and performance analysis.
- o Complete lethality analysis of Arrow II.
- o Evaluate Arrow II performance against surrogate threat HE and bulk chemical warhead targets.
- o Complete analysis of Arrow II flight test data.
- o Provide Arrow II flight data to U.S. TMD interceptor developers.

($25.462M) Arrow Deployability Project and Support
- o Purchase Arrow II interceptors and targets.
- o Evaluate Arrow interoperability with other TMD systems.
- o Evaluate expected Arrow Weapon System test performance.
- o Transfer Arrow Weapon System test plans to U.S. TMD interceptor developers.

($1.891M) ITB
- o Complete Adaptive Battle Management Center enhancements.
- o Conduct experiments on near-term improvements to the TMD system.

($1.891M) ISE&I

- o Provide independent oversight and assessment of near-term TMD system to include capability conformance and test plan traceability with operational specifications.
- o Conduct architecture effectiveness/cost/risk trade study to examine evolution from near-term TMD system.

(U) FY 1997 Plans:

($16.010M) Arrow Deployability Project and Support

- o Initiate Arrow Weapon System integrated flight tests.
- o Evaluate U.S. and Arrow components for electro-magnetic interference.
- o Transfer the results of the Arrow Weapon System tests to U.S. TMD interceptor developers.
- o Complete interoperability, lethality, kill assessment and producibility studies.

($23.990M) Israel Cooperative Research and Development

- o Complete design of technology demonstrator.
- o Begin fabrication of technology demonstrator
- o Transfer design data to U.S. TMD programs.

($1.900M) ITB

- o Continue experiments associated with the deployment of the near-term TMD system and future improvements of the TMD system.
- o Provide improved threat model and Arrow II update enhancements.

($2.300M) ISE&I

- o Analyze results of ITB Interoperability experiments.
- o Continue evaluations of the performance of the near-term TMD system based on ADP system engineering flight tests.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

Acquisition Strategy: This is a cooperative development program. By completing the Arrow Deployability Project, U.S. TMD programs will be afforded state-of-the-art technical data for program risk reduction and the Government of Israel will have developed information to make a sound Arrow Weapon System deployment decision. The planned SE&I and ITB experiments will continue to refine the operational tactics and techniques of the fielded near-term TMD system. The U.S. and the GOI under the umbrella of the various Memoranda of Agreements share in the cost of these projects. The U.S. cost-share ratio is based upon the maturity of the development. Each contract associated with the individual projects is a firm-fixed price (FFP) contract.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	65,797	57,200	48,800	44,200	215,997
Appropriated Value		56,101			56,101
Adjustments to Appropriated Value		-8,033			(8,033)
Current Budget Submit	64,771	48,068	56,558	44,200	213,597

Change Summary Explanation:
Funding: In the FY 95 Presidents Budget, the ITB was part of the Test and Evaluation Support (Project 3300) and the Israeli System Engineering and Integration (ISE&I) and Israeli BPI Study were part of the Architecture and Studies (Project 3201). This submission puts all the Israeli Co-operative Projects in one budget item. Schedule delays in Arrow II flight tests caused the Arrow Project Office and IMOD to enter discussions for a no cost extension to the ACES contract. The FY 95 ACES funds were decreased because of those delays. The FY 95 released funds were provided to ADP because Congress increased the ADP budget by $10M and were also used to satisfy other unallocated Congressional reductions. The funds are replaced in the FY 96 ACES budget in order to complete the fixed-price ACES contract. The increase in FY 96 ACES Support funds reflects the cost to maintain a U.S program office to manage the contract and provide technical assistance.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

Schedule: The U.S. and the GOI entered into discussions to extend the ACES contract to incorporate a less aggressive flight test schedule for Arrow II based on lessons learned from the Arrow I phase of the program and to reduce technical risk. The funding increase for the Joint U.S./Israeli BPI Assessment was provided in accordance with Congressional guidance. Reduction to the FY 95 ACES budget will have no impact on the Israeli ACES schedule or technical content.

Technical: The successful completion of the Arrow I phase of the ACES program after the intercept in June caused the Arrow Project Office to enter into discussions with the IMOD to extend the ACES contract. The lessons learned from the Arrow I effort prompted a reevaluation of the proposed Arrow II flight test schedule. The APO and IMOD determined that extending the flight test schedule reduced the technical risk of the program. Reduction to the FY 95 ACES budget will have no impact on the Israeli ACES schedule or technical content.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency (Yes[1]/No)
3359 - System Test & Evaluation - 0603872C	Yes
2154 - TMD-GBR - 0603862C	Yes
2257 - PATRIOT (PAC-3) - 0604225C	Yes
2260 - THAAD - 0603861C	Yes
3251 - Sys. Eng. & Tech. Spt - 0603872C	Yes
3352 - Modeling & Simulations - 0603872C	Yes
2259 - Israeli Coop. Projects (IBIS) - 0603173C	Yes
1266 - Navy Theater Wide TBMD - 0603868C	Yes
1265- Boost Phase Interceptor- 0603870C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
- Completed design of Arrow II interceptor & launcher						X										
- Arrow II CDR							X									
- Complete Interceptor development									X							
- Complete design of cooperative R&D tech demo													X			
- Complete BPI Studies				X				X								
T&E Milestone																
- Completed Arrow I flight tests			X													
- Initiate Arrow II flight tests					X											
- Initiate Arrow Weapon System integrated flight tests													X			
Contract Milestone																
- Award ITB contract					X											
- Award ADP contract								X								

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2259)
PE Title: Other TMD (U)

- Award ISE&I follow-on contract		X		
Other Program Events				
- Negotiated mutually beneficial tasks for ADP	X			
- Complete analysis of Arrow II flight test data			X	
- Complete ITB adaptive BMC enhancement			X	
- Complete ITB threat enhancement				X

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2294)
PE Title: Other TMD (U)

Project Number / Title: 2294 Advanced Capabilities DEM/VAL Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	0	0	0	0	99,649	93,551	480,632	640,615	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The advanced capability programs are required to counter the theater missile threat that is anticipated to exist in the 2010 to 2015 timeframe. These capabilities will provide improved theater missile defense above and beyond the TMD core program's capabilities.

(U) Today, there are three pre-Milestone 1 programs: 1) Navy Theater Wide TBMD, 2) Corps SAM, and 3) Boost Phase Intercept. Beginning in FY 1998, each of the three programs will transition into one of two new projects: Advanced Capability Concept Development Program (Project 1293) or Advanced Capability Dem/Val Program (Project 2294).

(U) During FY 1998, one program will proceed into the next acquisition phase under the Advanced Capability Dem/Val Program (Project 2294) and the two remaining programs will continue as concept development programs under the Advanced Capability Concept Development Program (Project 1293). Of the two concept development programs, one will proceed into the next acquisition phase in FY 2000, again under the Advanced Capability Dem/Val Program (Project 2294) while the remaining program will continue in concept development until FY 2004. At that point a decision will be made to move the remaining program into the next acquisition phase under the Advanced Capability Dem/Val Program (Project 2294). As a program transitions into Advanced Capability Dem/Val Program (Project 2294) the exact acquisition phase will depend upon the selected program.

(U) This time phased implementation approach is consistent with future military needs and available resources. The first program to enter the Advanced Capability Dem/Val Program (Project 2294) will then be designated as Advanced Capability I (ACAP I) in FY 1998, the second program as Advanced Capability II (ACAP II) in FY 2000, and the final program as Advanced Capability III (ACAP III) in FY 2004.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994-1997 Accomplishments/Plans: No programs will transition into this project until FY1998.

Acquisition Strategy:
(U) Today, there are three pre-Milestone 1 programs: 1) Navy Theater Wide TBMD, 2) Corps SAM, and 3) Boost Phase Intercept. Beginning in FY 1998, each of the three programs will transition into one of two new projects: Advanced Capability Concept Development Program (Project 1293) or Advanced Capability Dem/Val Program (Project 2294).

(U) During FY 1998, one program will proceed into the next acquisition phase under the Advanced Capability Dem/Val Program (Project 2294) and the two remaining programs will continue as concept development programs under the Advanced Capability Concept Development Program (Project 1293). Of the two concept development programs, one will proceed into the next acquisition phase in FY 2000, again under the Advanced Capability Dem/Val Program (Project 2294) while the remaining program will continue in concept development until FY 2004. At that point a decision will be made to move the remaining program into the next acquisition

phase under the Advanced Capability Dem/Val Program (Project 2294). As a program transitions into Advanced Capability Dem/Val Program (Project 2294) the exact acquisition phase will depend upon the selected program.

(U) This time phased implementation approach is consistent with future military needs and available resources. The first program to enter the Advanced Capability Dem/Val Program (Project 2294) will then be designated as Advanced Capability I (ACAP I) in FY 1998, the second program as Advanced Capability II (ACAP II) in FY 2000, and the final program as Advanced Capability III (ACAP III) in FY 2004.

The exact acquisition strategy will depend upon the programs which transition into this project in FY1998.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	0	0	0

Change Summary Explanation:
Funding: This project was funded under Project 2215 in the FY1995 President's Budget.
Schedule: None.
Technical: None.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 2294)
PE Title: Other TMD (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1265, Boost Phase Intercept, 0603872C	Yes
1266, Navy Theater Wide TBMD, 0603868C	Yes
1293, Advanced Capability Concept Development Program, 0603872C	Yes
2262, Corps SAM, 0603869C	Yes
3153, Architecture Analysis/BMC3 Initiatives, 0603872C	Yes
3251, Systems Engineering and Technical Support, 0603872C	Yes
3359, System Test And Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

Planned Milestones Beyond FY1997:

Select ACAP I	1Q98
Select ACAP II	1Q00
Select ACAP III	1Q04

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3153)
PE Title: Other TMD (U)

Project Number / Title: 3153 Architecture Analysis and BMC3 Initiatives

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	0	4,820	9,330	9,375	9,114	9,086	9,125	9,161	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project supports systems analysis work for BMDO architecture integration and BMC3 activities to determine the expected operational performance and effectiveness of missile defense systems under development. Computer simulation models are developed and used to investigate architecture and system level capability and to resolve critical technical issues related to the development of specific elements of the architecture. Tradeoffs in alternative elements, specific designs, inventory and integration of systems are conducted in detail to determine the most cost effective approach for a particular missile defense mission. This effort will provide for the synergistic evaluation of relevant BMC3I technical issues; the formulation of appropriate plans, programs, and policies to facilitate the coordination of all BMD Advanced Development BMC3I research, development, and acquisition activities across TMD and NMD program activities; promote appropriate reuse strategies to maximize BMD reuse capabilities; and minimize the duplication of BMC3I research and development efforts. The work is performed on a continuing basis in order to determine the impact of changing threats, mission requirements, and advances in technology.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3153)
PE Title: Other TMD (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:
- o None

(U) FY 1995 Plans:
- o ($ 4.820M) Follow up analysis work related to the TMD COEA will be conducted. Updates on projected missile threats and new scenarios developed by the BMDO Threat Working Group will be factored into the performance assessment of TMD architecture/system elements. A thorough evaluation of the ability of ballistic missile systems to handle stressing land attack cruise missiles will be made. New concepts for Boost Phase Intercept will be examined, especially systems based on laser devices. The capability of the Navy Upper Tier system to handle population defense over wide areas and the integration of this system in a multi-tier defense of critical military assets will be evaluated.

(U) FY 1996 Plans:
- o ($ 6.000M) Analysis of architectures and systems will continue using new (validated) simulation tools. Work to determine the ability of TMD systems to respond to proposed countermeasures will continue. Active defense will be studied in the context of overall defenses including passive and counterforce options. The capability of potential Russian and Allied missile defense systems will be evaluated.
- o ($ 3.375M) Support development of mission-area policies, processes, and guidance to support the coordinated system-level implementation of a seamless development environment for BMD BMC3 software development from requirements through design and production of BMC3 executable code. Promote the implementation of emerging evolutionary development processes across the BMD Community; support BMDO efforts in the formulation, and implementation of advanced BMC3 research and development efforts appropriate to support evolving BMDO TMD BMC3 requirements. Efforts will include

support in defining TMD BMC3 development process requirements; analysis and implementation of appropriate TMD software reuse capabilities and requirements consistent with BMDO requirements and DoD guidance and objectives; coordination in the analysis and implementation of various DoD initiatives and implications relating to BMDO TMD BMC3 development; support to NATO or other allied concerns outside the BMDO community in activities related to BMC3 development; ongoing support of BMC3 demonstrations relating to joint NMD/TMD inter-operability, BMC3 CONOPS, etc.; implementation of appropriate software engineering requirements across all BMDO BMC3 software development efforts including support of Software Engineering Institute (SEI) Software Capability Evaluations (SCEs) for BMDO source selection efforts; and provide the mission-area capability to address emerging BMC3 system requirements and concerns and facilitate their resolution in a synergistic environment across all NMD and TMD development efforts.

(U) FY 1997 Plans:
($ 6.000M) Continue systems analysis of architecture/system performance and related technical issues as directed by the BMDO Architecture Integrator and the Deputy for Acquisition/Theater Missile Defense.
($ 3.375M) Continuation of FY96 efforts.

Acquisition Strategy: Systems analysis work under this project is done under contract. In November 1995, a two year contract for this work (with two, one year extension options) was awarded to a ten member corporate team led by SPARTA, Inc., Laguna Hills, Calif. For BMC3 Initiatives efforts, expertise of Government, FFRDC, SEIC, and SETA personnel will be leveraged in the execution of project activities, utilizing existing contracts to the maximum extent possible. Specifically, USASSDC and USAF/ESC Government and contractor personnel are expected to lead Information Architecture and development efforts; existing and follow-on SETA (awarded to BDM Federal, December 1994) and SEIC contracts will provide the core of technical expertise for a variety of BMC3 activities; and existing FFRDC contract vehicles will provide state-of-the-art technical expertise in Software Engineering and related technical areas. Additional contractor services will be competitively procured if needed to meet emerging program requirements.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3153)
PE Title: Other TMD (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		5,000			5,000
Adjustments to Appropriated Value		-0,180			(180)
Current Budget Submit	0	4,820	9,330	9,375	23,525

Change Summary Explanation:

Funding: This project was performed under PE 0603173C (Project 3153) in FY95. Prior to FY95 the work was reported under Project 3207. Beginning in FY96, activities comprising FY95 CDS Project 3153 will be funded and performed via a combination of both TMD and NMD Program Elements, as appropriate. Increased required funding to provide for additional analyses in support of evolving TMD options.
Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency (Yes[1]/No)
3153, Arch. Anal. & BMC3 Initiatives, P.E. 0603217C	No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3153)
PE Title: Other TMD (U)

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
- Software Policy Update																
- BMD IA (CONOPS)						x										
- Software Engineering Documentation Updates							x			x						
T&E Milestone																
Contract Milestone																
- Award Arch. Analysis Support Contract						x										
Other Program Events																
- Annual Contract Program Review								x				x				x
- Tech. Analyses, Reports, & Briefings As Req'd	x	x	x	x	x	x	x	x	x	x	x	x	x			

Planned Milestones Beyond FY1997: TBD

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3157)
PE Title: Other TMD (U)

Project Number / Title: 3157 Environment, Siting and Facilities

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C MILCON	0	0	2,577	2,961	1,993	2,089	1,642	1,642	Continuing
0603872C RDT&E	0	0	4,036	4,054	4,097	4,084	4,108	4,123	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) Provides environmental program guidance, environmental impact analyses and documentation, real property facility siting, and facility management and acquisition support for the BMDO Theater Missile Defense (TMD) system projects. Plans, programs, budgets, and oversees facility acquisition through Military Construction (MILCON) and RDT&E construction projects. Provides guidance and leads BMDO TMD environmental compliance, pollution prevention, other environmental efforts, and the Environmental Assessment and Environmental Impact Statement process for TMD activities. Develops guidance for Executing Agents on facility siting, facility acquisition, and environmental matters. Provides MILCON design funds to support design of BMDO's TMD major and minor MILCON projects. Provides MILCON Minor Construction funds to support TMD's out-of-cycle unforeseen MILCON projects under $1.5M.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3157)
PE Title: Other TMD (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments: NONE

(U) FY 1995 Plans: NONE

(U) FY 1996 Plans:

- o ($ 2.180M) Develops siting, basing deployment plans, environmental compliance programs, environmental analyses, and documentation for technology demonstrations, test and evaluation, and weapon system essential technical stationing facilities. (Focus is on PAC-3, THAAD, and Navy Lower-Tier systems).
- o ($ 0.134M) Facility planning and preliminary designs for TMD garrisons and depots.
- o ($ 1.722M) Execute and manage TMD's FY 96-98 Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and acquisition. The emphasis is on the PAC-3 and THAAD EMD, test and deployment facilities, such as THAAD/GBR UOES Facility, THAAD/GBR Test Facility, Maintenance/Repair Target Launch Support Facility, TMD Target Launch Facilities, and THAAD/GBR Objective Facilities.
- o ($ 2.577M) MILCON design activities.

(U) FY 1997 Plans:

- o ($ 2.100M) Supports TMD programs with siting, environmental compliance, pollution prevention, studies, and environmental analysis and documentation. The Program increases cover costs associated with maturing acquisition programs, fielding of systems, and test and evaluation programs.
- o ($ 0.150M) Continues facility planning for fielding the PAC-3 and THAAD programs. It also continues facility planning support for test and evaluation programs.

- o ($ 1.804M) Provides funds to execute and manage TMD's FY 97-99 Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and other activities to provide program support. The emphasis will be to initiate construction on essential PAC-3, THAAD, and Navy Lower-Tier support facilities, and on continued test and evaluation support facilities, such as Maintenance/Repair Target Launch Facility, TMD Target Launch Facilities, THAAD/GBR Objective Facilities, and THAAD Objective Ammunition Facility and fielding the THAAD Second Objective Battalion.
- o ($ 2.961M) MILCON design activities.

Acquisition Strategy: BMDO contractor support (Currently under a small business Cost Plus Fixed Fee contract; this contract will be recompeted for similar contract-type award in FY 95) will be utilized for technical and overview assistance of facilities, siting, and environmental activities. Other similar small business contracts, as well as full and open competition Cost Plus Fixed Fee and Fixed Price contracts, by U.S. Army Space and Strategic Defense Command and the U.S. Army Program Executive Office-Missile Defense will be utilized for additional technical assistance for the development of Facilities, Siting, and Environmental documentation requirements. BMDO tasks the Services through Program Management Agreements to perform the required tasks in support of the TMD program. BMDO performs quarterly on-site reviews to verify and validate completed tasks.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3157)
PE Title: Other TMD (U)

Current Budget Submit	0	0	4,036	4,054	8,090

Change Summary Explanation:
Funding: This project was submitted as 3107 in the FY95 President's Budget and supported BMDO programs as a whole. Project 3157 is now split out in this submittal between two program elements to help track programmatic funding: Theater Missile Defense (0603872C) and National Missile Defense (0603871C). Project 3157 (Program Element 0603173C) incorporates FY94 and FY95 funding for this activity.

Schedule: None

Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:		Funding Dependency (Yes[1]/No)
2260 - THAAD	0603861C/0604861C	Yes
1266 - Navy Theater-wide TBMD	0603868C	Yes
2257 - Patriot (EMD)	0604865C	Yes
2263 - Navy Area TBMD	0603867C	Yes
3354 - Targets	0603872C	Yes
3359 - System Test & Evaluation	0603872C	Yes
3360 - Test Resources	0603872C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3157)
PE Title: Other TMD (U)

2154 - TMD-GBR	0603862C	Yes
2262 - Corps SAM	0603869C	Yes
1265 - Boost Phase Intercept	0603870C	Yes
1293 - Adv. Capability Concept Dev.	0603872C	Yes
2294 - Adv. Capability Dem/Val	0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Other Program Events				Xa/ Xb/ Xd	Xc/ Xf			Xa		Xg/ Xh	Xe/ Xi	Xa				Xa

Xa Final DD Forms 1391 for TMD Military Construction Budget Submission

Xb Manage construction contract for TMD PAC-3 and THAAD Dem/Val Target Launch Facilities at Wake Island (Construction supports Projects 2260 & 2257)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3157)
PE Title: Other TMD (U)

Xc Complete construction of TMD Target Launch Complex Facilities at White Sands Missile Range, NM (Construction supports Project 2260)
Xd Manage construction contract for Target Launch Facilities at Firing-in-Extension (FIX) north of White Sands Missile Range, NM (Construction supports Project 3354)
Xe Complete Construction Surveillance for TMD PAC-3 and THAAD Dem/Val Target Launch Facilities
Xf Complete Construction Surveillance for Target Launch Facilities at FIX
Xg Manage construction contract for TMD THAAD/GBR Test Facilities (Construction supports Project 2154 & 2260)
Xh Complete Construction Surveillance for TMD THAAD/GBR Test Facilities
Xi Manage construction contract for THAAD First Objective Battalion Facilities (Construction supports Project 2260)

Planned Milestones Beyond FY1997:

o	Update BMDO Facility Acquisition Strategy Plan	FY1998
o	Complete design of FY98 MILCON	FY1998
o	Complete facility requirements documentation for FY00 program	FY1998
o	Complete environmental planning for FY99 program	FY1998
o	Update BMDO Facility Acquisition Strategy Plan	FY1999
o	Complete Design of FY99 MILCON	FY1999
o	Complete environmental planing for FY00 program	FY1999
o	Complete facility requirements documentation for FY01 program	FY1999

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3160)
PE Title: Other TMD (U)

Project Number/Title: 3160 Deployment Planning

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	0	1,146	1,951	1,960	1,906	1,900	1,908	1,915	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project supports the development of Theater Missile Defense (TMD) systems with emphasis on producibility trade-offs and logistics supportability concepts and their integration into the diverse TMD elements. The project focuses these activities by coordinating efforts between the Services. TMD readiness activities include producibility and planning for manufacturing, acquisition logistics, metrology, and training. The efforts will concentrate on identifying and analyzing critical TMD systems level deployment, support, producibility and manufacturing (P&M) risks, industrial base capability issues and developing mitigation plans for these areas to ensure operational requirements and BMDO affordability objectives are met. In addition, TMD operational suitability and availability advances and lessons learned are applied to NMD projects.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

PROGRAM ACCOMPLISHMENTS AND PLANS:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3160)
PE Title: Other TMD (U)

(U) This program was begun in FY 95. The program develops and provides required TMD measurement standards and allows continuing infrared calibration services supporting TMD program offices, their contractors, Government laboratories and test centers as funded. This program also provides BMDO industrial base support in the areas of Producibility and Manufacturing and operational suitability planning for TMD programs. This program also provides leverage between TMD programs to identify and address logistic and other supportability issues.

(U) FY 1994 Accomplishments:
- o None.

(U) FY 1995 Plans:
- o ($0.737M) Support the TMD program offices, their contractors, government laboratories and test centers with Infrared (IR) calibration and measurement services. This includes development of IR calibration/measurement standards, specifications, procedures, and techniques traceable to a single national source at the National Institute of Standards and Technology (NIST). Services provided include development of calibration hardware, transfer standards, measurement/characterization of IR sources, filters, attenuators, and detectors and provide access to NIST experts to support on-going and planned TMD systems testing, development, and acquisition (to include TMD contractors) as funding permits.
- o ($0.259M) Integrate TMD producibility and manufacturing issues, identify common problems, and develop mitigation strategies for EMD phases.
- o ($0.150M) Identify operational suitability issues related to TMD concepts of operations, BMC3, and inter-Service operations.

(U) FY 1996 Plans:
- o ($1.041M) Continue to support the TMD program offices, their contractors, government laboratories and test centers with Infrared (IR) calibration and measurement services. This includes development of IR calibration/measurement standards,

specifications, procedures, and techniques traceable to a single national source at the National Institute of Standards and Technology (NIST). Services provided include development of calibration hardware, transfer standards, measurement/characterization of IR sources, filters, attenuators, and detectors and provide access to NIST experts to support on-going and planned TMD systems testing, development, and acquisition (to include TMD contractors) as funding permits.

- o ($0.420M) Integrate producibility issues, resolve TMD system common problems, develop mitigation strategies (both element specific and TMD wide) and review manufacturing planning.
- o ($0.490M) Update operational suitability planning, to address issues related to TMD concepts of operations, BMC3, inter-Service operations, and systems readiness and functional requirements.

(U) FY 1997 Plans:

- o ($1.050M) Continue to support the TMD program offices, their contractors, government laboratories and test centers with Infrared (IR) calibration and measurement services. This includes development of IR calibration/measurement standards, specifications, procedures, and techniques traceable to a single national source at the National Institute of Standards and Technology (NIST). Services provided include development of calibration hardware, transfer standards, measurement/characterization of IR sources, filters, attenuators, and detectors and provide access to NIST experts to support on-going and planned TMD systems testing, development, and acquisition (to include TMD contractors) as funding permits.
- o ($0.420M) Support completion and insertion of producibility and manufacturing mitigation programs developed in FY95 and 96, including non-BMDO programs. Support element program offices in exit criteria development and assessment.
- o ($0.490M) Update operational suitability planning, to address issues related to TMD concepts of operations, BMC3, inter-Service operations, and systems readiness and functional requirements.

Acquisition Strategy: This project uses competitively awarded existing and future BMDO Scientific Engineering Technical Assistance (SETA) contracts and Service executing agents to accomplish the planned activities.

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3160)
PE Title: Other TMD (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	1,960	1,960	1,960	5,880
Appropriated Value		1,411			1,411
Adjustments to Appropriated Value		-0,265			(265)
Current Budget Submit	0	1,146	1,951	1,960	5,057

Change Summary Explanation:
Funding: This project was derived from Project 3101 in the FY95 President's Budget and Project 3101 (PE 0603871C) and Support Technology (PE 0603873C). The current funding level will fund metrology and calibration, supportability and specialty engineering, and producibility and manufacturing efforts. This project supports BMDO management initiatives to reduce program costs and maximize leverage with NMD projects.
Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
Project 1155, Phenomenology, PE 0603872C	Yes

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3160)
PE Title: Other TMD (U)

Project 2154, TMD GBR, PE 0603862C	Yes
Project 2160, TMD Existing System Modifications, PE 0603872C/0604862C	Yes
Project 2257, PATRIOT, PE0604865C	Yes
Project 2260, THAAD, PE0603861C/060486C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

See FY94 - FY97 accomplishments and plans. Other Program Events such as infrared and improved IR dynamic range spectral calibration services are provided throughout.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3251)
PE Title: Other TMD (U)

Project Number / Title: 3251 Systems Engineering and Technical Support

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	33,372	53,207	47,836	56,926	66,714	59,375	67,991	70,276	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides system engineering and technical support for the integration of Service-supplied weapon systems to facilitate the identification and resolution of inter-Service integration and interoperability issues; technical and engineering assessments and trade-off studies of TMD system architectures and concepts; support for UK sensor data fusion studies; BMD system survivability oversight and assessment; risk reduction and acquisition streamlining support; modeling, simulation, experiment, and flight test support; development and maintenance of technical and programmatic databases; and preparation of technical reports, briefings, and programmatic documentation associated with TMD studies and critical issues.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) During FY 1994 the system description and system assessment documents were completed, trade-off studies were conducted, and independent technical and engineering assessments were performed. This project supported various analyses, e.g., the Theater

Defense Netting Study, reviews of technical and engineering documentation, and the resolution of critical issues pertaining to the acquisition of the TMD "family of systems." Modeling and simulation support increased in response to fiscal restraints in other areas. Cooperative architecture studies with the United Kingdom were completed and support to the Services for intra-Service integration continued.

(U) FY 1994 Accomplishments:

- ($ 1.935M) Completed cooperative UK architecture studies; maintained low-level support to the UK sensor data fusion and knowledge-based system efforts; continued development of an artificial intelligence (AI)-based fusion and situation assessment demonstrator and an end-to-end AI-based BM threat discrimination demonstrator.
- ($ 7.367M) Provided scientific, engineering, and technical support for the acquisition, integration, and fielding of TMD systems including: review of products in comparison to standards, specifications, and requirements; modeling and simulation support of architecture analyses and trade-off studies; risk reduction and acquisition streamlining support; engineering and technical support for international programs and BM/C3 efforts; development and maintenance of technical and programmatic databases; and preparation of technical reports, briefings, and programmatic documentation.
- ($11.740M) Using federally funded research and development center (FFRDC) resources, performed independent technical and engineering assessments of TMD system architectures including: system concept development and assessment; cost and operational effectiveness analysis (COEA) support; critical element technical and programmatic assessments including trade-off analyses; reviews of mandated documents, international cooperative programs, and treaty implications; multi-Service and allied BM/C3 integration; modeling, simulation, experiment and flight test support; integration of fielded components into operational units; and specific studies and analyses of critical issues.
- ($ 8.570M) Provided system engineering and integration at the TMD system level included the following efforts: identified inter-Service integration interfaces; developed and updated engineering documents to identify change requirements to the theater air defense C3I systems to incorporate and support TBMD; updated the TMD Integrated Test Plan; completed the

system description and system assessment documents; supported the development of requirements for the TMD System Exerciser; and planned, coordinated, and analyzed C2 wargames in support of CINC concepts of operations (CONOPS) development.

- o ($ 3.760M) Provided support to each Service for intra-Service integration, interoperability, and resolution of interface issues.

(U) FY 1995 Plans:

- o ($ 2.717M) Support a cooperative ATBM systems analysis with the UK; continue support to the UK sensor data fusion effort to deliver the initial Target Oriented Tracking System (TOTS); install TOTS on various BMD testbeds and begin integration testing; demonstrate an enhanced knowledge-based system prototype.
- o ($10.500M) Provide scientific, engineering, and technical support for the acquisition, integration, and fielding of TMD systems including: review of products in comparison to standards, specifications, and requirements; modeling and simulation support of architecture analyses and trade-off studies; risk reduction and acquisition streamlining support; engineering and technical support for international programs and BM/C3 efforts; development and maintenance of technical and programmatic databases; and preparation of technical reports, briefings, and programmatic documentation.
- o ($14.000M) Using FFRDC resources, perform independent technical and engineering assessments of TMD system architectures including: system concept development and assessment; COEA support; critical element technical and programmatic assessments including trade-off analyses; reviews of mandated documents, international cooperative programs, and treaty implications; multi-Service and allied BM/C3 integration; modeling, simulation, experiment and flight test support; integration of fielded components into operational units; and specific studies and analyses of critical issues. Participate in Warfare Analysis Laboratory Exercises (WALEX), a mechanism to study and insert TMD assets into warfighter plans.
- o ($ 4.686M) Provide technical support to the TMD COEA, individual system COEAs, and Congressionally directed studies.
- o ($ 9.581M) Provide system engineering and integration at the TMD system level including the following efforts: competition and contract award for follow-on SEI support contract; identification of inter-Service integration interfaces; development of

engineering documents to identify change requirements to the theater air defense C3I systems to incorporate and support TBMD; update the TMD Integrated Test Plan; update the system description documents; support requirements development for the TMD System Exerciser; and plan, coordinate, and analyze C2 wargames in support of CINC CONOPS development.

- o ($ 5.904M) Provide support to each Service for intra-Service integration, interoperability, identification and resolution of interface issues. Assess PAC-3 hardness criteria against nuclear detonations (NUDETS); assess susceptibility of critical BM/C3 nodes of Army enclave to disruptions caused by user saturation, environmental effects, laser/RF jamming, NUDETS, and anti-radiation missiles and recommend survivability enhancement options; assess C2/C3I vulnerabilities to Navy's Aegis SPY-1 radar system; support TMD program offices in implementing appropriate software engineering policies and standards to reduce technical, cost, and schedule risks across BMD/TMD software development, integration, testing, and maintenance efforts.
- o ($ 4.950M) Technical support to the PEO Missile Defense Program Offices and the PEO Space Program Offices.
- o ($ .869M) Provide support for BMDO services (e.g., security, contracting, supplies).

(U) FY 1996 Plans:

- o ($ 3.254M) Continue Allied architecture studies; continue UK sensor data fusion efforts including TOTS integration testing and development of specific TOTS applications.
- o ($11.500M) Provide scientific, engineering, and technical support for the acquisition, integration, and fielding of TMD systems including: review of products in comparison to standards, specifications, and requirements; modeling and simulation support of architecture analyses and trade-off studies; risk reduction and acquisition streamlining support; engineering and technical support for international programs and BM/C3 efforts; development and maintenance of technical and programmatic databases; and preparation of technical reports, briefings, and programmatic documentation.
- o ($13.250M) Using FFRDC resources, perform independent technical and engineering assessments of TMD system architectures including: system concept development and assessment; COEA support; critical element technical and

programmatic assessments including trade-off analyses; reviews of mandated documents, international cooperative programs, and treaty implications; multi-Service and allied BM/C3 integration; modeling, simulation, experiment and flight test support; integration of fielded components into operational units; specific studies and analyses of critical issues; and WALEX support.

- o ($ 3.704M) Provide technical support to the TMD COEA, individual system COEAs, and Congressionally directed studies.
- o ($ 9.109M) Provide minimum-level system engineering and integration support at the TMD system level will include the following efforts: continue to identify inter-Service integration interfaces; prepare engineering documents that identify changes required in theater air defense C3I systems to incorporate TBMD; update TMD Integrated Test Plan; update system description documents; complete TMD integration trade studies; support requirements development for TMD System Exerciser; and plan, coordinate, and analyze C2 wargames for CINC CONOPS development.
- o ($ 6.619M) Provide continued support to intra-Service integration, interoperability, and resolution of interface issues; support review of SEI contractor integration and assessment documentation; evaluate threat-generated requirements; initiate environmental modeling and simulation tool improvements; continue refinement of SEOs for BM/C3; continue support to TMD program offices in refining software development practices and mitigating technical, cost, and schedule risks across BMD/TMD software development, integration, testing, deployment, and maintenance efforts.
- o ($ .400M) Support for BMDO services (e.g., security, contracting, supplies).

(U) <u>FY 1997 Plans</u>:

- o ($ 1.270M) Continue UK sensor data fusion efforts including TOTS integration testing and development and testing of TOTS applications. Begin use of TOTS in test analysis.
- o ($13.000M) Provide scientific, engineering, and technical support for the acquisition, integration, and fielding of TMD systems including: review of products in comparison to standards, specifications, and requirements; modeling and simulation support of architecture analyses and trade-off studies; risk reduction and acquisition streamlining support; engineering and technical

support for international programs and BM/C3 efforts; development and maintenance of technical and programmatic databases; and preparation of technical reports, briefings, and programmatic documentation.

- o ($14.545M) Using FFRDC resources, perform independent technical and engineering assessments of TMD system architectures including: system concept development and assessment; critical element technical and programmatic assessments including trade-off analyses; reviews of mandated documents, international cooperative programs, and treaty implications; multi-Service and allied BM/C3 integration; modeling, simulation, experiment and flight test support; integration of fielded components into operational units; specific studies and analyses of critical issues; and WALEX support.
- o ($ 7.731M) Provide technical support to the TMD COEA, individual system COEAs, and Congressionally directed studies.
- o ($13.109M) Increase system engineering and integration support at the TMD system level to a more robust level. Continue to identify inter-Service integration interfaces; prepare engineering documents to identify changes required in theater air defense C3I systems to support TBMD; update TMD Integrated Test Plan; update system description documents; support requirements development for TMD System Exerciser; and plan, coordinate, and analyze C2 wargames for CINC CONOPS development.
- o ($ 6.847M) Provide support to Service integration, interoperability, and resolution of interface issues; assess BMC3 for follow-on alternative SEOs; continue environmental modeling and simulation tool improvements; assist in coordinate technology infusion to support preplanned product improvements; continue support to TMD program offices in refining software development practices and mitigating technical, cost, and schedule risks across BMD/TMD software development, integration, testing, and maintenance efforts.
- o ($ .424M) Support for BMDO services (e.g., security, contracting, supplies).

Acquisition Strategy: This project uses a combination of federally funded research and development centers (FFRDC), competitively awarded scientific, engineering and technical assistance (SETA) contracts, and a Memorandum of Understanding with the United Kingdom Ministry of Defence.

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PE:0603872C (Proj: 3251)
PE Title: Other TMD (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	37,943	72,249	78,449	81,668	270,309
Appropriated Value		46,255			46,255
Adjustments to Appropriated Value		6,952			6,952
Current Budget Submit	33,372	53,207	47,836	56,926	191,341

Change Summary Explanation

Funding: This project was previously funded under projects 3101 and 3201 in the FY95 President's Budget. Current funding for FY95 is lower than the amount requested in the FY95 President's Budget due to Congressional direction. The FY96 budget request is lower than the FY95 budget request due to the completion of some tasks and the reprioritization of efforts by OSD and BMDO. In FY97 the budget request returns to a level that is not much higher than the FY95 level. This increase is necessary to support the planned system engineering and integration program as well as special studies and reports required by Congress and OSD. Larger increases are planned for FY98 and FY00, the two years in which the actual start-up of a major defense acquisition program for the first two of the three proposed advanced concepts (i.e., Corps SAM, Navy Theater Wide TBMD, or Boost Phase Intercept) is scheduled.

Schedule: N/A

Technical: The reduction in FY95 and FY96 funding increases the risk that the system engineering and integration contractor will not provide sufficient interoperability and integration engineering data to permit timely and informed government assessment and decisions.

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PE:0603872C (Proj: 3251)
PE Title: Other TMD (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1170 - TMD Risk Reduction - 0603872C	Yes
1293 - Advanced Capability Concept Development - 0603872C	Yes
1266 - Navy Theater Wide - 0603868C	Yes
2154 - GBR - 0603862C/0604862C	Yes
2160 - Existing Sys. Mods. - 0603872C	Yes
2257 - Patriot - 0604865C/0604866C	Yes
2259 - Israeli Cooperative Projects - 0603872C	Yes
2260 - THAAD - 0603861C/0604861C	Yes
2262 - Corps SAM - 0603869C	Yes
2263 - Navy Area TBMD (Lower) 0603867C/0604867C	Yes
2294 - Advanced Capability Dem/Val - 0603872C	Yes
2358 - HAWK - 3863C/0604863C	Yes
3261 - BM/3I- 0603864C/0604864C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile:

	FY 1994				FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Support																

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PE Title: Other TMD (U)

- TMD COEA x x x x x
- TMD Commonality Study x x
- TPS-59 Milestone (MS) III x
- Hawk ADCP MS II and MS III x x
- PAC-3 missile MS II/IV
  ASARC and DAB x* x*
- SM-2 Blk IVA MS IV Review x
- Navy Area TBMD COEA x
- Support THAAD MS II Review x
- Support TMD-GBR MS II Review x
- Corps SAM MS I x

Engineering Support

- TMD Interface
  Management Document x* x*
- TMD Func. Rqmts. Doc. x*
- Delivery of Enhanced
  KBS Prototype x
- PAC-3 missile
  EMD contract award x*
- PAC-3 missile PDR x
- PAC-3 missile CDR x
- PAC-3 missile LRIP decision x
- THAAD EMD PDR x

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- THAAD System Requirements Review				x								
- THAAD SDR					x							
- JTIDS Reqmts. Definition		x*										
- JTIDS TBM Standard Msg. Set Approval Process	x*		x*		x		x		x		x		x		x
- BM/C3I wargames		x*				x				x				x	
- TIBS/TRAP message integration			x*				x				x				x
- Deliver Updated TMDSE Requirements Document		x*				x				x				x	
- Deliver TMD System Document				x				x				x			
- Deliver C3I Integration Assessments				x				x				x			
- Eagle SDR						x									
- Eagle PDR									x						
- Eagle CDR										x					
- Talon Shield processor mods											x				
- Corps SAM A Specifications										x					
- Aegis SDR							x								
- SM-2 Blk IVA lethality analyses								x							
- SM-2 Blk IVA PDR								x							
- SM-2 Blk IVA CDR											x				

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PE Title: Other TMD (U)

- Award follow-on SETA support contract													x				
- Award current SEI contract option						x											
- Award SEI follow-on contract						x											
- Award SEI follow-on contract option											x				x		
- Issue follow-on US/UK MOU for TOTS data fusion					x								x				
- Corps SAM concept development contract RFP and award						x											
- Corps SAM system development contract RFP and award														x			
Other Program Events																	
- Tech. analyses, reports & briefings as req'd.	x*	x*	x*	x*	x	x	x	x	x	x	x	x	x	x	x	x	
- Support cueing demo							x										
- Support negotiation of Eagle intl. participation				x*	x	x	x	x									
- Support to TCMP Campaign II										x							

* Completed

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RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3265)
PE Title: Other TMD (U)

Project Number / Title: 3265 User Interface

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	10,574	12,603	16,843	16,926	11,594	11,558	16,608	16,653	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The mission of the Commanders-in-Chief (CINC) Theater Missile Defense (TMD) Assessments Program is to support the CINCs in the execution of various exercises to provide the basis for the assessment, development, and improvement of TMD capabilities. This program integrates new technology and hardware into the CINC exercises to examine its effectiveness and contribution to the TMD mission. The program enables the collection of operational data that is used to evaluate the effectiveness of TMD systems, architectures, and operational concepts. The CINC's TMD Assessment Program provides a framework for the CINCs to perform TMD training and make TMD part of everyday business. Also, this program provides the basis for the integration of User Operational Evaluation Systems (UOES). UOES is a prototype operational system of hardware and procedures which will be user-operated for field evaluation purposes. Through the UOES program, the CINCs develop battle management command, control, and communications architectures, formulate and test operational concepts, and determine operational requirements.

(U) This project also supports the interfaces that must be provided to the military operational community. Analyses and simulations address systems effectiveness of proposed BMD system architectures against ballistic missile threats to U.S.-deployed forces and our allies. Analytical results are used to support activities required for the Defense acquisition process. Theater and strategic gaming with the CINCs is supported to identify roles, missions, and requirements for BMD. Funds are also provided from this project to operational users to enable them to develop and refine their operational requirements documents (ORD) and concepts of operation

(CONOPS) for employing BMD and ensuring that these concepts are integrated into the overall BMD system deployment strategy and planning.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY94 this project supported USCENTCOM execution of Joint Project Optic Cobra, USEUCOM execution of Joint Project Optic Needle, and USFK execution of Joint Project Ornate Impact. In addition, the project supported a TMD exercise for the KITTY HAWK Battle group and contributed resources in support of the USACOM TMD exercise with EISENHOWER Battle Group. These exercises resulted in the identification of new TMD operational procedures, the development of better training techniques for warfighters, and the validation of TMD warfighting policies/procedures. The development of a data link between the Warrior Prep Center (WPC) and the National Test Facility enabled responsive broadcasts across the theater early warning networks. The ORD and CONOPS were updated for the U.S. military services allowing the completion of user and developer analyses. Support was provided for theater and strategic wargaming. Continued to support CINC/services in requirements definition of operational evaluation of research and development activities and for policy/strategy development. Completed BMD mission analyses provided better requirements definition and supported the Army in completing operational concept and planning for user operational evaluation systems (UOES).

(U) FY 1994 Accomplishments:

- ($ 9.705M) Provided funding and guidance for the development and execution of USEUCOM

Joint Optic Needle, USCENTCOM Joint Project Optic Cobra, USFK Joint Project Ornate Impact (with GLOBAL 94), KITTYHAWK Battle Group TMD Exercise, and USACOM TMD Exercise with the EISENHOWER Battle Group.

- o ($ .50M) Provided funding to develop Warrior Prep Center (National Test Facility data link).
- o ($ .169M) Provided funding to develop NMD C2 software for TMD applications.
- o ($ .200M) Provided funding to refine ORDs and CONOPs.

(U) FY 1995 Plans:

- o ($ 8.000M) Provide funding to support USEUCOM Joint Project Optic Needle, USCENTCOM Joint Project Optic Cobra, USFK Joint Project Ornate Impact, USACOM TMD Exercises
- o ($ 1.808M) Provide funding to refine Operational Requirements Document (ORDs)
- o ($ 0.370M) Conduct theater and strategic wargaming, including GLOBAL 95.
- o ($ 0.625M) Conduct mission analysis for BMD.

(U) FY 1996 Plans:

- o ($12.000M) Provide funding to support USEUCOM Joint Project Optic Needle, USCENTCOM Joint Project Optic Cobra, USFK Joint Project Ornate Impact, USACOM TMD Exercises, USPACOM TMD Exercises.
- o ($ 2.000M) Provide funding and guidance in the development of the integration of improved TMD models supporting Command Post Exercises and allies/friends.
- o ($ 2.000M) Refine Operational Requirements Document (ORDs) and CONOPs for BMD.
- o ($ 0.843M) Conduct mission analysis and theater/strategic wargaming (including GLOBAL 96) for the U.S., allies, and friends.

(U) FY 1997 Plans:

- o ($14.000M) Provide funding to support USEUCOM Joint Project Optic Needle, USCENTCOM Joint Project Optic Cobra, USFK Joint Project Ornate Impact, USACOM TMD Exercises, and USPACOM TMD Exercises.
- o ($ 2.000M) Refine Operational Requirements Document (ORDs) and CONOPs for BMD.
- o ($ 0.926M) Conduct mission analysis and theater/strategic wargaming (including GLOBAL 97) for the U.S., allies, and friends.

Acquisition Strategy: This project uses a combination of federally funded research and development centers (FFRDC) and competitively awarded scientific, engineering, and technical assistance contracts (SETA).

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	9,130	13,658	23,629	31,136	77,553
Appropriated Value		10,666			10,666
Adjustments to Appropriated Value		1,937			1,937
Current Budget Submit	10,574	12,603	16,843	16,926	56,946

Change Summary Explanation:
Funding: The CINC's TMD Assessments Program and TMD/NMD User Interface are two activities that were previously under project 3202 in the FY95 President's Budget. The funding increase from FY95 to FY96 is due to two reasons. First, an increasing number of theater commands are participating in the program. Second, the cost and complexity of future exercises will increase as they incorporate future TMD systems. It is planned that by FY98, TMD will be integrated into the routine warfighting operations of a number of commands (e.g.,

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USEUCOM, USCENTCOM, USFK). As a result, there will be much less need to sponsor TMD exercises for these commands.
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1293, Adv. Capability Concept Development, 0603872C	Yes
2294, Adv. Capability Dem/Val, 0603872C	Yes
3153, Architecture Analysis & BMC^3 Initiatives, 0603872C	Yes
3251, Sys. Engineering & Tech. Support, 0603872C	Yes
3261, BM/C3I, 0603864C/0604864C	Yes
3352, Modeling and Simulation, 0603872C	Yes
3359, System Test & Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997		
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Joint Projects	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Model and Wargame	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Refine ORD/CONOP	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mission Analysis	x	x	x	x	x	x	x	x	x	x	x	x	x		

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PE: 0603872C (Proj: 3270)
PE Title: Other TMD (U)

Project Number / Title: 3270 Threat and Countermeasures Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	0	0	24,810	24,931	31,580	31,580	31,580	31,580	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) Threat and Countermeasures Program. The BMDO Theater Missile Defense (TMD) Threat Program defines potential adversary military forces, principally theater ballistic missile (TBM) threats. To accomplish this mission, BMDO has a threat development program which is based on intelligence community projections and is traceable to quantifiable analysis. This project produces capstone threat and counter measure documentation to ensure consistent technical threat definitions across all the Services. It does not duplicate Service-unique activities. The program consists of three component tasks: Intelligence Threat, Countermeasures Integration, and System Threat Scenario Generation. This project was previously funded under Project 3202, 3203, and 3206 in the FY95 President's Budget.

(U) Intelligence Threat Task. The purpose of this task is to provide an intelligence community-validated TMD threat description. The threat is divided into four major categories under this task: Operational Threat Environment, Targets, System Specific Threats (SST), and Reactive Threats. The Operational Threat Environment includes assessments of the TBM operational and technological environments and projects the effects of developments and trends on TMD mission capability. The Targets category includes a projection of foreign TBM systems and countermeasures that enhance their performance. This includes force structure, performance characteristics, and sample signatures. System Specific Threat addresses threats to the TMD "family of systems" including

reconnaissance, surveillance, and target acquisition; lethal and non-lethal threats; and regional integrated SST assessments. The Reactive Threats category includes those that an adversary may develop as a result of deployment of the TMD "family of systems."

(U) System Threat Scenario Generation Task. The accurate specification and characterization of ballistic missiles and the appropriate development and integration of scenarios using these characterizations are critical to the analysis of alternative ballistic missile architectures, the performance assessments of potential technology applications, and the operational performance evaluations of candidate designs. This task provides baseline and excursion scenario descriptions in documentary and electronic form for use in BMDO TMD cost and operational effectiveness analyses (COEA). These descriptions are the only approved threat employment portrayals authorized for acceptable BMDO analysis. This task:

(1) Identifies user needs for threat scenario descriptions.
(2) Identifies analyses needed to fully specify and characterize the threat missile systems, penetration aids, tactics, etc., and ensures the analyses is accomplished.
(3) Provides the analysis results to all interested agencies for review and comment.
(4) Addresses critical threat issues which arise during the analysis process.
(5) Ensures all supporting agencies' views on threat issues are fully aired.
(6) Reviews, approves, produces, and distributes all System Threat Scenario Descriptions.
(7) Produces threat computer tapes electronic media and supporting documentation for use by the development and acquisition communities.

(U) Countermeasures Integration Task. The BMDO Countermeasure Integration (CMI) Program assists TMD acquisition program offices in developing theater ballistic missile defense systems that are robust to potential countermeasures and are practical and within the means of anticipated adversaries. Included in this mission is CMI Program support to the TMD threat development process and advance warning to BMDO system designers. The BMDO CMI Program reviews TMD systems for susceptibilities and identifies

potential countermeasures, determines credibility through analyses and tests, characterizes credible countermeasures by providing designs and performance parameters, informs intelligence and system threat developers of potential countermeasures, informs TMD system designers with advance warning of potential countermeasures, and assists TMD system designers in developing counter-countermeasures. Providing vulnerability and susceptibility information to the system designers early enables them to build robustness into their designs during the early stages of the system development process, a cost-effective means for providing a flexible high-performance design. The CMI Program takes a "rest-of-world" perspective in developing credible, potential countermeasures.

(U) The project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:
Not applicable

(U) FY 1995 Plans:
Not applicable

(U) FY 1996 Plans:

- ($ 6.007M) Intelligence Threat Task. Provide Capstone STAR, specialty threats, targets analyses, operational threat environment intelligence assessments, management and planning support.

- o ($ 5.142M) System Threat Scenario Generation Task. Continue to develop threat system characterizations and scenario descriptions in response to the analysis needs of the system/element developers; upgrade the threat modeling capability and produce electronic media and supporting documentation through the National Test Facility (NTF); and develop scenarios depicting threat systems employed in theater environments.
- o ($13.661M) Countermeasures (CM) Integration Task. Support TMD CM Red/Blue activities and counter-countermeasure parametric studies; TMD CM technical experiments and evaluations; CM Skunkworks teams in conducting CM concept, design, fabrication, and testing; and non-technical analysis, oversight, and database management.

(U) FY 1997 Plans:

- o ($ 6.037M) Intelligence Threat Task. Provide Capstone STAR, specialty threats, targets analyses., operational threat environment intelligence assessments, management and planning support.
- o ($ 5.167M) System Threat Scenario Generation Task. Continue to develop threat system characterizations and scenario descriptions in response to the analysis needs of the system/element developers; to upgrade the threat modeling capability and produce threat tapes and supporting documentation through the NTF; and develop scenarios depicting threat systems employed in theater environments.
- o ($13.727M) Countermeasures Integration Task. Support TMD CM Red/Blue activities and counter-countermeasure parametric studies; TMD CM technical experiments and evaluations; CM Skunkworks teams in conducting CM concept, design, fabrication, and testing; and non-technical analysis, oversight, and database management.

Acquisition Strategy: Funding is provided to executing agents who accomplish tasks under existing contracts via Military Interdepartmental Purchase Requests (MIPR); scientific, engineering, and technical assistance (SETA) contracts; and federally funded research and development centers (FFRDC).

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PE: 0603872C (Proj: 3270)
PE Title: Other TMD (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	24,810	24,931	49,741

Change Summary Explanation:
Funding: This project was funded under projects 3202, 3203, and 3206 in the FY95 President's Budget and is now shared with project 3270 (PE 0603871) beginning in FY96. All previous funding is found in project 3270 (PE 0603873) for FY94 and FY95.

Schedule: None.

Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes or No)
1266, Navy Theater-wide TBMD, 0603868C	Yes
1293, Advanced Capability Concept Development, 0603872C	Yes
2154, TMD-GBR, 0603862C/0604862C	Yes

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2257, PATRIOT, 0204865C	Yes
2260, THAAD, 0603861C/0604861C	Yes
2263, Navy Area TBMD, 0603867C/0604867C	Yes
2294, Advanced Capability Dem/Val, 0603872C	Yes
3251, System Engineering and Tech. Support, 0603872C	Yes
3352, Modeling and Simulation, 0603216C/0603217C	Yes
3359, System Test and Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
STAR Published																
CM Skunkworks Flight Tests									X		X		X		X	X
Threat Scenario Generation																
Updates As Required					X	X	X	X	X	X	X	X	X	X	X	X

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PE:0603872C (Proj: 3352)
PE Title: Other TMD (U)

Project Number / Title: 3352 Modeling and Simulations

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	31,475	64,801	70,521	57,486	61,990	59,181	60,023	60,257	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Theater Missile Defense (TMD) program's goal is to develop, maintain and deploy a cost-effective, Antiballistic Missile (ABM) Treaty compliant system designed to protect the United States and its Allies against the immediate and growing threat from shorter range theater ballistic missiles. The TMD core programs are PATRIOT, Theater High Altitude Area Defense (THAAD), Extended Range Intercept Technology (ERINT), Corps SAM, Navy Theater Wide TBMD and Navy Area TBMD, and Boost Phase Intercept (BPI).

(U) This project provides development and validation of models and simulation techniques and tools that are critical in assessing the performance capabilities of BMD systems. This is a highly complex problem requiring high-performance vector and parallel processing super-computers as well as scalar processors and advanced graphic workstations. This cost effective approach will reduce high cost missile test programs and will establish requirements for future technology. This capability is housed at the National Test Facility (NTF), and the Advanced Research Center/Simulation Center (ARC/SC). These facilities are capable of operating in a distributed integrated simulation environment and host modeling and simulation wargames that provide the analysis, integration, demonstration, and performance verification capability for BMD systems. These facilities are provided to all Services and procedures have been established that ensure efficient utilization and sound verification, validation, and accreditation.

(U) The funding for these facilities is distributed across three Program Elements (Pes) in FY95 (NMD, TMD, and Support Technology), and two Pes in FY96 and beyond (NMD, TMD). This cost sharing approach maximizes synergy and minimizes duplication of modeling and simulation resources. These Pes cover the total cost for operations and maintenance of these facilities which includes: computer hardware and software, communications networks, security, and other essential capabilities necessary to develop and operate reconfigurable, multiple experiment test bed environments. This document describes the TMD portion of funding for these activities.

(U) This project also funds the development, operation, verification, validation, and accreditation of the Extended Air Defense Test Bed (EADTB) and the Extended Air Defense Simulation (EADSIM) which support the analysis required for TMD program acquisition and integration. The EADTB is a flexible simulation tool that can determine the performance of specific existing and conceptual extended air defense systems with the added complexity of theater missile defense threats. This a multi-node test bed that is comprised of high and medium fidelity models of sensors, environments, weapon systems, threats, and BMC3 systems. The capabilities of the EADTB are being incrementally developed and accredited. EADSIM is a low to medium detail simulation system that operates on a stand-alone Silicon Graphics workstation. This simulation is used for architectural analysis of EAD systems and provides user interface for scenario preparation and model description. M&S activities funded by this project include: development, enhancement, and maintenance of the theater test beds and conduct of wargames that provide the analysis, integration, demonstration, and performance verification capability for TMD systems. This project ensures joint usage of simulation tool resources, supports allied and friendly international participation and cooperation in wargaming exercises.

(U) The project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3352)
PE Title: Other TMD (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project has established an initial operational capability for the EADTB and begun the verification, validation and accreditation of the EADSIM. Over 100 Specific Systems Representations (SSRs), medium to high fidelity models of environments, weapon systems, threats, and BMC3 systems, have already been established at the EADTB and the first remote node has been established at the SHAPE Technical Center (STC). Through an incremental approach these capabilities will be enhanced and accredited while simultaneously adding additional operational nodes. In FY95 and beyond, this project will be responsible for developing and maintaining the modeling and simulation capabilities at the NTF and ARC/SC facilities. Activities support TMD M&S requirements in the areas of simulations, models, test beds, wargames, software, telecommunications networks, and computational facilities in order to meet the evolving needs of the TMD program.

(U) FY 1994 Accomplishments:

- ($25.805M) Delivered EADTB Capability 1 to establish initial operational capability and provided support for EADTB data collection and experiments which created over 100 SSRs (including: THAAD, Patriot, BMC3, defended areas such as population centers, enemy aircraft, and enemy tactical ballistic missiles), and a limited set of scenarios, and experiments for verification of the software performance and implemented an EADTB node at the STC.
- ($4.620M) Provided support for UK Test Bed, SDC Test Bed and other TMD cooperative international test bed activities.
- ($1.300M) Provided development and verification, validation and accreditation (VV&A) support for EADSIM tool enhancements.

(U) FY 1995 Plans:

- ($26.248M) Deliver EADTB Capability 2 and 2A. These upgrades add new SSRs including a TBMD cruiser and space based sensors. Software functionality improvements were made to provide a more user friendly simulation environment and to

improve output displays and data accessibility. Participate in planned Cost & Operational Effectiveness Analysis (COEA) studies and joint exercises. Rehost software to Silicon Graphics platform (Convex platform retained at present nodes). Deliver remote EADTB access node at NTF. Provide on-site support, operation, and maintenance at the STC, provide software change request enhancements to baseline, and continue VV&A of EADSIM.

- o ($24.225M) Provide super-computing resources at the NTF which will be used by the Threat and Countermeasures program to upgrade model capability, develop scenarios and produce threat tapes. A prototype connection of the Theater Planning Tool (TPT) to existing tactical communications systems will be established through the BMC3 Element Support Center (BESC). Award NTF contract.
- o ($6.915M) Provide super-computing resources at the ARC/SC to operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements including the EADTB and EADSIM.
- o ($2.888M) Provide TMD M&S management oversight and support the independent verification and validation (IV&V), and head-to-head comparisons required for accreditation by the Services.

(U) <u>FY 1996 Plans:</u>

- o ($30.537M) Provide super-computing resources at the NTF which will be used by the TMD Systems Exerciser (TMDSE) to provide credible estimates of Kinetic Energy Weapon lethality against Theater Ballistic Missiles (TBMs). Continue use of facility for threat scenario generation, threat tape production and the development and operation of the TPT.
- o ($23.187M) Rehost EADTB Capability 3 (Convex version) to Silicon Graphics system. Continue development for EADTB Capability 4. These upgrades include SSRs of F15 aircraft, BPI, AWACS, and ground-based command and control centers. Complete Theater Air Combat Control Simulation Facility (TACCSF) and Navy nodes. Provide EADSIM enhancements and improvements.

- o ($8.807M) Provide super-computing resources at the ARC/SC to operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements including the EADTB, EADSIM, and the TMD Ground-Based Radar Test Bed (GBRTB).
- o ($7.990M) Provide TMD M&S management oversight and support the IV&V, and head-to-head comparisons required for accreditation by the Services.

(U) FY 1997 Plans:

- o ($20.900M) Deliver EADTB Capability 4 and 5. These upgrades make the test bed Distributed Interactive Simulation (DIS) compatible and create additional space based sensor SSRs. Provide EADSIM enhancements and improvements.
- o ($20.457M) Provide super-computing resources at the NTF which will be used for the TMDSE to provide credible estimates of kinetic energy weapon lethality against TBMs. Continue use of facility for threat scenario generation, threat tape production and the development and operation of the TPT.
- o ($8.850M) Provide super-computing resources at the ARC/SC to operate a multiple experiment test bed environment for conducting research and development activities for the Army and Ground Based Elements including the EADTB, EADSIM, and GBRTB.
- o ($7.279M) Provide TMD M&S management oversight and support the IV&V, and head-to-head comparisons required for accreditation by the Services.

(U) Acquisition Strategy: The tasks in this project have and will be met through full and open competition. Primary M&S support is performed at the NTF, ARC/SC, and other testbed facilities. The NTF contract was awarded to Loral in 1QFY95. The ARC/SC contract is a CPFF with COLSA, first awarded in June of 1989. The prime contractor for development and operation of the EADTB is Hughes Aircraft which was awarded a C/CPAF contract in September 1989.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3352)
PE Title: Other TMD (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	26,385	68,840	64,640	62,240	222,105
Appropriated Value		60,175			60,175
Adjustments to Appropriated Value		4,626			4,626
Current Budget Submit	31,475	64,801	70,521	57,486	224,283

Change Summary Explanation:
Funding: This project was formerly a subset of project number 3300 in the FY95 President's Budget. Previous President's Budget values state total M&S funding amounts which are now reported in three separate Pes (under this project, 3352) to reflect funding by TMD, NMD, Technology Follow-ons. This explains the large differences between previous and current appropriated values. The increase in funding for this project between FY94 and FY95 is attributed to TMD and NMD shared costs for the NTF and ARC/SC. This was previously funded in the NMD project for FY94. The decrease in FY97 costs at the NTF is a result of a one year change in the distribution of funding responsibilities at the NTF between NMD and TMD. A corresponding one year increase will be reflected in the NMD M&S project. Funding levels at the NTF and ARC/SC have been reduced resulting in single shift operation at both facilities.
Schedule: NONE
Technical: NONE

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1266, Navy Theater Wide, 0603868C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3352)
PE Title: Other TMD (U)

2154, TMD Ground Based Radar, 0603861C/0604861C	Yes
2260, THAAD, 0603861C/0604861C	Yes
2262, CORPS SAM, 0603869C	Yes
3251, Systems Engineering, 0603872C	Yes
3261, BMC3I, 0603864C/0604864C	Yes
3270, Threat and Countermeasures, 0603872C	Yes
3352, Modeling and Simulation, 0603871C/0603173C	Yes
3359, System Test & Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone				b1	b2	b3	b4&5		b6			b7			b8	
T&E Milestone					c1											
Contract Milestone					d1											
Other Program Events						e1		e2								

b1 Delivery of EADTB Capability 2 (Complete)
b2 Rehost EADTB to Silicon Graphics system
b3 Delivery of EADTB Capability 2A
b4 Delivery of EADTB NTF node

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3352)
PE Title: Other TMD (U)

b5 Delivery of EADTB Capability 3 (Convex)
b6 Delivery of EADTB Capability 3 (S.G.)
b7 Delivery of EADTB Capability 4
b8 Delivery of EADTB Capability 5
c1 Technical Engineering Demonstration
d1 NTF Support Contract Award
e1 NMD/TMD Wargame 95-A (CENTCOM)
e2 NMD/TMD Wargame 95-B (EUTCOM)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3354)
PE Title: Other TMD (U)

Project Number / Title: 3354 Targets Support

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	43,051	64,042	26,091	29,900	40,637	20,704	47,695	47,880	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides targets and services needed to support the testing and evaluation of Theater Missile Defense (TMD) programs. It is a segment of the BMDO Consolidated Targets Program (CTP). The CTP mission is to provide threat representative ballistic missile target system support to interceptor and sensor development and acquisition programs. This project funds the development of target systems and Foreign Military Acquisition (FMA) to support TMD test and evaluation. Also funded are the refurbishment and support costs of retired missile systems components that are used to construct the target systems. The THAAD, PAC-3, and Navy programs require target system support to accomplish their planned test and evaluation. The THAAD program intends to use the newly developed Hera target system with planned launches from White Sands NM and Wake Island into the Kwajalein Missile Range (KMR) impact area. The PAC-3 program will use Storm and Hera targets launched from White Sands and the Navy may use Hera targets launched from Pacific Missile Range Facility (PMRF) (Barking Sands, Kauai, HI) into open ocean impact areas.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3354)
PE Title: Other TMD (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:
Hera target development was continued, Storm targets were provided for PATRIOT/ERINT tests, and old missiles were refurbished for use as GFE TMD targets.

(U) FY 1994 Accomplishments:
- o ($18.000M) Continued development of the Hera target system to support TMD test and evaluation (THAAD, PAC-3, Navy)
- o ($10.000M) Continued to provide the Storm target in support of PATRIOT/ERINT testing
- o ($15.051M) Supported TMD targets infrastructure to include refurbishment of retired missile systems to be provided as GFE to construct target systems

(U) FY 1995 Plans:
- o ($33.000M) Complete development of the Hera target system and provide target launch support for Patriot and THAAD testing.
- o ($22.980M) Continue to provide TMD targets infrastructure support to include refurbishment of retired missile systems to be provided as GFE to construct target systems. Also, supports Foreign Material Acquisition (FMA) targets program.
- o ($9.562M) Technical support for targets program operations at the executing agent.

(U) FY 1996 Plans:
- o ($5.000M) Continue procurement of additional FMA target systems and target development to support TMD EMD test and evaluation.
- o ($20.091M) Continue to budget for infrastructure to support TMD targets to include refurbishment of retired missile systems to be provided as GFE to construct target systems.
- o ($1.000M) Initiate development of advanced payload to meet future requirements.

(U) FY 1997 Plans:

- o ($7.000M) Continue procurement of additional FMA target systems and target development to support TMD test and evaluation.
- o ($10.900M) Continue to budget for infrastructure to support TMD targets to include refurbishment of retired missile systems to be provided as GFE to construct target systems.
- o ($12.000M) Provide support for the Strategic Target System to include refurbishment of missile components and maintaining launch capability to support TMD EMD test and evaluation.

Acquisition Strategy: The Hera target system, being developed by Coleman Research Corporation (Orlando, FL) will be procured with a contract for a quantity of 25 targets. Two additional options are available for procurement of 25 targets in each option. Orbital Sciences Corporation is under contract to deliver three Storm target systems. Additional targets include STRYPI IX missiles and Lance target system.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	40,448	32,992	36,818	41,000	151,258
Appropriated Value		50,430			50,430
Adjustments to Appropriated Value		13,612			13,612
Current Budget Submit	43,051	64,042	26,091	29,900	163,084

Change Summary Explanation:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3354)
PE Title: Other TMD (U)

Funding: Project 3354 was included in project 3300 for the FY95 President's Budget submitted. The funding increase in FY95 was due to a change in the program element structure for FY95 to comply with congressional directives. Funding for this project consolidates targets development cost under one funding line. Each Major Defense Acquisition Program (MDAP) subsequently funds procurement and support for these targets used in program testing. The funding decreases in FY96-97 reflects current program requirement.
Schedule: NONE
Technical: NONE

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
2257, PATRIOT,0603486C/0604865C	Yes
2358, HAWK System BMC3, 0603863C	Yes
3157, Environmental, Siting & Fac, 0603872C	Yes
3359, System Test and Evaluation, 0603872C	Yes
3360, Test Resources, 0603872C	Yes
2262, Corps SAM, 0603869C	Yes
2260, THAAD, 0603861C	Yes
1170, TMD Risk Reduction, 0603872C	Yes
1263, Navy Theater WideTBMD, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3354)
PE Title: Other TMD (U)

D. (U) Schedule Profile Hera Targets Program

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
T&E Milestone (Hera Targets)				△ CDR				△ IOC								

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3359)
PE Title: Other TMD (U)

Project Number / Title: 3359 System Test & Evaluation

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	34,042	27,758	47,137	46,720	48,056	29,667	29,896	30,978	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides for BMDO planning oversight and coordination of integrated Test and Evaluation activities, as well as inter-service Test and Evaluation efforts. Once the test plans are developed, test resource and target development and support is provided. (Test resources located in project 3360, include test facilities, ranges and test instrumentation; target development and support is found in project 3354). Additionally, this project provides the following: independent test evaluation of systems, technology programs and special reviews; estimates of kinetic energy weapon (KEW) Lethality against Theater Ballistic Missiles; fidelity models and simulation to support system development testing; and execution of independent technical reviews, system analyses and performance evaluations which contribute to the development of the BMD family of systems and achievement of acquisition milestones. The performance evaluation has as its primary goals the identification and understanding of system-level performance drivers and the mitigation of technical risk. Efforts include short-term special studies, focused technical investigations, and participation in test readiness reviews to ensure successful test and experiments.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3359)
PE Title: Other TMD (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project provided lethality test data which supported the PAC-3 Milestone II (MSII) decision and will support the THAAD and Sea-Based Area Defense MSII decision. It provided independent evaluations of high interest technical issues for TMD acquisition programs, and TMD system level Test and TMD system level test tools.

(U) FY 1994 Accomplishments:

- ($ 2.930M) Completed theater environment for Proof of Principle (POP) demonstration of the Distributed Theater Missile Defense System Level Exerciser; conducted Proof of Principle demonstration for TMD System Exerciser (TMDSE). Conducted PAC-3/ERINT missile suitability study, THAAD power system study, and THAAD Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) evaluation.
- ($28.738M) Live flight data from the Patriot system confirmed destruction of submunitions in hit-to-kill intercepts. Updated PAC-3 lethality codes to support Live Fire Test & Evaluation (LFT&E) analysis for PAC-3 DAB.
- ($1.187M) Developed independent evaluation methodology. Conducted special study of THAAD missile power interrupts. Conducted technical investigation of government Infrared Red hardware-in-the-loop testing facilities. Analyzed and verified attainment of exit criteria for PAC-3 Defense Acquisition Board (DAB) Milestone Review.
- ($1.187M) Provided Test and Evaluation (T&E) technical support. Reviewed, analyzed, and critiqued the Test and Evaluation Master Plans (TEMP's) for PAC-3 and Sea-based Area Defense Programs. Research and analyze BMD T&E issues and policies in support of the Defense Steering Group (DTESG) and the OSD T&E Resources Committee (TERC).

(U) FY 1995 Plans:

- o ($9.782M) Develop interface for TMD System Exerciser, to resolve some of the major theater integration issues, both inter and intra-service; conduct TMD system level interoperability testing and evaluation with System Exerciser. Perform test planning for scheduled System Integrated Tests (SITs). Perform Command, Control, Communications Intelligence Integration Test (C3IITs) in conjunction with the SIT schedule and conduct SITs.
- o ($14.594M) Perform THAAD Interceptor, PAC-3 Lethality and Sea-Based Area Defense sled test. Perform sub-scale interceptor gas-gun scaling experiments.
- o ($1.691M) Execute independent evaluation plan and methodology. Conduct special studies and technical investigations. Participate in THAAD Test Readiness Reviews. Monitor THAAD flight testing and confirm attainment of test objectives. Conduct special studies and analyses in support of the TMD Cost and Operational Effectiveness Analysis (COEA) effort.
- o ($1.691M) Provide Test and Evaluation technical support. Review, analyze, and critique the BMDO TMD T&E program. Research, analyze, and document TMD T&E issues and policies for the OSD BMD Acquisition Executive. Research and analyze BMD T&E issues and policies in support of the Defense T&E Steering Group (DTESG) and the OSD T&E Resources Committee (TERC).

(U) FY 1996 Plans:

- o ($23.131M) Provide sensor integration to the TMDSE. Perform test planning for scheduled SITs. Perform C3IITs in conjunction with the SIT schedule and conduct SITs. For example, two major tests are scheduled at USAKA with Patriot, Aegis and BMC^3 using countermeasures and realistic targets.
- o ($18.533M) Perform lethality sled tests to establish geometry variation with realistic targets for PAC-3 and THAAD. Perform direct hit lethality sled test for Sea-Base Area Defense.
- o ($2.737M) Execute independent evaluation plan and methodology. Conduct special studies and technical investigations. Participate in THAAD Test Readiness Reviews. Conduct Independent Evaluations of TMDSE testing. Monitor THAAD flight testing and confirm attainment of test objective.

- o ($2.736M) Provide Test and Evaluation (T&E) technical support. Review, analyze, and critique the BMDO TMD T&E program. Research, analyze, and coument TMD T&E issues and policies for the OSD BMD Acquisition Executive. Research and analyze BMD T&E issues and policies in support of the Defense T&E Steering Group (DTESG) and the OSD T&E Resources Committee (TERC).

(U) FY 1997 Plans:

- o ($21.518M) Provide service integration to TMDSE. Perform test planning for scheduled SITs. Perform C3IITs in conjunction with the SIT schedule and conduct SITs. Integration tests of the Army enclave will be performed with Patriot, THAAD and BMC^3 using both live and simulated TMDSE capabilities.
- o ($19.702M) Continue PAC-3/THAAD live fire T&E/Lethality sled tests against threat targets. Initiate Sea-Base Area Defense geometry variation sled tests.
- o ($2.750M) Execute independent evaluation plan and methodology. Conduct special studies and technical investigations. Participate in THAAD Test Readiness Reviews. Participate in PAC-3 Test Readincss reviews. Conduct Independent Evaluations of TMDSE testing.
- o ($2.750M) Provide Test and Evaluation (T&E) technical support. Review, analyze, and critique the BMDO/TMD T&E program. Research, analyze, and document TMD T&E issues and policies for the OSD BMD Acquisition Executive. Research and analyze BMD T&E issues and policies in support of the Defense T&E Steering Group(DTESG) and the OSD T&E Resources Committee (TERC).

Acquisition Strategy: This effort will use Service executing agents through existing contracts to construct a TMD Family of Systems HWIL capability (TMDSE) and conduct TMD system level live flight testing. The strategy provides for lethality sled testing managed by BMDO and executed by Service labs against TMD targets. It also provides Service and BMDO system evaluation funding. Various Federally Funded Research and Development Centers (FFRDC) will be used to execute the evaluation process.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3359)
PE Title: Other TMD (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	33,838	44,650	46,450	45,250	170,188
Appropriated Value		28,531			28,531
Adjustments to Appropriated Value		-0,773			(773)
Current Budget Submit	34,042	27,758	47,137	46,720	155,657

Change Summary Explanation:
Funding: System Test and Evaluation Activities, project 3359, were included in projects 1502 and 3300 for the FY95 President's Budget. Due to Congressional direction program-specific lethality funding has been moved to projects 2257 (PATRIOT), 2260 (THAAD), and 2263 (Navy Area TBMD). Funding increased due to the initiation of System Integration Tests (SITs) in FY96 and the outyears. Underfunding of TMSDE in FY95 resulted in a program slip of approximately six months; FY96 provides increased funding to restore the schedule consistent with major defense acquisition programs' development and their associated integration with the BMC3. Other increased funding is required to implement C3IIT in preparation for and post assessment of SITs. Greater emphasis on lethality and evaluation represents planned growth to reflect the overall pace of the TMD program. Evaluation effort provides funding to support service evaluation efforts (e.g., AMSAA) during intense test periods.
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3359)
PE Title: Other TMD (U)

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155, Phenomenology, 0603872C	Yes
1170, TMD Risk Mitigation, 0603872C	Yes
1266, Navy Theater Wide Defense, 0603868C	Yes
2154, TMD GBR, 0603862C/0604862C	Yes
2260, THAAD, 0603861C	Yes
2257, PATRIOT, 0604865C	Yes
2262, Corps SAM, 0603869C	Yes
2263, Navy Area, 0603867C	Yes
2358, HAWK System BMC3, 0603863C	Yes
3157, Environmental, Siting & Fac, 0603872C	Yes
3251, Sys Eng & Tech Spt, 0603872C	Yes
3261, BMC3I Concepts, 06033864C	Yes
3352, Modeling and Sim, 0603872C	Yes
3354, Targets, 0603872C	Yes
3360, Test Resources, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

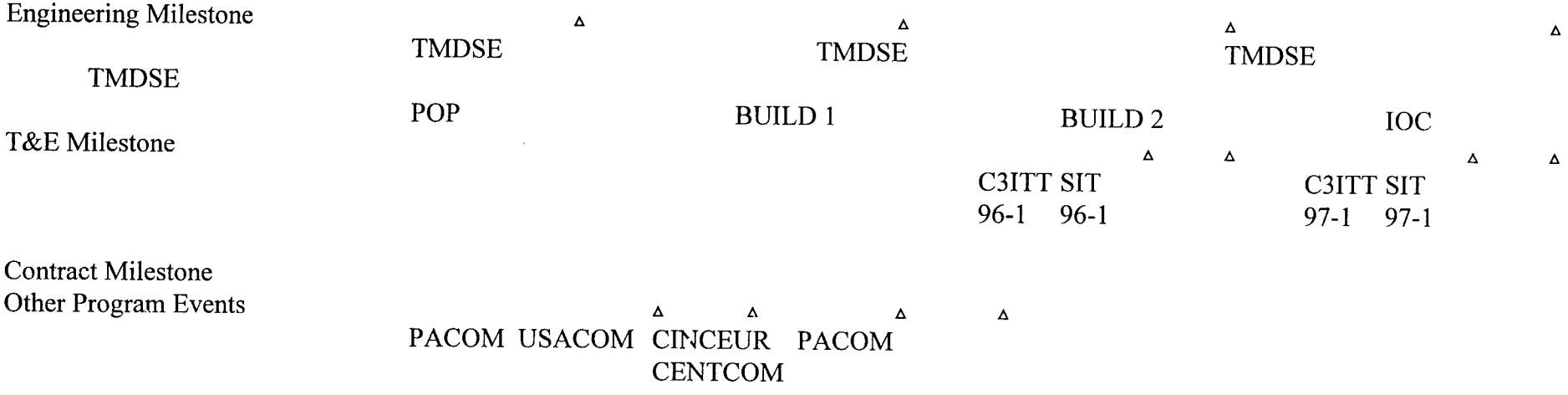
D. (U) Schedule Profile

FY1994				FY1995				FY1996				FY1997			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE: 0603872C (Proj: 3359)
PE Title: Other TMD (U)



RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3360)
PE Title: Other TMD (U)

Project Number / Title: 3360 Test Resources

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603872C RDT&E	14,919	25,585	34,237	35,853	34,937	34,808	35,494	35,651	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides for BMDO planning, oversight, and coordination of integrated test and evaluation activities, as well as inter-service test and evaluation efforts. Additionally, this project provides the test infrastructure for common ground test facilities, common range facilities, and range instrumentation in direct support of THAAD, PATRIOT, Navy TBMD, theater missile defense (TMD) target phenomenology projects, and the Technology Readiness program. The common ground test facilities include: the Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) at Eglin AFB, Fort Walton Beach, FL; the Hypervelocity Wind Tunnel Number 9 (Tunnel 9) at the Naval Surface Warfare Center, White Oak, MD; the National Hover Test Facility (NHTF) at Edwards AFB, CA; the Kinetic Energy Weapon Digital Emulation Center (KDEC) at U.S.Army Space and Strategic Defense Command, Huntsville, AL; the Army Missile Optical Range (AMOR) at the U.S. Army Missile Command, Huntsville, AL; and the infra-red and blackbody standards at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. The common range facilities include national ranges such as: the White Sands Missile Range (WSMR) located in Las Cruces, NM; the Kwajalein Missile Range (KMR) with the Wake Island Complex located in the Marshall Islands; the Pacific Missile Range Facility (PMRF) located at Kauai, HI; the Gulf Test Range (GTR) located at Eglin AFB, Fort Walton Beach, FL. The range instrumentation includes special test equipment, data collection assets, and range instrumentation upgrades including: the High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor, based at Aeromet, Inc., Tulsa, OK; the Rapid Optical Beam Steering (ROBS) system, the Sea-Lite Beam Director (SLBD), the Experimental Test System (ETS), and the High Altitude Optical Imaging System (HAOIS)

all based at WSMR. These ground test, range and instrumentation assets provide program risk reduction and test implementation capability in support of the Theater Missile Defense test and evaluation program. These facilities and capabilities support systems design, verification and validation of target realism, and the evaluation of test results. This project was part of project 3300 in the FY95 President's Budget.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project has provided the test infrastructure for ground test facilities, range facilities and range instrumentation in direct support of the THAAD, PATRIOT, Navy Sea-based Area, and TMD target phenomenology projects as well as the Technology Readiness program in FY94. The full flight duplication capability at the NSWC Wind Tunnel Number 9 and the HERA launch complex (LC 32) at WSMR achieved their initial operating conditions. Successfully collected unique target phenomenology data from airborne and ground sensors for all TMD target/interceptor flights launched at WSMR during FY94 (total of eight flights). Demonstrated initial capabilities of the Rapid Optical Beam Steering (ROBS) system, a laser radar tracking system, at WSMR.

(U) FY 1994 Accomplishments:

- ($ 4.519M) Provided ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, and propellant loading expertise from the NHTF. Support initial operating capability (IOC) of the full flight duplication capability at Tunnel 9 and the design and planning of the Wide-Band Infra-red (IR) Scene Projector (WISP) at the KHILS facility.

- o ($ 8.250M) Provided test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of TMD launch and range facilities, and associated range instrumentation sites.
- o ($ 2.150M) Provided range instrumentation, upgrades, data collection, and analyses for BMDO testing including: design and planning of the Kwajalein Mobile Range Safety System (KMRSS) at KMR, deployment of ROBS system at WSMR, and data collecting and processing by SLBD and ETS at WSMR and HALO/IRIS.

(U) FY 1995 Plans:

- o ($ 8.657M) Provide ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, propellant loading expertise from the NHTF, and phenomenology characterization at AMOR and KHILS. Complete the full flight duplication capability at Tunnel 9. Support the IOC of the WISP at KHILS.
- o ($ 7.150M) Provide test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of TMD launch and range facilities at WSMR, Wake Island, and associated range instrumentation sites.
- o ($ 9.778M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including: IOC of KMRSS at KMR, IOC of ROBS system, and data collection and processing by SLBD and ETS at WSMR and the HALO/IRIS sensor. Support the design and planning of HAOIS at WSMR.

(U) FY 1996 Plans:

- o ($15.204M) Provide ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, propellant loading expertise from the NHTF, phenomenology characterization at AMOR and KHILS, and primary infra-red standards at the NIST. Complete the WISP at KHILS.

- o ($ 8.404M) Provide test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of TMD launch and range facilities at WSMR and Wake Island, and associated range instrumentation sites.
- o ($10.629M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including: FOC of KMRSS at KMR, FOC of the ROBS system, and data collecting and processing by SLBD and ETS at WSMR and the HALO/IRIS sensor. Support the IOC of HAOIS at WSMR.

(U) FY 1997 Plans:

- o ($16.950M) Provide ground test facility infrastructure and upgrades for BMDO testing including: digital emulation at KDEC, hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, propellant loading expertise from the NHTF, phenomenology characterization at AMOR and KHILS, and primary infra-red standards at the NIST.
- o ($ 8.950M) Provide test range infrastructure, upgrades, and environmental documentation for BMDO testing including development of TMD launch and range facilities, and associated range instrumentation sites.
- o ($ 9.953M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including: data collecting and processing by ROBS, SLBD and ETS at WSMR and HALO/IRIS sensor. Support the FOC of HAOIS at WSMR.

Acquisition Strategy: In the selection and acquisition of ranges and test facilities, the BMDO implements a reliance process which a) maintains perspective of national technical test capabilities; b) is responsive to program requirements; c) uses existing test resources where possible; d) requires coordination prior to development of new resources; and e) consolidates management of existing resources where possible and practicable. This policy results in a variety of acquisition methods. This project uses Service executing agents through existing contracts in support of TMD testing. Executing agent project managers for the Service projects and tasks under this project include the three services and the BMDO, to take best advantage of existing strengths and capabilities. Service project manager organizations specifically include : the U.S. Army Space and Strategic Defense Command (USASSDC), the U.S.

Navy Office of Naval Research, Navy Ballistic Missile Defense Technology, and the U.S. Air Force Phillips Laboratory. The majority of the ground test facilities are government owned and operated, many with some degree of contractor support, which support multiple BMDO users. The ranges in this project supporting TMD are part of the DoD major range and test facility bases, i.e., WSMR, KMR, PMRF, and GTR. The HALO/IRIS sensors are operated by competitively awarded contracts. The ROBS laser radar was developed by a contractor who is providing continuing technical support through the initial check-out and operation. SLBD is operated by the U.S. Navy (government and contractor personnel). Data from ETS and SLBD is collected and processed by federally funded research and development center personnel.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	15,026	31,721	31,721	31,721	110,189
Appropriated Value		27,971			27,971
Adjustments to Appropriated Value		-2,386			(2,386)
Current Budget Submit	14,919	25,585	34,237	35,853	110,594

Change Summary Explanation:
Funding: Project 3360 was a portion of project 3300 in the FY95 President's Budget. Increase in FY96 is required for planning and preparation for range instrumentation and test ranges consistent with the pace and growth of the TMD program.
Schedule: None
Technical: None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3360)
PE Title: Other TMD (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes or No)
1155, Phenomenology Program, 0603872C	Yes
1265, Boost Phase Interceptor, 0603870C	Yes
1266, Navy Theater-wide TBMD, 0603868C	Yes
1267, Ground-based Interceptor, 0603871C	Yes
1270, Advanced Interceptors, 0603173C	Yes
2257, PATRIOT, 0604865C	Yes
2259, Israeli Cooperative Projects, 0603872C	Yes
2260, THAAD, 0603861C/0604861C	Yes
2263, Navy Area TBMD, 0604867C	Yes
3157, Environmental Siting & Fac, 0603872C	Yes
3354, Targets, 0603872C	Yes
3359, System Test and Evaluation, 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

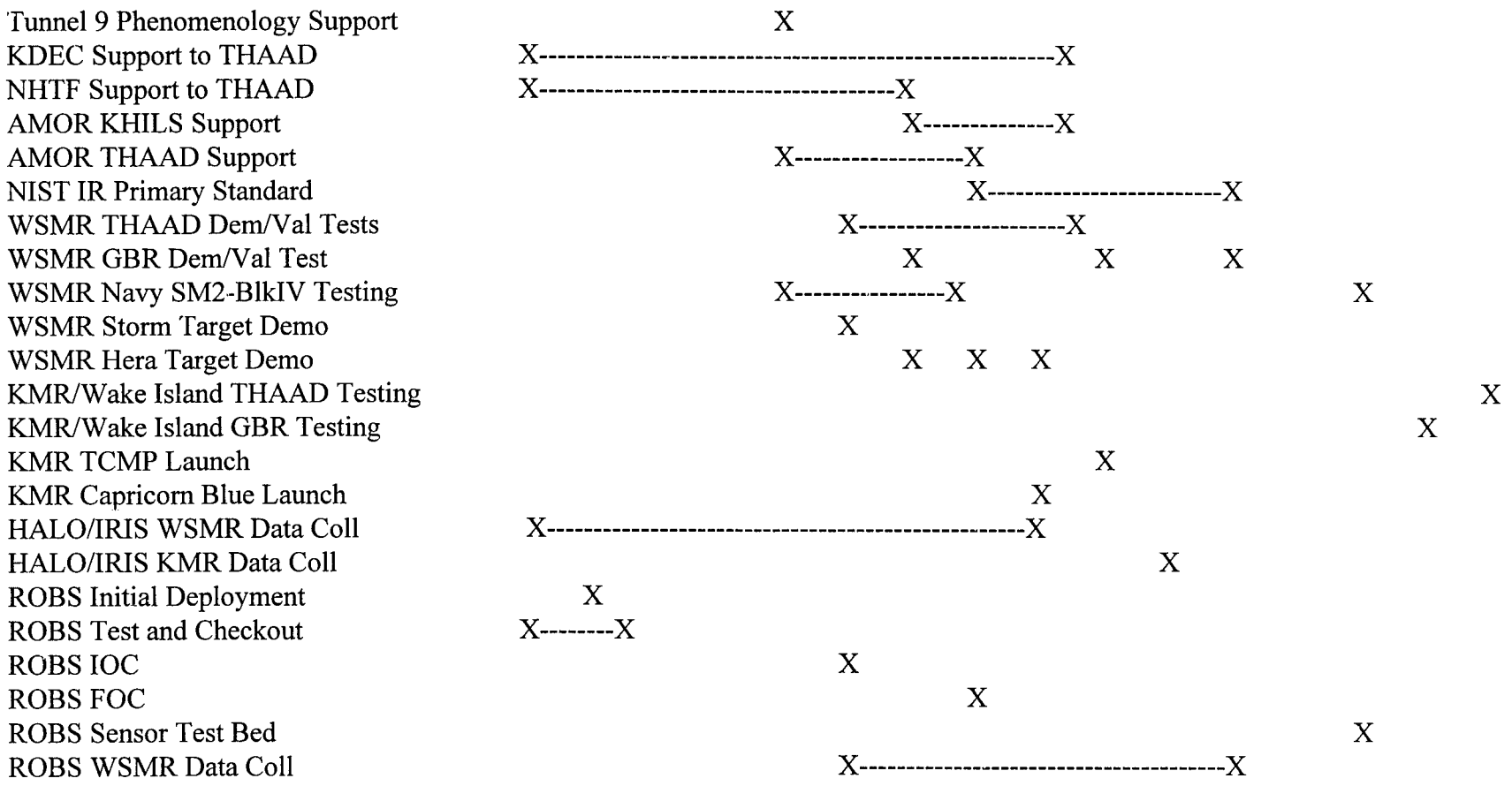
D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
KHILS WISP IOC							X									
KHILS WISP FOC												X				
Tunnel 9 Full Flight Dup IOC				X												

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04 (Dem/Val)

PE:0603872C (Proj: 3360)
PE Title: Other TMD (U)



PATRIOT Advanced Capability-3 Missile (PAC-3)
PE 0208865C / 0603865C / 0604865C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604865C (Proj: 2257)
PE Title: PAC3 (U)

Project Number / Title: 2257 PATRIOT

Program Name:	FY1994 Actual	FY1995* Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0208865C PROC	120,115	253,272	399,463	413,608	486,247	423,600	469,050	271,967	3,347M
0603865C RDT&E	77,584	0	0	0	0	0	0	0	629M
0604865C RDT&E	42,097	276,283	247,921	160,070	65,005	775	487	98	804M

* See OTHER PROGRAM FUNDING SUMMARY section

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) PATRIOT is a long-range, mobile, field Army and Corps air defense system, which uses guided missiles to simultaneously engage and destroy multiple targets at varying ranges. The PATRIOT Advanced Capability Level 3 (PAC-3) Upgrade Program is the latest evolution of the phased material change improvement program to PATRIOT. The material changes will provide improved performance across the spectrum for system and threat intercept performance. The material changes include a new PAC-3 missile (previously known as ERINT), remote launch capabilities, communications and computer/software improvements, and radar upgrades to enhance system performance by improving its multi-function capability for tracking, and target handling capability against air breathing, ballistic and cruise missile threats. The PATRIOT operates as lower tier of the Army's TMD enclave concept and is developing the capacity to interact with the Navy Cooperative Engagement Capability (CEC) system.

(U) This project is assigned to the Budget Activity and Program Element Codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604865C (Proj: 2257)
PE Title: PAC3 (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS

(U) The ERINT was selected as the PAC-3 missile as a result of successful tests and a thorough evaluation of the missiles capabilities by the U.S. Army. The Dem/Val missile conducted three successful intercepts against tactical ballistic missile and air breathing targets. Following the missile selection, a Defense Acquisition Board (DAB) review of the PAC-3 program was conducted resulting in approval for the PAC-3 missile to enter Engineering and Manufacturing Development (EMD). U.S. Army Missile Command (MICOM) released the solicitations for development of the PAC-3 missile and integration of the PAC-3 missile into the PATRIOT system. Milestone III decision was approved for production of Guidance Enhanced Missile (GEM)(Upgrade to the PAC-2 missile). MICOM released solicitations for the Routing Logic Radio Interface Unit (RLRIU). The Army fielded 31 Quick Response Program Kits. Submitted preliminary Engineering Change Proposals for Radar Phase III. The Army conducted the Initial Production Readiness Review for Radar Phase III. Efforts now focus on completing the radar and remote launch enhancements to the system, completing initial work on PATRIOT/ERINT integration, and initiating PAC-3 missile EMD. PATRIOT is pursing integration of PATRIOT BMC3I with the Project Manager, Air Defense Command and Control Systems to take advantage of previous Army developments that can be incorporated into the PATRIOT program. This project was listed as PE: 0604216C/0604225C in the FY1995 President's Budget. The FY1994 accomplishments listed include the accomplishments from the Risk Reduction/Mitigation from PE: 0604866C Proj 2257. The Risk Reduction/Mitigation project was listed as PE: 0604216C (Theater Missile Defense) Proj: 2208 (ERINT) in the FY1995 President's Budget.

(U) FY 1994 Accomplishments

- o Initiated the PAC-3 missile EMD phase.
- o Conducted operational test planning and support.
- o Completed PATRIOT Multimode missile Dem/Val program.

- o Completed Radar Phase III system integration and pre-production quality testing (PPQT); continue Classification, Discrimination, Identification (CDI) Phase III (HRR) development.
- o Continued Remote Launch development.
- o Complete ERINT Dem/Val flight tests; award contract go-ahead for the EMD missile; complete testing of PATRIOT/ERINT integration hardware and software; deliver Dem/Val seeker to support MICOM HWIL testing.

(U) FY 1995 PLANS:

- o ($204.191M) Continue PAC-3 missile EMD; begin PAC-3 missile hardware procurement/fabrication and conduct in-process review (IPRs); hold Software Specification Review (SSR), Preliminary Design Review (PDR), and Critical Design Review (CDR) to complete PAC-3 missile design; develop test plans and procedures for Development Test(DT)/ Operational Tests (OT) /Initial Operational Tests and Evaluation (IOT&E) flight tests.
- o ($20.88M) Continue Remote Launch/communication development program. .
- o ($26.32M) Continue of CDI Phase III development program.
- o ($22.040M) Initiate TMD/THAAD integration and cueing software program to provide basis for interoperability within Theater Missile Defense via Joint Tactical Information Distribution System (JTIDS)/Tactical Air Defense Information Link (TADIL)-J messages to the THAAD Battery Tactical Operations Center (BTOC).
- o ($ 2.852M) Provide hardware to support sled tests and hypervelocity gun tests to support lethality reporting requirements and live fire test preparation. Support digital computer code modeling unique to PATRIOT.

(U) FY 1996 PLANS:

- o ($215.121M) Continue PAC-3 missile EMD program; begin formal flight testing; EMD target and test support.
- o ($11.097M) Continue Remote Launch/communications development program.
- o ($16.649M) Complete integration and testing of CDI Phase III and conduct Production Design Review.

- o ($ 3.064M) Continue TMD/THAAD integration/cueing program.
- o ($ 1.990M) Continue lethality efforts.

(U) FY 1997 PLANS:

- o ($158.57M) Continue PAC-3 missile hardware procurement/fabrication and conduct In Progress Reviews; continue target supports, Development Test and Operational Test flight tests.
- o ($ 1.500M) Continue lethality efforts.

(U) Acquisition Strategy: The PAC-3 Upgrade Program will provide enhancements to the current PATRIOT system through a series of upgrades divided into three configurations which will be individually tested and procured. Missile and ground equipment configurations will be fielded through a hardware retrofit and concurrently released software builds. During EMD, an expanded risk reduction/mitigation program (PE: 0604866C, Proj: 2257) will be implemented to address areas of risk identified during the Dem/Val phase.

B. (U) PROGRAM CHANGE SUMMARY:

PAC-3 DEM/VAL:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	81,184	69,240	30,960	0	181,384
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	77,584	0	0	0	77,584

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604865C (Proj: 2257)
PE Title: PAC3 (U)

PAC-3 EMD:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	42,097	217,200	205,620	134,230	599,147
Appropriated Value		286,440			286,440
Adjustments to Appropriated Value		-10,157			(10,157)
Current Budget Submit	42,097	276,283	247,921	160,070	726,371

Change Summary Explanation:
Funding: This project was previously listed under PE: 0604216C/0604225C, Proj: 2207 in the FY1995 President's Budget. All Dem/Val funding in the FY1995 President's Budget was moved into the EMD program element as the program was approved to enter EMD. The Ballistic Missile Defense Organization is reassessing the mix of Procurement and RDT&E funding for PATRIOT in FY1996. Pending the outcome of this assessment, revised requests with a zero sum gain between Procurement and RDT&E funds may be submitted to the Congressional committees during the FY1996 budget deliberations.

Schedule: None
Technical:None

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:	Funding Dependency (Yes[1]/No)
Project 2257 PAC-3 Risk Mitigation PE 0604866C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604865C (Proj: 2257)
PE Title: PAC3 (U)

*Project 1155 Phenomenology PE:0603872C	Yes
*Project 1170 TMD Risk Mitigation PE:0603872C	Yes
*Project 3157 Environ, Siting, & Facilities PE 0603872C	Yes
Project 3160 Logistics PE:0603872C	Yes
*Project 3251 Sys Eng & Tech Spt PE 0603872C	Yes
*Project 3261 BMC3I PE 0603872C/0604864C	Yes
*Project 3265 CINCs TMD Assessment PE 0603872C	Yes
*Project 3352 Modeling & Simulation PE 0603872C	Yes
*Project 3354 Targets PE 0603872C	Yes
*Project 3359 Sys Test & Eval PE: 0603872C	Yes
*Project 3360 Test Resources PE:0603872C	Yes

* These projects provide essential technical, engineering, and/or infrastructure support to TMD MDAP programs.

(U) FY 1995 efforts totalling $0.600M that are funded in the Other TMD Activities Program Element (PE 0603872C) are included in the program element totals shown on this R-2 Exhibit.

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PAC-3 Missile EMD																

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604865C (Proj: 2257)
PE Title: PAC3 (U)

| | | |

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 04 - Dem/Val

February 1995

Project and Title - 2257 PATRIOT

P.E. Number: 0603865C
P.E. Title : PAC-3 (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Multimode Missile Program	55,500	0	0	0
b. Remote Launch	1,135	0	0	0
c. Radar Phase III	20,949	0	0	0
Total	77,584	0	0	0

B. Budget Acquisition History and Planning Information

This PE was restructured in FY1995 and was not funded past FY1994.

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Development							0	0	0	0	
Raytheon(Multimode Missile)	SS-CPIF					55,500	0	0	0	0	
Raytheon (Remote Launch)	SS-CPIF					1,135	0	0	0	0	
Raytheon(Radar Phase III	SS-CPIF					20,949	0	0	0	0	
Subtotal Product Dev.						77,584.					
Subtotal Support & Mgmt.											
Subtotal Test & Evaluation											
Total Project						77,584.	0	0	0	0	

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 05 - EMD

February 1995

Project and Title - 2257 PATRIOT

P.E. Number: 0604865C
P.E. Title : PAC-3 (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Category	1994	1995	1996	1997
a. PAC-3 Missile (EMD)	42,097	276,283	247,921	160,070

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Development											
Raytheon (Radar/CDI III)	SS-CPIF	TBD	44651	44651.0	0	0	30421.0	14230.0	0	0	44651.0
Raytheon (Remote Launch/ Commo)	SS-CPIF	TBD	25186.0	25186.0	0	0	15701.0	9485.0	0	0	25186.0
Loral (Current)	SS-CPIF	15 Jun 94	30000.0	30000.0	0	30000.0	0	0	0	0	30000.0
Raytheon(Integration)	SS-CPIF	18 Nov 94	121000.0	121000.0	0	4521.0	20479.0	20092.0	16837.0	59071.0	121000.0
Loral(EMD)	SS-CPIF	26 Oct 94	515000.0	515000.0	0	4521.0	160479.0	138406.0	77533.0	134061.0	515000.0
RDEC/OGA	PO	15 Oct 93	49207.0	49207.0	0	1491.0	12826.0	12475.0	11605.0	10810.0	49207.0
Undetermined											
Support and Management Organizations											
Coleman	MIPR	TBD	450.0	450.0	0	50.0	400.0	0	0	0	450.0
Delta	MIPR	TBD	3800.0	3800.0	0	0	1800.0	2000.0	0	0	3800.0
Nichols	MIPR	TBD	21790.0	21790.0	0	0	3040.0	5515.0	5255.0	5980.0	19790.0
CAS/0105	SS-CPIF	TBD	19766.0	19766.0	0	0	4850.0	4114.0	4052.0	4750.0	17766.0
OGA/Inhouse	PO	TBD	36271.0	36271.0	0	0	8249.0	8485.0	8402.0	9135.0	34271.0
Raytheon(E/S 94)	SS-CPIF	1-30-94	1114.0	1114.0	0	1114.0	0	0	0	0	1114.0
Raytheon(E/S 95)	SS-CPIF	TBD	11653.0	11653.0	0	0	9283.0	2370.0	0	0	11653.0
Raytheon(E/S 96)	SS-CPIF	TBD	1197.0	1197.0	0	0	0	9557.0	2440.0	0	11997.0
Test and Evaluation Organization											
WSMR/ARL	MIPR	TBD	36095.0	36095.0	0	400.0	8155.0	10694.0	9606.0	7240.0	36095.0
OT&E	MIPR	TBD	4732.0	4732.0	0	0	600.0	547.0	840.0	2745.0	4732.0
Targets	MIPR	TBD	52895.0	52895.0	0	0	0	9951.0	23500.0	19444.0	52895.0

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property TBD	Negative										
Support & Mgmt. Property TBD	Negative										
Test & Eval. Property TBD	Negative										

Subtotal Product Dev.					0	40.533	239.906	194.688	105.975	203,942	785,044
Subtotal Support & Mgmt.					0	1.164	27.622	32.041	20.149	19.865	100.841
Subtotal Test & Evaluation					0	.400	8.755	21.192	33.946	29.429	93.722
Total Project					0	42,097	276,283	247,921	160,070	253,236	979,607

PATRIOT Advanced Capability-3
Risk Reduction
PE 0604866C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604866C (Proj: 2257)
PE Title: PAC3 Risk (U)

Project Number / Title: 2257 PAC3 RISK REDUCTION

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0604866C RDT&E	97,000	74,000	19,485	9,760	0	0	0	0	200M

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) PATRIOT is a long-range, mobile, field Army and Corps air defense system, which uses guided missiles to simultaneously engage and destroy multiple targets at varying ranges. The PATRIOT Advanced Capability Level 3 (PAC-3) Upgrade Program is the latest evolution of the phased material change improvement program to PATRIOT. The material changes will provide improved performance across the spectrum for system and threat intercept performance. The material changes include a new PAC-3 missile (previously known as ERINT), remote launch capabilities, communications and computer/software improvements, and radar upgrades to enhance system performance by improving its multi-function capability for acquisition, tracking, and target handling capability against air breathing, ballistic and cruise missile threats. The PATRIOT operates as a lower tier of the Army's TMD enclave concept and is developing the capacity to interact with the Navy Cooperative Engagement Capability (CEC). This project provides for risk reduction activities associated with the PAC-3 system including the PAC-3 missile. There are three sets of activities; the PAC-3 missile and system integration activities; the Mountain Top Demonstration; and captive carry and HWIL testing of a 16" seeker. This project addresses PAC-3 missile system risks including; system integration of the PAC-3 missile; maneuvering re-entry threat vehicles; Electronic Counter-Counter Measures; relocation of threat vehicle payloads and low altitude and, low radar cross-section cruise missiles in a high clutter and/or adverse weather environment.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604866C (Proj: 2257)
PE Title: PAC3 Risk (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS

(U) The ERINT was selected as the PAC-3 missile as a result of successful tests and a thorough evaluation of its capabilities by the U.S. Army. The Dem/Val missile conducted three successful intercepts against tactical missile and air breathing targets. Following the missile selection, the Defense Acquisition Review Board (DAB) approved the PAC-3 missile to enter Engineering and Manufacturing Development (EMD). MICOM released the solicitations for development of the PAC-3 missile and integration of the PAC-3 missile into the PATRIOT system. This program is focusing on risk reduction/mitigation activities which address overall system integration of the PAC-3 missile and the capability of the system to address the full spectrum of threats including the advanced cruise missile. The FY1994 accomplishments and plans are included in the PE: 0604865C Proj 2207. This PE in FY1994 was listed as ERINT (Proj 2208) under PE: 0604216C (Theater Missile Defense) under the FY1995 President's Budget. The FY1995 through FY1997 funding in PE:0604866C address the PATRIOT Risk Reduction program.

(U) FY 1995 PLANS:

- o ($65.5M) Activities include Engineering and Manufacturing Development (EMD) Seeker captive carry and Hardware -in-the-loop (HWIL) testing, upgrading the PATRIOT Flight Mission Simulator to increase the fidelity of operational testing, additional/alternate development of critical PAC-3 missile seeker technologies and designs to further reduce PAC-3 system risks, and HWIL/captive carry testing of a 16" seeker against advanced cruise missile threats.
- o ($8.5M) Activities support participation of the PATRIOT system and PAC-3 missile seeker in the Mountain Top Cruise Missile defense Advanced Concept Technology Demonstration. This effort demonstrates and evaluates over-the-horizon detection and engagement of cruise missiles using an elevated sensor platform to detect and track the incoming target.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604866C (Proj: 2257)
PE Title: PAC3 Risk (U)

(U) FY 1996 PLANS:
- o ($19.48M) Continuation of the Risk Reduction/Mitigation program. This does not include funding for the Mountain Top Demonstration.

(U) FY 1997 PLANS:
- o ($9.76M) Completion of the Risk Reduction/Mitigation Program.

Acquisition Strategy: The PAC-3 Risk Reduction and Mitigation program is a multi-faceted effort involving two prime contractors and three contracts. The risk reduction/mitigation modification efforts are for existing EMD contracts with each of the two prime contractors. A new separate contract is planned for one of the contractors which will be a phased work effort on the 16" seeker and unpriced options for follow-on phases which include further development and testing. The initiation and execution of the follow-on phases are keyed to events and activities in the EMD program which will indicate the degree of risk remaining in meeting the performance goals of the PAC-3 missile.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	97,000	58,460	19,580	9,760	184,800
Appropriated Value		74,000			74,000
Adjustments to Appropriated Value		0			0
Current Budget Submit	97,000	74,000	19,485	9,760	200,245

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604866C (Proj: 2257)
PE Title: PAC3 Risk (U)

Change Summary Explanation:
Funding: There is a decline in the amount of dollars needed between the different fiscal years as the amount anticipated is not as great in the years following the first year of integrating the PAC-3 missile into the PATRIOT system. Congress directed $8.5 of the FY1995 $74M appropriated, be used solely for the Mountain Top Demonstration. This PE in FY1994 was listed as ERINT (Proj 2208) under PE: 0604216C (Theater Missile Defense).

Schedule: None
Technical: None

C. OTHER PROGRAM FUNDING SUMMARY

Related RDT&E: Funding Dependency? (Yes[1]/No)
None

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Config-1 Software rel	X											
PAC-3 Missile PDR				X								
Config-1 FUE		X										

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 05 (EMD)

PE: 0604866C (Proj: 2257)
PE Title: PAC3 Risk (U)

Config-2 CDT&E	X		
Pac-3 Missile CDR			X
Config-2 FOTE		X	
PDB-4 Software Release			X
Config-2 FUE		X	
PAC-3 Missile LRIP Decision			X

Planned Milestones Beyond FY1997:

Config-3 IOTE/FOTE	2Q/3QFY98
PAC-3 Missile Milestone III	4QFY98
PDB-5 Software release	4QFY98
Config-3 FUE	4QFY98
Config-3 CDT&E	1QFY98

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 05 - EMD

February 1995

Project and Title - 2257 PATRIOT

P.E. Number: 0604866C
P.E. Title : PAC-3 Risk (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Risk Reduction/Mitigation	97,000	74,000	19,485	9,760

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Development											
Loral(Erint)											
I/H-OGA	SS-CPIF	Dec 93	67,753	69,753	0	67,753	0	0	0	0	69,753
Loral/Raytheon	PO	Dec 93	5,978.5	5,978.5	0	5,978.5	0	0	0	0	5,978.5
	TBD	TBD	TBD	TBD			57,573	16,405	7,947	0	82,020
Support and Management Organizations											
Nichols/0038											
Delta/0029	C-CPAF	Dec 92			0	5,089	0	0	0	0	0
Nichols/SSDC	C-CPAF	Dec 91			0	1,230	0	0	0	0	0
I/H-OGA	MIPR	Nov 93			0	75	0	0	0	0	0
Nichols (RR)	PO	Oct 93			0	14,874.5	0	0	0	0	0
CAS (Risk M)	MIPR	TBD	3,000	3,000	0	0	3,000	0	0	0	3,000
Other I/H-OGA	SS-CPAF	TBD	1,000	1,000]	0	0	1,000	0	0	0	1,000
Mountain Top	PO	TBD	8,820	8,820	0	0	3,927	3,080	1,813	0	8,820
			8,500	8,500	0	0	8,500	0	0	0	8,500
Test and Evaluation Organization											

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property TBD	Negative										
Support & Mgmt. Property TBD	Negative										
Test & Eval. Property TBD	Negative										

Subtotal Product Dev.	TBD	TBD			0	75,731.5	57,573	16,405	7,947	0	157,656.5
Subtotal Support & Mgmt.						21,268.5	16,427	3,080	1,813	0	42,588.5
Subtotal Test & Evaluation	Negative										
Total Project					0	97,000	74,000	19,485	9,760	0	200,245

Support Technologies
PE 0602173C / 0603173C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 02 (Exploratory Development)
RDT&E Defensewide / BA 03 (Advanced Development)

Program Element Number: 0602173C/0603173C
PE Title: Support Technologies (U)

Project Number and Title:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
PE NUMBER 0602173C									
1651 Innovative Science and Technology	38,267	45,509	50,739	52,614	50,384	51,143	48,828	47,868	Continuing
1660 Statutory and Mandated Programs	31,893	38,496	42,569	52,699	54,619	49,254	46,740	45,801	Continuing
PE TOTAL	70,160	84,005	93,308	105,313	105,003	100,397	95,568	93,669	
PE NUMBER 0603173C									
1155 Phenomenology Program	0	6,566	0	0	0	0	0	0	Continuing
1161 Advanced Sensor Technology	103,681	10,162	23,500	27,840	27,300	28,500	32,000	30,200	Continuing
1270 Advanced Interceptors	13,150	15,415	21,731	25,660	26,200	25,000	30,000	31,800	Continuing
1299 Discontinued Projects	19,928	0	0	0	0	0	0	0	Completed
1360 Directed Energy Programs	75,031	41,808	29,854	30,000	0	0	0	0	Completed
1660 Statutory and Mandated Programs	4,323	4,323	4,302	4,323	4,323	4,323	4,323	4,323	Continuing
2259 ACES / ADP	0	3,000	0	0	0	0	0	0	Continuing
3153 Arch, Analysis / BMC3 Initiatives	0	7,392	0	0	0	0	0	0	Continuing
3157 Environmental, Siting, & Facilities	5,506	5,606	0	0	0	0	0	0	Continuing
3270 Threat and Countermeasures Program	31,243	30,167	0	0	0	0	0	0	Continuing
3352 Modeling & Simulations	0	3,000	0	0	0	0	0	0	Continuing
3360 Test Resources	0	6,963	0	0	0	0	0	0	Continuing
PE TOTAL	252,862	134,402	79,387	87,823	57,823	57,823	66,323	66,323	

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The BMD supporting technology program develops concepts and components for next generation and product improved ballistic missile defense systems.

This responsibility for BMD unique technology development rests solely with BMDO within the Department of Defense. In order to meet long range defense guidance priorities, a focused, robust component and advanced concept technology development program must be maintained to position the Department to be able to respond to a changing environment and an uncertain future. The program advances the state-of-the-art in those critical functions, components, and subsystems necessary to increase system performance, reliability, maintainability and survivability while reducing acquisition and life cycle cost. This program directly supports those critical related technologies for next generation BMD Systems.

(U) The BMD technology program is designed to provide answers to many key R&D issues for developmental and future Theater and National Missile Defense systems. BMDO crafts the program as a component of the overall Department technology area plan. The efforts include:

- Development of all-weather, day/night detection, tracking and discrimination of TMD targets from air borne fused sensors, discrimination and target object map generation on-board interceptors, the detection and tracking of low observable targets, and other high leverage sensor technologies all under Advanced Sensor Technology (Project 1161).
- Advanced component and system technology development for missile defense interceptors (Project 1270). These programs address the technical issues associated with nuclear hardened seekers critical for hit to kill vehicles, low drift inertial guidance, divert/attitude control systems with more desirable field handling characteristics, advanced signal processing and limited field of view optical systems, and other needed technical advances unique or vital to missile defense systems.
- The culmination of advanced chemical laser systems technologies (Project 1360) to demonstrate integration of high power laser beam with large optics per Program Decision Memorandum guidance.
- While not part of this program element, the continued development of hit-to-kill interceptors which operate at high speed within the atmosphere (Project 1265) is integrally related to this program of supporting technology.
- This program also includes important mandated outreach efforts to transition BMD technology to commercial and industrial sectors and to affirmatively incorporate historically minority and black colleges and universities in development of BMD technology. (Project 1660).
- Includes manpower authorizations and the associated costs specifically identified and measured to the performance of these programs.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments: See individual R-2 project summaries.
(U) FY 1995 Plans: See individual R-2 project summaries.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 02 (Exploratory Development)
RDT&E Defensewide / BA 03 (Advanced Development)

Program Element: 0602173C/0603173C
PE Title: Support Technologies (U)

(U) FY 1996 Plans: See individual R-2 project summaries.
(U) FY 1997 Plans: See individual R-2 project summaries.

Acquisition Strategy: See individual R-2 project summaries.

B. (U) Program Change Summary:

PE NUMBER 0602173C	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	73,053	106,460	106,774	113,820	400,107
Appropriated Value		81,406			81,406
Adjustments to Appropriated Value		2,599			2,599
Current Budget Submit	70,160	84,005	93,308	105,313	352,786

PE NUMBER 0603173C	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	247,703	241,831	239,163	230,145	958,842
Appropriated Value		143,631			143,631
Adjustments to Appropriated Value		-9,229			(9,229)
Current Budget Submit	252,862	134,402	79,387	87,823	554,474

Change Summary Explanation:
Funding: Over the past few years, in compliance with congressional direction and in consonance with the recent Bottom-Up Review findings, the Department has significantly restructured the follow-on supporting technology program for ballistic missile defense. Today, only those programs that either directly support future TMD and NMD system developments, or hold significant promise for advanced BMD systems remain under the management responsibility of BMDO. In instances where those programs have significant collateral application to other military missions, technical information is shared with the interested military department. The ongoing advanced technology program supports DoD's long-term commitment to continue, at a stable level, critical research on technologies that build on work to date in order to prepare for more capable and affordable active ballistic missile defense systems. The funding that is now available to the development of technologies does not allow for the exploitation of breakthroughs developed by the far-term efforts or to speed up development of mid-term systems should the need or opportunity arise.
Schedule: None.
Technical: None.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E Defensewide / BA 02 (Exploratory Development)
RDT&E Defensewide / BA 03 (Advanced Development)

Program Element: 0602173C/0603173C
PE Title: Support Technologies (U)

C. (U) Other Program Funding Summary

Related RDT&E:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate
0603861C THAAD SYSTEM DEM/VAL	710,093	651,901	576,327	72,188	0	0	0	0
0603863C HAWK DEM/VAL	29,629	26,800	23,188	0	0	0	0	0
0603864C TMD-BMC3 DEM/VAL	12,617	20,009	24,231	24,425	25,237	20,751	22,193	22,278
0603865C PAC3 DEM/VAL	77,584	0	0	0	0	0	0	0
0603867C NAVY L/T DEM/VAL	150,446	139,676	0	0	0	0	0	0
0603868C NAVY U/T DEM/VAL	81,000	68,450	30,442	33,400	0	0	0	0
0603869C CORPS SAM DEM/VAL	16,270	14,971	30,442	33,400	0	0	0	0
0603870C BPI DEM/VAL	37,022	40,000	49,061	44,300	66,300	72,300	0	0
0603871C NMD DEM/VAL	549,973	386,988	370,621	399,038	399,341	399,318	399,472	399,472
0603872C OTHER TMD DEM/VAL	272,388	386,368	460,470	449,908	613,099	551,654	951,981	1,116,700
0604861C THAAD SYSTEM EMD	0	0	0	664,000	838,000	619,100	212,000	86,000
0604864C TMD-BMC3 EMD	0	534	14,301	17,976	25,977	20,861	29,201	29,314
0604865C PAC3 EMD	42,097	276,283	247,921	160,070	65,005	775	487	98
0604866C PAC3 RISK EMD	97,000	74,000	19,485	9,760	0	0	0	0
0604867C NAVY L/T EMD	0	0	237,473	193,600	142,680	151,428	115,482	50,323
0605218C MGMT	205,948	163,206	185,542	188,418	224,742	219,543	230,014	223,971

D. (U) Schedule Profile
See individual R-2 project summaries.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 1155)
PE Title: Support Tech (U)

Project Number / Title: 1155 Phenomenology Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	0	6,566	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) International technical exchange programs are implemented in the areas of optical and radar discrimination, reentry, background, and plume phenomenology. The basic approach involves identifying areas where mutual benefits can be realized through joint activities such as joint participation in ground and flight tests, phenomenology code/algorithm comparisons, data exchanges, and joint data analyses. Technically, the U.S. stands to gain from insight into foreign phenomenology code capabilities (identifying areas not handled well by U.S. phenomenology codes), access to a broader range of data sets and test opportunities, and access to areas of unique foreign expertise (e.g., U.K. penaid design). From a technology and funding perspective, there is potential U.S. gain from foreign contributions to flight tests, experimental hardware, and data collections.

(U) A team of U.S. experts in the areas of discrimination, reentry signatures, backgrounds, and plumes is necessary to assess proposals for joint efforts and ensure that interchanges result in benefits to U.S. programs. This team proposes, plans, and executes joint data collections, data analyses, and phenomenology code and algorithm comparisons. Current U.S. background, target signature, and plume technology bases include a wealth of data and a number of phenomenology codes and models which have been systematically built up over the past few years. These international efforts provide the means to advance the backgrounds and plume technology bases and leverage foreign cooperative programs. Current programs include: U.S./U.K. Scientific Cooperative Research Exchange (SCORE)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 1155)
PE Title: Support Tech (U)

Program - Target Signatures & Backgrounds (TSB) Panel, NATO Extended Air Defense (EAD)/Theater Missile Defense (TMD) Ad Hoc Working Group (AHWG) - Plume Phenomenology Expert Group (U.S., U.K., France, Canada), U.S./French Bilateral Group - Plumes, Backgrounds, and Reentry Signatures, U.S./Israeli TBM Signature and Phenomenology Research, U.S./German Phenomenology Research.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The mission of this project is to provide for joint activities such as ground and flight tests, phenomenology code/algorithm comparisons, data exchanges, and joint data analyses that support TMD and NMD systems development. These international efforts will continue under Project 1155 beyond FY95, although costs will be shared between NMD and TMD PE's.

(U) FY 1994 Accomplishments:
- o (0.000M) None.

(U) FY 1995 Plans:
- o ($1.200M) Discrimination. Continue joint U.S./U.K. analysis of data sets to compare and validate codes for discrimination techniques, optical and radar signatures, data fusion, aerothermal heating, and hardbody modelling through the SCORE TSB Panel. Provide for the exchange of data sets from past and future joint experimental flight tests (specifically Zodiac Beauchamp, Red Tigress, and TMD Critical Measurements Program (TCMP)) to drive these analyses. Complete a Data Exchange

Agreement (DEA) between the U.S. and France on exchange of TBM reentry signature data through the U.S./French Bilateral Group. Provide a threat representative target test case to French for joint analysis in the area of TBM reentry signatures. Exchange reentry, intercept, and kill assessment data through the U.S./Israeli TBM Signature and Phenomenology Research program.

- o ($1.000M) Backgrounds. Joint background data collection involving U.S. Miniature Sensor Technology Integration (MSTI) satellite and French sensor aircraft. Provide funding for U.S. expert team to evaluate proposals for comparison of state-of-the-art phenomenology codes through the U.S./French Bilateral Group. Exchange Earth background and environmental data through the U.S./Israeli program. Establish U.S./German Phenomenology Research program for cooperation in the backgrounds phenomenology area.
- o ($1.666M) Plumes. Complete analysis of shared plume data from previous U.S./French missions. Continue the investigation of joint test cases, through the SCORE TSB Panel, comparing U.S. and U.K. plume flow field and radiation models. Complete the exchange/sanitizing/disclosure process for release of the Composite High Altitude Radiation Model (CHARM) to the U.K. Provide a data set from observations of an Atlas plume for joint analysis and code comparisons by the French Bilateral Group. (Complete U.S. proposal for joint data collection on a French submarine launched missile.) Identify parameters for a threat representative target to begin code/algorithm comparisons and begin analysis. Complete proposal to collect data on the static firing of a French rocket motor, where France, the U.S., the U.K., and Canada will provide optical sensors for data collection.
- o ($2.700M) Technical Analysis. Provide BMDO the specialized support required to resolve development and deployment issues. Includes trades studies of the cost, schedule, and technical risks of alternative deployment readiness options. Provide special studies and reviews involving long-range program planning, technical and programmatic issues such as methods to maximize NMD deployment by leveraging development efforts of the TMD program.

(U) <u>FY 1996/1997 Plans:</u>

None. Efforts will continue in parts of Project 1155, cost shared between TMD (PE 0603872C) and NMD (PE 0603871C).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 1155)
PE Title: Support Tech (U)

Acquisition Strategy: This project funds its efforts through executing agents in the Air Force, Army, Navy and BMDO via existing contracts.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	450	450	450	1,350
Appropriated Value		3,450			3,450
Adjustments to Appropriated Value		3,116			3,116
Current Budget Submit	0	6,566	0	0	6,566

Change Summary Explanation:
Funding: This project evolved from projects 1101,1105, and 3300 in the FY95 President' Budget. The increase in funding from FY94 to FY95 is due to: 1) Project roll up described in the paragraph above, 2) NMD, TMD, and Technology cost sharing of the project, and 3) Creation of new U.S./international working groups, with the exception of U.S./U.K. SCORE, which is a continuing effort. The reduction in funding from FY95 to FY96 shows that Technology PE 0603173C will no longer participate in the cost sharing arrangement for Project 1155 and international efforts will be supported by TMD and NMD PE's.

Schedule: None

Technical: None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 1155)
PE Title: Support Tech (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1155 Phenomenology PE: 0603871C	Yes
1155 Phenomenology PE: 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

U.S./U.K. Scientific Cooperative Research Exchange (SCORE) Program - Target Signatures & Backgrounds (TSB) Panel Meetings: December 1994, April 1995, and September 1995.

NATO Extended Air Defense (EAD)/TMD Ad Hoc Working Group (AHWG) - Plume Phenomenology Expert Group (U.S., U.K., France, Canada) Meeting: December 1994, March 1995, and August 1995.

U.S./French Bilateral Group - Plumes, Backgrounds, and Reentry Signatures Meetings: November 1994 and May 1995.

U.S./Israeli TBM Signature and Phenomenology Research Meetings: November 1994 and July 1995.

U.S./German Phenomenology Research Meeting: March 1995

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1161)
PE Title: Support Tech (U)

Project Number / Title: 1161 Advanced Sensor Technology

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	103,681	10,162	23,500	27,840	27,300	28,500	32,000	30,200	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) To prepare for critical future active defense needs, advanced technology programs will invest in a balanced program of high leverage technologies that yield improved capabilities across a selected range of boost phase and terminal missile defense interceptors, advanced target sensors, and innovative science. The objectives of these investments are component technologies with improved performance or reduced costs for acquisition programs, and technical solution options to mitigate advanced and unpredicted threats.

(U) The Advanced Sensor Technology Program (ASTP) is a shift in emphasis from demonstration of existing sensors to advanced sensor development. ASTP will develop and demonstrate enhanced performance sensor subsystems that are needed for post-2000 missile defense. Previous advanced development efforts (like those formerly in Project 1201, Interceptor Component Technology) were focused only on component development and were managed separately. In FY94 plans were made to consolidate these advanced sensor technology efforts into a single program to leverage funding and more efficiently develop sensor subsystems applicable to a variety of missions, including atmospheric surveillance and interceptor seekers, beginning in FY95. For the surveillance application, emphasis is placed on timely detection of missile launches from long ranges, precise tracking for launch site location and impact/intercept point prediction, target designation, and kill assessment. Development of LWIR passive sensors, miniaturized ladars, and radar components necessary to achieve long range threat detection, accurate homing guidance, and aimpoint selection for autonomous hit-to-kill interceptors will be performed in the Advanced Interceptor and Systems Technology (AIST) program in Project

1270, Applied Interceptor Materials and Systems Technology. The AIST program will build upon achievements made in sensors and sensor data fusion as a part of the ASTP program. Specifically, these demonstrated subsystems support upgrades to the exo-kill vehicle and surveillance and tracking sensor elements of NMD (Projects 1151 and 1267), and future TMD system generation.

(U) In contrast, Project 1155 (Phenomenology) uses state-of-the-art sensors for collecting phenomenology data that can be used by ASTP. Project 1151 (Sensors) concentrates on more mature technology to reduce the immediate NMD risks. Exploratory and basic research technologies (6.1 and 6.2) are addressed by the Innovative Science and Technology (IS&T) program, while technologies selected for ASTP are at the Engineering Development (6.3) stage.

(U) Advancements made in interceptor component and sensor technology (Projects 1101 & 1201) during the late 1980's and early 1990's allowed BMDO in FY94 to identify components offering the most potential for system improvement. BMDO consolidated these programs and resources to effectively focus on advanced sensor subsystem development and demonstration to provide improvements for upgrades to NMD and TMD systems, as described above. Due to the Congressional reduction in FY95, the program was stretched out one year, and emphasis was placed only on extremely critical and promising technologies.

(U) Advanced Sensor Technology Program (ASTP)

(U) Advanced sensor subsystems for NMD and TMD surveillance systems under development in FY95 have been selected based on their capabilities to address future ballistic missile threats with increased sophistication. Specifically, ASTP will develop passive and active sensors for long range threat detection and for target tracking and identification. Passive infrared, radar, and ladar components will be developed and improved to deliver increased performance while decreasing sensor size, mass, and power consumption. Active and passive sensors will be integrated into a compact assembly to enable surveillance from distributed platforms, either in space or in the atmosphere (via aircraft) Real time sensor data fusion techniques and processing hardware will be developed and combined with

the integrated sensor package. This will provide a fused sensor system capable of precise threat identification with a more rapid response by exploiting multiple phenomena, thereby increasing the probability of detection and correct target identification, extending the defended area, improving probability of kill, and reducing the probability of leakage.

(U) Russian American Observation Satellites (RAMOS)

(U) The RAMOS program is an cooperative effort with Russian scientists and engineers to exchange infrared data acquired through remote sensing systems and to develop plans for future cooperative space experiments. This program investigates options to leverage off existing funded experiments to foster a closer working relationship at the technology level between both nations.

(U) This project is assigned to the Budget Activity and Program Element Codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY93 and FY94 the Clementine and Miniaturized Sensor Technology Integration (MSTI) programs successfully demonstrated the operational capability of existing sensor technology in space. In FY95 the MSTI program was transferred to the Air Force and the Clementine program was transferred to the Navy. In FY94, a review of on-going and planned sensor advanced development efforts was conducted by BMDO with participation from the Army, Navy, and Air Force. ASTP represents a shift in FY95 from demonstration of existing sensors to development of advanced sensor subsystems. Studies and analyses were conducted to provide insight to the most promising technologies for ASTP applications. Specific technologies that were consolidated into the ASTP

program include: multi-color focal plane arrays such as mercury cadmium telluride (HgCdTe) and aluminum gallium arsenide (AlGaAs) multiple quantum well (MQW), on focal plane array processors, solid state (including eyesafe) and CO_2 laser radars for atmospheric surveillance, miniature gigaflop processors, advanced radar techniques, and multi-target and data fusion algorithms. This program will integrate these components into complete sensors, develop appropriate algorithms to fuse multi-sensor information, and will perform field tests and demonstrations. Passive and active sensors will be integrated in ground demonstrations starting in FY96, leading to further development and integration for flight demonstration in FY00 and FY02. Multiple approaches will be pursued for various sensor subsystems when more than one technology appears feasible and selection cannot be made without additional development and testing. Technology downselects will occur in FY98 for the atmospheric surveillance flight demonstration in FY00.

(U) In previous years, work was also performed for Launch Services in Project 1701 and in Special Test Activities in Project 1702. These efforts have been terminated in FY95. The cost of launch services and special test activities will now be assumed by the appropriate users on an as needed basis. This cost will be included in the total cost for each program.

(U) FY 1994 Accomplishments:

- o ($36.53M) Interceptor Integration Technology
  - Completed MSTI satellite flight tests utilizing existing sensor technology
  - Began mission planning and flight hardware procurement activities for MSTI-3
- o ($27.91M) Sensor Integration
  - Completed Clementine I Space Experiment
- o ($27.86M) Launch Services
  - Completed ground-based preflight verification for MSTI, Clementine, and Single Stage Rocket Technology (SSRT)
  - Supported payload processing, payload integration, mission operations and planning, range operations and integration, mission analysis, and test operations for MSTI, Clementine, and SSRT

- o ($4.8M) Special Test Activities (Completed BMDO SSRT Program)
  - Completed two flight tests
  - Began repair of DC-X flight test vehicle in preparation of possible completion of flight tests
  - Transferred system to NASA

(U) FY 1995 Plans:

- o ($1.30M) Program planning and analyses
  - Program scheduling and critical path identification
  - Test planning
  - System simulation
- o ($2.16M) Sensor design and analysis of Clementine multi-spectral boresighted imagery and fused sensor data for application to ASTP
- o ($1.80M) Design passive IR multi-color HgCdTe and multiple quantum well (MQW) focal plane arrays, and on-focal plane array processors
- o ($2.90M) Design solid state and gas laser transmitters, direct and heterodyne detectors, and eyesafe ladar components
- o ($0.50M) Integrate radar technology development objectives with existing programs
- o ($0.50M) Develop data fusion processing hardware algorithms
- o ($1.00M) Define terms of RAMOS agreement
  - Review and organize remote sensing data
  - Perform data exchange

(U) FY 1996 Plans:

- o ($7.80M) Perform sensor integration, demo planning, and simulation for ground demonstrations; refine requirements for

components typical of NMD & TMD missions

- o ($8.35M) Fabricate and deliver 256x256 2-color HgCdTe Array, perform simultaneous 2-color 256x256 MQW imagery demo, perform on-FPA processing demo
- o ($1.25M) Demonstrate eyesafe laser pump
- o ($4.35M) Begin bi-static radar testing, component integration
- o ($2.75M) Complete planning and begin testing of data fusion algorithms with system simulations, begin design of data fusion processor brassboard

(U) FY 1997 Plans:

- o ($9.84M) Begin laboratory, ground, and chamber demonstrations of integrated components, begin planning for flight demonstrations, continue sensor performance simulations
- o ($8.10M) Continue development, integration, and testing of passive IR subsystems that are candidates for multi-sensor flight demo: demonstrate 256x256 2-color array at Army Missile Optical Range (AMOR), test 10x10 multi-color strained layer superlattice array; deliver on-focal plane array electronics
- o ($1.75M) Fabricate and deliver hardened eyesafe aluminum gallium antimonide detector for eyesafe ladar
- o ($4.45M) Continue integration and testing of radar sensors that are candidates for multi-sensor flight demo
- o ($3.65M) Complete data fusion processor brassboard and begin testing algorithms, some with data from sensor demos

(U) Acquisition Strategy:

(U) ASTP is a Tri-Service/BMDO program. The executing agents will utilize existing contracts, planned new contracts, and in-house resources to perform this program. The Air Force is developing passive infrared technology (multi-color focal plane arrays and on-focal plane processing) and is responsible for passive sensor integration and testing. The Army is responsible for ladar integration and

testing. The Navy is developing radar technology (bi-static) and is leveraging off of existing airborne radar programs. BMDO is developing fusion processor technology and algorithms and is responsible for performing platform integration and conducting major flight demos. BMDO will initiate contracts to perform these efforts. Cooperation with on-going programs will be maximized to leverage funding.

(U) This project assures timely infusion of the needed ASTP technologies into BMDO core programs. Since ASTP is a continuation of BMDO sensor technology, many of the contracts are now in place. Extensive planning and preparation during FY94 and FY95 will also facilitate the FY96 program expansion. A coordinated team of management and technical personnel is now in place in the Army, Navy, and Air Force, managed by BMDO. Essential documentation has been prepared, and mission requirements have been analyzed and flowed-down to ASTP component designs. Broad Agency Announcements have been published to ensure potential attractive technologies and innovative approaches have not been overlooked during the tri-service planning efforts. BMDO contracting efforts are in progress to initiate platform integration and sensor fusion.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	104,829	48,000	48,000	48,000	248,829
Appropriated Value		15,162			15,162
Adjustments to Appropriated Value		-5,000			(5,000)
Current Budget Submit	103,681	10,162	23,500	27,840	165,183

Change Summary Explanation:
Funding: The advancements made in interceptor component technology (Project 1201) and sensor technology (Project 1101) during the late

1980's and the early 1990's allowed BMDO in FY94 to identify components offering the most potential for system improvement. BMDO consolidated these programs and resources to effectively focus on advanced sensor subsystem development to provide improvements for upgrades to NMD and TMD systems. Through this extensive FY94 preparation, BMDO was poised to pursue ASTP at a $48M level in FY95 mostly utilizing existing contracts and some planned new contracts. The 79% reduction in FY95 funding has caused the demonstrations that were originally planned for FY99 and FY01 to both slip one year. The significantly reduced FY95 funding has been partially accommodated by deferring the planning and design of service-built sensors and BMDO's integration efforts until FY96. This accounts for $18.4M of the budget reduction. Cuts and deferrals in technology development constitute the remainder of the $38M reduction. Radar technology development was all but eliminated in FY95; only studies of alternative approaches and platforms will be performed. Contract new starts will be delayed by six to twelve months. A $10M reduction in FY96 funding will limit the amount and fidelity of ground testing that can be accomplished. Any further reductions in funding will jeopardize insertion of technology into NMD and TMD systems in the timeframe required. The remaining $13.27M deficit in FY96 and the $20.16M deficit in FY97 account for the funds transferred to Project 1270 to perform AIST.

Schedule: No Change

Technical: The FY95 program represents a shift in philosophy from demonstration of existing technology (e.g. Clementine and MSTI, formerly Projects 1110 and 1202, transferred to the Navy and the Air Force, respectively), to development of advanced technologies to counter the advanced or unpredicted threat.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

Related RDT&E:	Funding Dependency? (Yes[1]/No)

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1161)
PE Title: Support Tech (U)

1270 Advanced Interceptor, PE: 0603173C	Yes
3360 Rapid Optical Beam Steering (ROBS) PE:0603871C	Yes
XXXX AirForce Maui Optical Site (AMOS)	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone								Xh				Xj				
Xm,Xo T&E Milestone			Xa*	Xb*,Xc*		Xd*			Xf	Xg		Xi,Xn			Xk	
Xg Contract Milestone																
Other Program Events				Xe*		Xp										

Xa - Completed ground based pre-flight verification for MSTI, Clementine, and SSRT
Xb - Completed Clementine I space experiment
Xc - Completed MSTI satellite flight tests
Xd - Completed DC-X flight tests and transferred system to NASA
Xe - Completed planning for ASTP consolidation
Xf - Sequential 2-color 256x256 MQW Imagery Demo
Xg - 64x64 2-color HgCdTe Demo at AMOR

Xh - On-FPA Processing Electronics Design Complete
Xi - Simultaneous 2-color 256x256 MQW Imagery Demo
Xj - On-FPA Electronics Demo
Xk - 10x10 Multi-color Strained Layer Superlattice Array Demo
Xl - 256x256 2-color HgCdTe Demo at AMOR
Xm - On-FPA Electronics Delivery
Xn - Eyesafe Ladar Pump Demo
Xo - Hardened Eyesafe Solid State Ladar AlGaSb Detector Delivery
Xp - Define Terms of RAMOS Agreement

Planned Milestones Beyond FY1997:

- o First technology downselect planned for FY98
- o Fused sensor suite for atmospheric surveillance demo planned for FY00
- o Second technology downselect planned for FY00

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1270)
PE Title: Support Tech (U)

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	13,150	15,415	21,731	25,660	26,200	25,000	30,000	31,800	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Advanced Interceptor and Systems Technology (AIST) program develops and demonstrates: advanced interceptor sensor processing power components; multifunctional material and structures; low cost interceptor composite manufacturing processes; gel propellants and low cost flight test demonstrations. These technologies are critical to the deployment of effective, affordable TMD and NMD systems.

The AIST projects are planned and executed through direct interchange with System Program Offices (SPOs) and prime contractors responsible for fielding current NMD Technology Readiness and TMD systems hardware.

The AIST program consists of five major task programs:

(U) Advanced Interceptor Components Program

(U) The focus of the Advanced Interceptor Component program is the development of interceptor components necessary to achieve long range threat detection, accurate homing guidance, discrimination, and aim point selection for autonomous hit-to-kill interceptors. components.

(U) The Materials and Structures (M&S) Program

(U) The M&S program develops advanced low cost manufacturable multifunctional composite structural components, sensor jitter adaptive and passive vibration isolation and suppression systems, optical materials and baffle specialty components and low temperature superconductor LWIR sensor electronics.

(U) Advanced Propellant Interceptor Motors Program

(U) This program (funding currently being reassessed for FY95-96) develops and demonstrates a high-performance, low cost, throttleable divert and attitude control system (DACS) for gel and solid propellant engines.

(U) Power Technology Program

(U) The power program provides test data from Russian TOPAZ II space nuclear reactors and develops power components for interceptors. The TOPAZ project will be transferred to the Defense Nuclear Agency for FY96. The remaining funding will be used to develop power component technology providing weight and performance improvements.

(U) Endo Atmospheric Flight Experiment (EFEX) Program

(U) This multiflight test program (funding currently being reassessed FY95-96) will use existing sounding rockets to provide the hypersonic flight environment to validate advanced interceptor technologies.

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1270)
PE Title: Support Tech (U)

(U) This project is assigned to the Budget Activity and Program Element Codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Use of active/passive systems for target/decoy discrimination has been demonstrated in ground tests performed at the Army Missile Optical Range (AMOR). The multi-folded-carbon dioxide ladar with a 1-m cavity length was tested with an integrated receiver/processor. Results were correlated with passive measurements to demonstrate discrimination.

The M&S program has successfully developed a one step, near net shape mold fabrication process for lightweight, ultrastiff composite interceptor structures, which makes composite manufacturing cost competitive with aluminum machining processes.
Use of adaptive "smart" structures for vibration suppression has been successfully demonstrated in space. Component and system ground tests of a brassboard gel DACS have been completed.

(U) FY 1994 Accomplishments:

- ($10.65M) Space Surveillance System Support
- Delivered Space Active Modular Materials Experiments (SAMMES), Satellite Attack Warning Assessment Experiment (SAWAFE), and Active Control Experiment 2 (ACTEX II) for 2QFY95 launch.
- Conducted STRV-1b space radiation and cryocooler flight experiment.
- Continued design and development of the US/UK experiment module (STRV2) for space non-contaminating composites, radiation measurement, jitter control, MWIR and lasercomm validation in support of Midcourse Sensor Programs.
- Continued TOPAZ ($7.06M) Space Nuclear Reactor Non-Nuclear Ground Test.

- o ($2.500M) Interceptor System Support
- o Demonstrated manufacturable weight reducing structural composite, optical and thermal components for ERINT/PAC-3 and THAAD.
- o Static pressure tested carbon-carbon flexseal nozzle.
- o Initiated low temperature superconductor LWIR sensor multi-agency (NASA/BMDO) testbed.
- o Continued Endo atmospheric flight experiment (EFEX) program conceptual design for interceptor composite structures, optical materials and window cooling concepts.

(U) FY1995 Plans:

- o ($11.30M) Space Surveillance System Support
- o Continue TOPAZ ($8.5M) testing (Note: TOPAZ is to be transferred to DNA in FY1996 per Congressional direction).
- o Continue data reduction of existing space flight experiments (ACTEX-1, STRV-1b and STEP 3).
- o Develop design data for vibration isolation and suppression experiment to be flown on the STRV-2 experiment module.
- o Complete and space flight demonstrate SCARLET (satellite solar concentrator array).
- o ($4.115M) Interceptor System Support
- o Initiate advanced structural composite collaborative manufacturing technology programs for geometric complex shapes with Japan.
- o Complete initial phase of low temperature superconducting interceptor LWIR sensor signal processing demonstration. The results will demonstrate the high speed, wide bandwidth, low power capability of LTS microelectronics for LWIR signal processing. Initiate LTS collaborative program with Japan.

(U) FY1996 Plans:

- o ($4.0M) Space Surveillance System Support

- o Complete FY94-FY95 space flight experiments (ACTEX 1, STRV-1b and STEP 3) data reduction and final reports. Complete development of sensor isolation system for STRV-2 flight experiment.
- o ($21.731M) Interceptor System Support
- o Develop flight test articles of advanced optical baffles and weight reducing structural/thermal composite components for Navy lower tier, THAAD and TMD-GBR systems.
- o Fabricate first EFEX flight test assembly to evaluate advanced cooled and uncooled sapphire windows and high temperature interceptor composite structures.
- o Initiate gel propellant motor testing. Baseline solid propellant designs.
- o Initiate advanced ground interceptor battery and power transfer components.
- o Demonstrate solid state laser amplifier and verify coherent ladar waveforms.
- o Demonstrate 3 meter folded CO2 ladar receiver and transmitter.
- o Continue LTS interceptor LWIR sensor testbed and composite component manufacturing programs with Japan.

(U) FY 1997 Plans:

- o ($2.0M) Space Surveillance System Support
- o Complete correlation of space environmental effects ground test data with space flight experiments. Complete integration of sensor isolation system and launch STRV-2 flight experiment.
- o ($23.66M) Interceptor System Support
- o Continue development of weight reducing structural, thermal and optical components for Corps Sam, TMD-GBR, and Navy lower-tier.
- o Conduct EFEX 1 flight experiments; continue development of EFEX 2 flight experiment; initiate EFEX 3 design.
- o Test interceptor power component prototype units (THAAD); provide test data to interceptor system designers and program offices.

- o Continue development, integration and testing of ladar subsystems for multi-sensor flight demo.
- o Perform solid state 2-D imaging demo and test 6 meter folded CO2 ladar amplifier.
- o Demonstrate hardened, low drift rate IMU and light weight, small volume communications package.
- o Initiate radome development for enhanced performance MMW radar.
- o Complete joint LTS and composites program with Japan.

Acquisition Strategy: The AIST Project utilizes U.S. Army Space Defense Command, DoD and DoE laboratories to fund contractors supported by relevant in-house expertise to meet the AIST milestones. Weapons systems prime contractors acquire license agreements to use advanced manufacturing/producibility processes (e.g., composite materials, baffles and nozzles) developed by the AIST Project. International funding (e.g., UK and Japan) and joint agency coalitions (e.g., NASA, DoE and ARPA) are assembled to obtain critical level of effort (e.g., US/UK STRV-2, BMDO/AF/ARPA Smart Structures, US/Japan Composites and superconducting materials programs).

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	11,630	12,000	12,000	12,000	47,630
Appropriated Value		13,300			13,300
Adjustments to Appropriated Value		2,115			2,115
Current Budget Submit	13,150	15,415	21,731	25,660	75,956

Change Summary Explanation:

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1270)
PE Title: Support Tech (U)

Funding: None
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1161, Advanced Sensor Technology; PE# 0603872C,0603173C	NO
1265, Boost Phase Interceptor; PE# 0603870C	NO
1267, Ground-based Interceptor; PE# 0603871C	Yes
1151, Sensors (Active and Passive) PE# 0603871C	Yes
2257, PATRIOT; PE# 0604865C	NO
2260, THAAD; PE# 0603861C	NO
3180, NMD System Integration; PE# 0603871C	NO
3251, Systems Engineering and Technical Support; PE# 0603871C	NO
2262, Corps SAM; PE# 0603869C	NO
2263, Sea Based Area; PE# 0603867C	NO

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1270)
PE Title: Support Tech (U)

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Grnd/Producibility Tests				X[b]				X[e]		X[f,g,h,v]	X[i,t,w,x,y,z]	X[e,m,n]	X[p,q,aa]	X[r]		
Flight Tests			X[c]			X[d]		X[bb]						X[k]		X[y]
Other Program Events									X[o]	X[j]			X[l]			
Engineering Milestone							X[u]									

[a]-Test flexseal nozzle [b]-TOPAZ ground test [c]-Launch STRV-1 [d]-Launch STEP3
[e]-Test PAC3 gimbal post [f]-Demo superconductor processor [g]-KV ground plane EMI shield demo [h]-Deliver THAAD composite bulkhead
[i]-Test interceptor power components [j]-Deliver MWIR Interceptor baffle [k]-Launch EFEX-I [l]-Adv. battery demo
[m]-KV active damping demo [n]-Interceptor composite structures demo [o]-Transfer TOPAZ to DNA [p]-Complete LTS sensor processor demo
[q]-Test interceptor power module [r]-Gel propellant life characterization [s]-US/UK flt. exp. data reduction [t]-Gel DACS hardware and test
[u]-3-m CO2 ladar transmitter design [v]-3-m CO2 ladar transmitter demo [w]-Solid state ladar amplifier demo [x]-Coherent ladar waveform verification
[y]-3-m CO2 ladar receiver demo [z]-6-m CO2 ladar amplifier test [aa]-Solid state ladar 2-D imaging demo [bb]-Lauch SCARLET flight demo

Planned Milestones Beyond FY1997:

o Continue EFEX Program Flights 2 through 5	FY98-01
o Continue development of weight reducing structural/thermal components for TMD	FY97-99
o Initiate Materials and Structures support efforts for Corps-SAM and BPI	FY98
o Continue battery technology for interceptors	FY98-01
o Flight test gel DACS	FY99
o On-orbit data reduction for STRV-2	FY97-98
o First technology downselect for Advanced Interceptor Components	FY98
o Second technology downselect for Advanced Interceptor Components	FY00
o Fused sensor suite for autonomous interceptor for Advanced Components	FY02

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1299)
PE Title: Support Tech (U)

Project Number / Title: 1299 Discontinued Projects

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	19,928	0	0	0	0	0	0	0	Completed

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) Prior to its termination in FY94, Brilliant Pebbles (BP) was the space-based interceptor element of the National Missile Defense (NMD) major defense acquisition program. As a result of the Bottom-Up Review, NMD was restructured to a technology readiness program and BP was cancelled in the FY95 PB, and is represented in this project.

(U) Project 1204 funded technical and engineering resources required by Government Program Managers to plan and conduct technology investigation programs within the Interceptor Technology Directorate, and is represented in this project. Resources were used to perform analyses, develop innovative concepts in the particular technologies, plan and implement major experiments, perform data reductions and analysis of experiment results, and perform system engineering studies on interceptor technology concepts. Technical and engineering support was provided to all phases of interceptor technology program design, development, and test, including systems requirements/concepts definition, systems engineering and design, flight test planning and conduct, and range and on-orbit operations.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1299)
PE Title: Support Tech (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) In FY94, the two competing BP contractor efforts were terminated.

(U) FY 1994 Accomplishments:

- ($15.0M) Terminated TRW and Martin Marietta BP contracts.
- ($0.247M) Continued systems engineering and technical assistance efforts in support of identification, analysis, development, and testing of advanced kinetic energy interceptor components and subsystems, including D2 and Communications Technology efforts.
- ($1.535M) Provided in-depth technical comparisons and research of emerging technologies; analyzed architectural changes and determined interceptor technology development requirements; continued support of technical feasibility decisions and interceptor technology advanced program planning.
- ($3.146M) Planned in detail, and provided technical support to all phases of ground and flight experiments for the Navy LEAP, SRAM/LEAP, MSTI, AIT, and ADI programs.

(U) FY 1995 Plans: None

(U) FY 1996 Plans: None

(U) FY 1997 Plans: None

Acquisition Strategy: N/A

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1299)
PE Title: Support Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	19,928	0	0	0	19,928
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	19,928	0	0	0	19,928

Change Summary Explanation:

Funding: None
Schedule: None
Technical:None

C. (U) OTHER PROGRAM FUNDING SUMMARY None

D. (U) Schedule Profile None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1360)
PE Title: Support Tech (U)

Project Number / Title: 1360 Directed Energy Programs

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	75,031	41,808	29,854	30,000	0	0	0	0	Completed

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) BMDO's charter is to provide for defense against current and future missile threats. A robust missile defense against a wide variety of threats requires terminal phase, mid-course phase, and boost phase intercept capabilities. The Space Based Laser (SBL) program was created to provide the nation with a space-based boost phase intercept capability option. This program element, project number 1360 contains DOD's only space-based ballistic missile defense program.

(U) The Space-Based Laser program was created in 1979 (well before SDI) to explore the possibility of performing ballistic missile defense and other counterspace missions. New technologies offered the possibility of intercepting missiles in the boost phase on a global, 24-hour basis—with the ability to destroy missiles before they release tens to hundreds of submunitions and to prevent debris from landing on defended assets. Such basing provides a robust first tier for ground-based systems, greatly enhancing defense-in-depth. Upon transfer to the Strategic Defense Initiative Organization (SDIO), the program was diverted from its focus of producing a weapon. Hence the program ceased trying to achieve such goals as high laser power, functioning optics, and systems integration on a time-urgent basis. Extensive concept definition studies were carried out, as well as technology development. The results were extremely positive.

(U) The program addressed the key critical technical issues: (1) Can a chemical laser be built powerful enough to destroy a missile at militarily useful ranges? (Alpha program); (2) Can mirrors and optics be built large enough and easily enough? (Large Aperture Mirror Program (LAMP) and Large Optical Segment (LOS)); (3) Can the high power beam be controlled and directed adequately? (Large Optics Demonstration Experiment,LODE); (4) Can missile targets be acquired and tracked from space and can a laser be pointed and fired accurately enough? (Acquisition, Tracking, and Pointing/Fire Control (ATP/FC)); (5) Can these key components be integrated into a functional unit suitable for space flight and operation? (Star LITE program); (6) Can the fully integrated system operate adequately on-orbit? (Star LITE flight option).

(U) Progress To Date. The program has proved that the answer to all these questions is "yes," and has built devices that perform all the above material functions. These devices can be integrated into a functioning defensive weapon. (1) The Alpha program's high energy chemical laser achieved weapons-class power for the first time in 1991. (2) LAMP and LOS demonstrated the ability to build optics of the required size with the successful fabrication of a 4 meter segmented mirror in 1989 and a key segment of an 11 meter mirror in 1993. (3) Large Optics Demonstration Experiment (LODE) demonstrated the ability to control the projected (or outgoing) beam in low power laser experiments in 1987. (4) The basic feasibility of acquiring and tracking missiles from ground and space has been demonstrated by a number of programs. The ATP/FC technologies required (sensors, optics, processors, etc.) have been demonstrated at or near performance levels required for the Space Based Laser program. Stable low power laser beam pointing from space to ground was demonstrated at the same precision level required for an operational SBL in 1991 in the Relay Mirror Experiment (RME).

(U) Current Status. The major building blocks have been developed (issues 1-3, partially 4). Key system integrations and tests lie ahead (issues 4-6). Remaining tasks are: to integrate the high power laser with the large optics beam director and test (Alpha-LAMP Integration, ALI); to integrate ATP technologies and test ATP/FC technologies; to integrate ALI hardware with ATP/FC hardware and test; to integrate ALI/ATP/FC system with spacecraft interfaces; and to build a prototype SBL spacecraft for first flight testing.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1360)
PE Title: Support Tech (U)

(U) Unique features of a space-based laser missile defense include global, 24-hour boost phase intercept capability and defense against surprise first strikes. SBLs can destroy missiles of greater than 80 km range, providing a robust first layer for both theater and national missile defenses-in-depth. SBL does not require prior knowledge of enemy launch site locations. The footprint of one SBL can cover 10% of the earth. Twelve to eighteen could provide overlapping, full-time coverage of missile threats from theaters anywhere. Each SBL would be capable of destroying up to 100 missiles. SBL can defend against missiles without putting the lives of US military personnel at risk. With its long range and speed of light defense, it accomplishes boost phase intercept at the earliest possible moment, offering the highest probability that intercepted missile fragments (possibly containing active chemical/biological or nuclear materials) will fall back on the attackers, not on defended assets.

(U) The 103rd Congress directed that the SBL be phased out. Accordingly only the ALI tests and initial HABE ground tests will be accomplished. The high power Alpha laser has been placed in "maintenance only" status until required by ALI in 1996. After completion of the ALI tests in 1997, the SBL program would be terminated, the nation's only space based laser missile defense option.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Three of the four major subsystems for an operational space-based laser (SBL) (laser device, beam control system, and the beam director or telescope) have been demonstrated by the chemical laser project with hardware scalable and traceable to operational system requirements. These three systems, along with the attendant ATP, comprise the major subsystems of an operational SBL. The current focus of the Chemical Laser project is the integration of these subsystems in a program named the Alpha/LAMP Integration

(ALI) experiment. In 1994, virtually all ALI hardware as well as the ALI test facility will be completed. The schedule calls for experiment integration in FY95 and FY96, with high power testing complete in FY97.

The following is a list of accomplishments for FY 1994.

(U) FY 1994 Accomplishments:

- ($32.579M) ALI. Continued fabrication and delivery of ALI experiment hardware (application of Holographic Optical Elements (HOEs) to all primary mirror segments, uncooled secondary mirror assembly, PtSi focal plane arrays, optical bench assembly, and several diagnostic and support assemblies), and brought ALI facility to beneficial occupancy status.
- ($10.280M) Alpha. Began modification of Alpha for interface with ALI and demonstrated high power operation of modified Alpha. Validated performance of uncooled, single-crystal-silicon beam-sampling mirrors. Completed modification of test facility coolant system to correct major source of beam jitter.
- ($11.275M) Chemical Laser Advanced Technology Programs. Performed fluid dynamic testing of the Stimulated Brillouin Scattering (SBS) cell in the Advanced Phase Conjugation Experiment (APEX). Continued fabrication of first advanced hydrogen fluoride-overtone laser nozzle module to increase efficiency and brightness of hydrogen fluoride lasers. Continued numerous small advanced technology research/demonstration efforts including beam expander repointing/stabilization technology, small scale autonomous alignment risk reduction, hydrogen fluoride laser master oscillator/power amplifier (MOPA) measurements, hydrogen fluoride laser line-selection measurements, and application of neural net technology to precise pointing and disturbance rejection. Continued fabrication of second Large Optical Segment (LOS) 4-meter mirror facesheet (center facesheet of space compatible 11 meter diameter mirror). Continued development of advanced optical coatings for uncooled optics; demonstrated all fabrication technologies for full scale annular resonator optic substrate, including diamond turning across fused single crystal silicon bond joints. Began modification of the Advanced Beam Control System brassboard for autonomous beam control system alignment experiments.

- o ($2.400M) HABE ATP Field Experiment. Continued HABE ATP system integration and restructured program to delay flight operations and address ground tests. Conducted initial ground experiments against subscale threats. Accepted delivery of Inertial Pseudo-Stellar Reference Unit (IPSRU) for system integration.
- o ($4.209M) ATP Technology Development. Completed structural disturbance damping tests, evaluated system identification algorithms, and documented system configuration on Space Pointing and Integrated Controls Experiment (SPICE) program. Completed hard body hand over algorithm development and delivered to HABE test group. Tested and delivered 3 axis inertial pseudo-stellar reference unit for integration into the HABE experiment. Developed initial simulation and data archival software for ATP-FC components and test experiments. Finalized advanced ATP technology reference concepts and developed experiment and test concepts to validate advanced system design.
- o ($12.407M) Close-Out of Neutral Particle Beam Program. Discontinued all ground testing at Los Alamos Labs including the Ground Test Accelerator. Argonne National Lab projects in abeyance pending FY95 decommissioning (~$3M) if no other funding source acquired. Canceled all flight preparation activity. Terminated contract with Grumman.
- o ($1.881M) Close-Out of Directed Energy Demonstration Program. Evaluated feasibility of applying Russian technology to scale Diode-Pumped Solid State Lasers to weapon levels (joint program was considered). Performed atmospheric propagation analyses to support Aircraft Based Laser (ABL) program and evaluate its operational capabilities. Contributed to joint USN/UK Royal Navy tests using Mid-Infrared Advanced Chemical Laser and Sea Lite Beam Director at White Sands Missile Range.

(U) In 1994 the Chemical Laser project continued to develop additional promising advanced technologies with the potential for significant cost, weight, and/or brightness improvement. Advancements in very-low-absorptance optical coatings and mirror substrates eliminated the need for liquid-cooled optics. Experience in the Chemical Laser project shows that uncooled ultra-lightweight optical components can be produced in half the time for one third the cost of cooled optics. Other efforts included (1)

operating a hydrogen fluoride laser on its overtone, thereby doubling its brightness, (2) phase-conjugation beam/jitter control and (3) improved optical manufacturing techniques. These efforts are not funded in FY95 or beyond.

(U) The ATP-FC program completed the space Relay Mirror Experiment and the ground-based Rapid Retargeting Precision Pointing testbed demonstration which achieved operational level stabilization and pointing accuracies. Completed solid rocket plume ultra-violet (UV) signature measurements from space. Completed a closed loop demonstration of active control of structural disturbances on the Space Pointing and Integrated Controls Experiment (SPICE) test bed. Completed development of an Inertial Pseudo-Stellar Reference Unit (IPSRU) capable of pointing a low-power laser alignment beam with extreme precision in inertial space. FY95 plans focus on integration of ATP component technologies in an end-to-end field test as part of the High Altitude Balloon Experiment (HABE). The ATP program is not funded in FY96 or beyond.

(U) FY 1995 Plans:

- o ($27.150M) ALI. Complete fabrication and delivery of all critical optical hardware (high-bandwidth deformable mirror and high-bandwidth fast-steering mirror, calibration and alignment assembly, spare PtSi focal planes) and remaining facility hardware (support pallets, power management equipment, plumbing and integration and test chamber handling and support assembly).
- o ($2.850M) Alpha. Place Alpha in a "maintenance-only" mode. Periodic operation of critical systems will be exercised to preserve the laser device for return to high power operation in FY97. These periodic operations include flowing all water systems, operating the pressure recovery system and large gate valves, operating all pumps, compressors and valves, inspecting optics and probe laser and performing alignment checks.
- o ($8.100M) HABE ATP Field Experiment. Continue ATP ground integrated system checkout. Integrate IPSRU with HABE payload. Perform IR tracking tests from the ground against boosting scaled rockets. Perform balloon system checkout flight.

- o ($3.708M) ATP Technology Programs. Develop the aimpoint selection and target identification algorithms for integration into HABE tests. Integrate auto-alignment capability for two-mirror system onto existing ABCS brassboard and demonstrate automated boresight and alignment. Continue ATP-FC integration efforts and perform preliminary analysis on concepts for future precision ATP-FC systems for surveillance and laser defensive system concepts. Perform BMC^3/Directed Energy information architectures.

(U) FY 1996 Plans:

- o ($27.150M) ALI. Complete fabrication of the remaining ALI hardware. Conduct subsystem tests and carry out the ALI experiment configuration system level tests.
- o ($2.850M) Alpha. Continue to preserve the Alpha through the third quarter in a low maintenance mode.

(U) FY 1997 Plans:

- o ($20.500M) ALI. Complete subsystem tests and the Alpha buildup to include full system diagnostics. Carry out a single ALI high power experiment. Reduce the data, deliver final report and conduct an orderly closeout.
- o ($9.500M) Alpha. Conduct one high power lasing test to verify proper laser operation before the ALI experiments and verify ALI diagnostics operations. Conduct orderly closeout.

(U) Acquisition Strategy: BMDO's contract to build a space-based laser ("Zenith Star") was competed in 1988 and awarded to Martin Marietta. The Alpha/Lamp Integration (ALI) effort is performed under this contract. The Alpha laser is maintained and operated under a BMDO contract to TRW. Existing contract vehicles are viable for closing out the program in FY97 or to launch the first prototype in December 1998. The contracts remain open and can receive new funds in FY96 if options are exercised.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1360)
PE Title: Support Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	70,144	90,000	90,000	90,000	340,144
Appropriated Value		42,500			42,500
Adjustments to Appropriated Value		-0,692			(692)
Current Budget Submit	75,031	41,808	29,854	30,000	176,693

Change Summary Explanation:
Last year's project numbers of 1302 and 1305 have been consolidated this year as 1360. Last year's project numbers 1303 (Neutral Particle Beam) and 1307 (Directed Energy Weapon Demonstrations) have been terminated.

Funding:
Schedule:
Alternative:

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:		Funding Dependency? (Yes[1]/No)
Demonstration and Validation	P.E. 0603319F	No
1161 Advanced Sensor Technology	P.E. 0603173C	No
1155 Phenomenology Program	P.E. 0603173C	No
3360 Test Resources	P.E. 0603871C	No

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 1360)
PE Title: Support Tech (U)

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestones				x^a				x^b		x^c						x^d
T&E Milestones						x^e		x^f					x^g	x^{h-i}		
Other Program Events								x^{j-k}								x^l

x^a - Holographic gratings applied to 4-m LAMP mirror
x^b - ALI optical bench assembly fully populated and rolled in to vacuum chamber
x^c - Began low-power ALI experiments; integrate and align system
x^d - ALI final report
x^e - Acceptance test of ALI deformable mirror and fast steering mirror
x^f - High Altitude Balloon Exp. (HABE) Balloon Sys Checkout
x^g - High-power Alpha lasing test to reverify operational status
x^h - First high-power ALI lasing exp. (open-loop)
x^i - ALI high-power test (closed-loop)
x^j - HABE IR passive tracking exp
x^k - ATP-FC program close-out
x^l - Chemical Laser program close-out

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 02 (Expl. Dev.)

PE: 0602173C (Proj: 1651)
PE Title: Support Tech (U)

Project Number / Title: 1651 Innovative Science and Technology (IS&T)

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0602173C RDT&E	38,267	45,509	50,739	52,614	50,384	51,143	48,828	47,868	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) To prepare to meet critical future active defense needs, advanced technology programs will invest in a balanced program of high leverage technologies that yield improved capabilities across a selected range of boost phase and terminal defense interceptors, advanced target sensors, and innovative science. The objectives of these investments are to provide (1) component technologies that offer improved performance or reduced costs for our acquisition programs, (2) a better understanding of the physical processes to support the acquisition programs, and (3) technical solution options to mitigate unpredicted threats. This project explores innovative technologies of interest to BMDO. Unlike other BMDO projects that fund near term technology and testing efforts, this project invests seed money in high-risk technologies that could dramatically change how BMD develops future systems. Cause and exploit breakthroughs in science that will keep BMD at the foremost edge of what is possible. Conduct proof-of-concept demonstrations that transition technology to development programs.

(U) Many of today's baseline technologies on BMDO systems like THAAD, ERINT, and GBR are available only because of wise investment in innovative technology 10 years ago. Examples include: Indium Antimonide and Mercury Cadmium Telluride ultra-sensitive detectors, 32-bit RISC processors for image analysis, composite materials for lightweight satellite structures, interferometric fiber optic gyroscopes for sophisticated guidance and control, and solid-state Gallium Arsenide transmitter/receivers for BMDO radars. The IST program is the only R&D program in the Defense Department focussed on future BMDO technical requirements.

(U) These programs will focus, to the maximum extent feasible, on innovative technologies in support of future BMD sensor and interceptor systems. These systems will require processing, sensor,power, optics, propulsion, and communications capabilities beyond those currently being developed. An important goal of the programs is to identify, develop, and demonstrate innovative technologies which will dramatically improve BMD system performance.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Since the IST program began, it has fathered several new technologies important to BMDO and other military and commercial systems including: thin-film diamond, wide-bandgap electronics, digital superconducting electronics, and terahertz communications. It has transitioned several new technologies into advanced development including: multi-chip module fabrication, diode-pumped solid state lasers, novel sensor focal plane arrays, and fiber-optic gyroscopes for guidance systems. Several other technologies have moved into BMDO systems including: back-lighted thyratron switch for ground-based radar, advanced tracking algorithms for interceptors, and fault-tolerant electronic circuits for space-based sensors. In addition, IST defense technologies have already given birth to over 90 new products available today in the commercial market making it one of the most productive dual-use programs in government.

(U) In addition, the IST office managed the highly successful CLEMENTINE satellite program which demonstrated 23 novel technologies in space, flight qualifying them. Innovative management and procurement practices accomplished this highly acclaimed mission for only $80M in under 23 months. The lean management of IST has already produced a satellite laser communications transceiver that recently demonstrated 1.2 gigabit per second data transfer (a new record for free space) in a mountaintop-to-

mountaintop demonstration. The cost of producing artificial diamond films has been reduced by a factor of 300 by IST since 1986, opening up a wide array of applications for BMDO to exploit, including: high-power electronics for radars, high-temperature seeker window for endo interceptors, ultra-sensitive ultraviolet detectors for rocket plumes, and low-friction hard coatings for gimbals, tracker mounts, and rocket nozzles. There are numerous other examples of major technology demonstrations sponsored by IST R&D which will make BMDO platforms more capable, affordable, and manufacturable.

(U) There are more than 300 research contracts sponsored by IST in these areas. For brevity, the projects are listed by the six broad areas below. Note that these program areas continue each year, unchanged, except by redirection of BMDO priorities. The technical contracts, of course, may change annually. The dollar amounts are only targets, since new ideas and innovations are often proposal driven and are difficult to anticipate.

(U) FY 1994 ACCOMPLISHMENTS:

- ($8.467M) Advanced Processing - Wafer integration of 3-dimensional neural network computer for a fast-frame seeker, and first integration of superconducting analog to digital converters, correlators, phase shifters, etc., for 60 Ghz spread spectrum communications. When completed, the fast-frame seeker will be able to process 1000 frames per second, allowing BMDO interceptors to perform passive discrimination of many targets. The superconducting communications modem will permit an increase of 100,000 in the data rate that was available during the Desert Storm conflict, as well as many simultaneously users, without fear of interception or jamming.
- ($12M) Sensor and Detection - Complete critical design review of Skipper satellite to obtain aerothermochemistry data necessary for high-speed re-entry vehicle target detection. SKIPPER is the first joint American/Russian satellite and will cost the US less than $8M when completed for a complete orbital mission. A Gallium Arsenide quantum well detector was demonstrated that has far better yield, is 70 times cheaper, more radiation-hard, much more manufacturable than the incumbent

HgCdTe sensors was demonstrated in the lab for long-wave infrared (LWIR) detection on BMDO interceptors and sensors...this is a major breakthrough in sensor technology!

- o ($3.9M) Power and Propulsion - Demonstrated 95% efficient power conditioning unit for Hall Electric Thruster which IST purchased from Russia last year. This electric propulsion unit will be ready for flight testing in FY95. Novel solar cell arrays using dual-band Gallium Arsenide/Indium Gallium Arsenide were integrated with an innovative inexpensive cylindrical-lens solar concentrator. The lab tests confirmed over 30% efficiency from an affordable array which will be ready for flight testing in FY95.
- o ($6.1M) Materials - Major improvements in the growth of wide-bandgap semiconductor materials for high-power electronics were achieved. These materials, silicon carbide, Gallium Nitride, and Aluminum Nitride, will revolutionize the microelectronics field with their tremendous thermal dissipation, blinding switching speeds, and high electric breakdown strengths when manufactured into devices. Diamond films and sheets where manufactured at affordable prices 300 times less than when IST began its program in 1986. A major accomplishment resulted when a square foot of diamond 2 millimeters thick was grown by the new technique of planar plasma processing.
- o ($1.3M) Propellants - IST is exploiting years of Russian expertise and investment in ammonium dinitrimide propellants, where the Russians are a decade ahead of the US. BMDO researchers are learning the manufacturing technology of this next-generation propellant which promises a spectacular doubling of payloads with similar mass of propellant.
- o ($6.5M) Communications - IST developed a 2 x 200 mW diode laser for high-data-rate satellite laser communications system that will reduce the weight of the transmitter substantially. This transmitter demonstrated the ability to transfer over 1,000,000,000 bits of information through free space in a field demonstration. A flight test of this revolutionary technology is now possible.

(U) <u>FY 1995 Plans</u>:

- ($9M) Complete integration of the neural network fast frame seeker and demonstrate the performance in a lab demonstration. Complete integration of the wafer-scale associative string processor for computing the imaging data from large-format sensors planned for BMDO space sensors in real time, impossible with today's image processors. Continue programs in wavelength division multiplexed networks for distributed simulation and communications. Continue programs in target tracking algorithms, photonic devices for data fusion from multiple sensors, and missile signature measurements.
- ($9.5M) Integrate the gallium arsenide quantum well focal plane array with a monolithic readout technology and optics into a completed camera system and demonstrate it in the field against BMDO targets. Demonstrate the efficacy of sparse-array coherent laser radar against real missile targets in the field, using the advanced diode-pumped solid-state glass laser system delivered to the IST experimental range last year. Continue programs in advanced sensors and detectors using novel materials, sensor fusion experiments employing both radar and optoelectronic detectors, and neural network processors for BMDO target recognition in cluttered environments.
- ($8M) Exploit IST advances in wide band-gap materials for high-power electronic devices to reduce the weight and volume of ground-based radar power supplies. Prepare the high-efficiency solar array concentrators for flight testing in FY96 if funding is made available.
- ($5.5M) Continue the development of wide band-gap semiconductors for non-volatile memory and ultraviolet sensors. Improve the quality and the area of diamond films produced by plasma processing and extend the technique to other semiconductor materials to produce large sheets of microelectronic wafers greater than a square foot.
- ($4.509M) Exploit the Russian ammonium dinitrimide propellant technology for BMDO interceptors, by jointly producing test quantities in US laboratories. Prepare the Hall Stationary Plasma Thruster for flight testing and fly it if funding is made available in FY96. Continue the R&D program on advanced thermoplastic elastomers for solid rocket propellant.
- ($6M) Flight test the high data rate laser satellite communication system on an airplane and prepare for a space flight in FY96 if funding is available. Continue to develop the superconducting terahertz modem for spread-spectrum, code division multiple access communications for BMDO battle management.

- o ($3M) Launch the SKIPPER aerothermochemistry and missile signature experiment onboard a Russian Molniya rocket. Continue the R&D projects on dual-band solar blind detectors and plume spectroscopy measurements.

(U) FY 1996 Plans:

The IST program is a focussed, mission research project which relies on breakthroughs and new opportunities in missile defense technology as well as on its structured core R&D efforts. Thus, out-year planning is purposely left general in many respects to allow the program to exploit new proposals in the key technical areas listed below. Where specific projects are planned to come to fruition, they are noted directly.

- o ($8M) Neural networks for image recognition; optical image processing; multi-sensor tracking; distributed simulation battle management; BM/C^3 networking. A field demonstration of the associative string processor, linked to a large-format focal plane array is planned.
- o ($18M) Advanced focal plane arrays; LIDAR; sensor fusion testbed for target handover and multi-sensor fusion; missile signatures. The fast framing seeker is slated for testing in a real interceptor scenario to test its ability to do passive discrimination,
- o ($8M) Advanced switching for radar; high-efficiency solar cells and concentrators; miniature interceptor guidance technology. Flight test the high-efficiency solar concentrator arrays in space to qualify the new technology and demonstrate folding.
- o ($8M) Wide band-gap semiconductors; polymer-based electronics; digital superconducting electronics; non-volatile random access memory; diamond windows and coatings. Fabricate a 10 square centimeter diamond window and test it at high velocity.
- o ($4M) High-impulse solid propellants; electric propulsion thrusters; propellant manufacturability. Flight test the stationary plasma thrusters in space for satellite orbital transfer and orbit plane adjustment.

- ($4.734M) Laser diodes for communication; laser satellite communication systems; terahertz communication sources; spread-spectrum CDMA communications modem. Flight test the laser satellite communication system using a satellite-to-ground link to demonstrate free-space communications at data rates greater than 1 gigabit per second.

(U) FY 1997 Plans:

The R&D efforts supported in FY97 and beyond will generally be in the areas listed below. However, specific activities such as major demonstrations, flight tests, and discoveries of novel technologies will emerge from the core IST research programs in the future and are unknown at this time. Thus, dollar amounts are estimates. Recall that IST research is opportunity-driven and must remain flexible and adaptive.

- ($8M) Neural networks for image recognition; optical image processing; multi-sensor tracking; distributed simulation battle management; BM/C^3 networking.
- ($18M) Advanced focal plane arrays; LIDAR; sensor fusion testbed for target handover and multi-sensor fusion; missile signatures; fast framing seeker.
- ($8M) Advanced switching for radar; high-efficiency solar cells and concentrators; miniature interceptor guidance technology.
- ($9M) Wide band-gap semiconductors; polymer-based electronics; digital superconducting electronics; non-volatile random access memory; diamond windows and coatings.
- ($4.5M) High-impulse solid propellants; electric propulsion thrusters; propellant manufacturability.
- ($5.114M) Laser diodes for communication; laser satellite communication systems; terahertz communication sources; spread-spectrum CDMA communications modem

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 02 (Expl. Dev.)

PE: 0602173C (Proj: 1651)
PE Title: Support Tech (U)

Acquisition Strategy: This R&D program receives proposals in response to an annual Broad Agency Announcement of research opportunities. Proposals received are competitively judged according to BMD relevance, cost, and capabilities of the offeror. Strong emphasis is placed on the dual-use nature of the proposed effort.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	41,510	60,000	60,000	60,000	221,510
Appropriated Value		41,510			41,510
Adjustments to Appropriated Value		3,999			3,999
Current Budget Submit	38,267	45,509	50,739	52,614	187,129

Change Summary Explanation:
Funding: FY94 reduction was an internal BMDO reduction. FY95 reduction was Congressional. The FY95 adjustment was management funds transferred to the R&D account. Reduction in FY96 and 97 are OSD reductions to scale down technology investment. Reductions will slow future technology discovery and development, and delay demonstrations across the spectrum of IST technical activities.

Schedule: NONE

Technical: NONE

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 02 (Expl. Dev.)

PE: 0602173C (Proj: 1651)
PE Title: Support Tech (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:
(U) The IST program acts as a creator of new technology for BMD. It feeds into all to other BMDO technology programs and it acts as a catalyst to transition devices and components whose efficacy has been demonstrated under IST sponsorship into these other advanced development programs for next-stage engineering demonstration.

D. (U) Schedule Profile
(U) With the exception of the SKIPPER satellite launch, scheduled for July 1995, future demonstrations of maturing IST technology are not specified more accurately than by year (and these are stated in the Program Plans sections above). The uncertainty associated with payoffs from innovative research makes it difficult to predict actual progress to a particular quarter of the year.

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Annual Broad Area Announcement			X				X				X					X

Planned Milestones Beyond FY1997: Contingent on new discoveries and innovations.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 02/03 (Expl. Dev. / Advanced Development)

PE: 0602173C/0603173C (Proj: 1660)
PE Title: Support Tech (U)

Project Number / Title: 1660 Statutory and Mandated Programs

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0602173C RDT&E	31,893	38,496	42,569	52,699	54,619	49,254	46,740	45,801	Continuing
0603173C RDT&E	4,323	4,323	4,302	4,323	4,323	4,323	4,323	4,323	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) There are three programs managed under this project:

1. Small Business Innovation Research
2. Technology Applications
3. Historically Black Colleges and Universities/Minority Institutions

(U) The Small Business Innovation Research (SBIR) program explores innovative concepts pursuant to PL102-564 which mandates a two phase competition for small businesses with innovative technologies.

(U) The Technology Applications Program, established in 1986, makes BMD technology available to federal agencies, State and local governments, and U.S. business and research interests. The program objective is to develop and support the transfer of BMD derived technology to other Department of Defense applications as well as other federal, state and local government agencies, federal laboratories, universities, and the domestic, commercial, and private sector.

(U) The Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) Program increases and improves the participation of these colleges and institutions in the BMDO program. It also responds to Section 832 of PL 101-510 which establishes a specific goal within the overall five percent goal for HBCU and MIs and introduces them to BMDO technologies and the particulars of the BMDO procurement process.

(U) Each program will focus, to the maximum extent feasible, on innovative technologies in support of future BMD sensor and interceptor systems. These systems will require processing, sensor, power, optics, propulsion, and communications capabilities beyond those currently being developed. An important goal of each program is to identify, develop, and demonstrate innovative technologies which will dramatically improve BMD system performance.

(U) These projects are assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Brief Description of Element section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The BMDO SBIR program has been a model for all government. It has nurtured infant technologies that have a future BMD can use and into which the commercial markets can invest. Nine firms have had a sufficient level of assistance from SBIR to enable them to go to the capital markets and raise over $100M in Initial Public Offerings. The market value, which fluctuates widely as expected for unprofitable but promising firms, is nearly twice the total amount the BMDO has spent in its entire SBIR program that has invested in about 180 firms. BMDO plans to continue its emphasis on new technology with both anti-missile and commercial market appeal. The ratio of private sector funding to BMDO dollar increase as more and more firms realize that BMDO takes seriously the commercialization mandate of PL102-564 and makes commercialization an active factor in choosing technologies and

firms to support with this small seed capital fund. Historicaliy, this program has obtained a remarkable 65 cents of private investment for every BMDO dollar invested. The STTR program is just starting.

(U) FY 1994 Accomplishments:
- o ($31.903M) Began developing many forward looking advanced technologies toward which the private sector has invested $20M to continue development for future military and commercial applications.

(U) FY 1995 Plans:
- o ($12M) 200 Phase I SBIR and STTR awards to 140 firms.
- o ($27.896M) 60 Phase II SBIR and STTR awards to 50 firms.

(U) FY 1996 Plans:
- o ($10.694M) 200 Phase I SBIR and STTR awards to 140 firms.
- o ($32.083M) 60 Phase II SBIR and STTR awards to 50 firms.

(U) FY 1997 Plans:
- o ($13.175M) 200 Phase I SBIR and STTR awards to 140 firms.
- o ($39.524M) 60 Phase II SBIR and STTR awards to 50 firms.

(U) The BMDO Technology Applications program has been a technology transfer model for all government. This multifaceted program has successfully moved technology from a defense environment to the commercial sector -- an effort that has contributed to roughly 168 BMDO-related commercial products. It has also assisted the 28 companies that spun out from Federal laboratories, universities, and industries to manufacture products using BMDO-funded R&D. Encouraging face-to-face interaction between people

in government, industry, and universities, the program is effective using various approaches. In FY 1994 the program accomplished the following:

(U) FY 1994 Accomplishments:

- ($1.200K) Database - Completed review of new operating concept to move database to more modern, accessible, and usable format. Integrated on-line database with general outreach program to provide users with expanded, more detailed information.
- ($450K) Panel Reviews - Conducted joint reviews with NASA, Army, and Air Force on BMD-supported technology. Expanded availability and level of support in commercialization assistance to BMD researches at panel reviews.
- ($350K) Outreach - Revised and expanded publications to better provide information and technology transfer services. Conducted survey of primary outreach tool to target most significant readership and provide desired level of information. Conducted series of presentations on BMD technology transfer program to national technology transfer professionals.
- ($862K) Networking - Working with other federal technology transfer and dual-use programs such as Technology Reinvestment Project (TRP), Advanced Technology Project (ATP), the OSD Director, Defense Research and Engineering (DDR&E) Office of Technology Transition, and expand results of technology transfer.

(U) FY 1995 PLANS:

- Program will continue as mandated by law with minor changes to preceding FY94 effort.
- ($1.200K) Database - Design, program, and install improved national database on BMD programs. Expand technical information to improve chances for technology transfer. Open database access to wider segment of U.S. technical and business community.
- ($450K) Panel Reviews - Expand unique and innovative business and commercialization assistance for BMD-supported large, medium and small business researchers by covering application areas such as transportation, communications, environment, and others. Conduct joint service and laboratory Panel Reviews to teach technique to other DoD organizations.

- o ($350K) Outreach - Publications, brochures, target articles for journals and newspapers, quarterly newsletters, conference exhibits, ads and reports on BMDO technology. Publish in-depth synopses on BMD-supported research such as accelerators, power sources, materials, and other breakthrough technical innovations coming from BMD research.
- o ($862K) Networking - Working with other federal technology transfer and dual-use programs such as Technology Reinvestment Project (TRP), Advanced Technology Project (ATP), the OSD Director, Defense Research and Engineering (DDR&E) Office of Technology Transition, and expand results of technology transfer.

(U) FY 1996 PLANS:

- o Program will continue as mandated by law with minor changes to preceding FY95 effort.
- o ($1.200K) Database - Complete installation of improved database and investigate international access to the technology database.
- o ($459K) Panel Reviews - Provide assistance to large, medium and small businesses wishing to bring BMD supported technology to the commercial market.
- o ($350K) Outreach - Publications, brochures, target articles for journals and newspapers, quarterly newsletters, conference exhibits, ads and reports on BMDO technology, etc.
- o ($862K) Networking - Working with other federal technology transfer and dual-use programs such as Technology Reinvestment Project (TRP), Advanced Technology Project (ATP), the OSD Director, Defense Research and Engineering (DDR&E) Office of Technology Transition, and expand results of technology transfer.

(U) FY 1997 PLANS:

- o Program will continue as mandated by law with minor changes to preceding FY96 effort.
- o ($1.200K) Database - Maintain up-to-date information on potential BMD programs that have commercial applications. Implement graphics and interactive modes into national database on BMD-sponsored technologies.

- o ($450K) Panel Reviews - Provide assistance to large, medium and small businesses wishing to bring BMD supported technology to the commercial market.
- o ($350K) Outreach - Publications, brochures, target articles for journals and newspapers, quarterly newsletters, conference exhibits, ads and reports on BMDO technology, etc.
- o ($862K) Networking - Working with other federal technology transfer and dual-use programs such as Technology Reinvestment Project (TRP), Advanced Technology Project (ATP), the OSD Director, Defense Research and Engineering (DDR&E) Office of Technology Transition, and expand results of technology transfer.

(U) The Historically Black Colleges and Universities/Minority Institutions (HBCU/Mis) pilot was well received and encouraged more HBCU/Mis to participate in BMDO related research.

(U) FY 1994 Accomplishments:
- o ($1.461K) HBCU/MI's set-aside resulted in 10 contract awards to conduct Innovative Science and Technology basic research.

(U) FY 1995 PLANS:
- o ($1.461K) HBCU/MI program will award 10 contracts as a target.

(U) FY 1996 PLANS:
- o ($1.461K) HBCU/MI program will award 10 contracts as a target.

(U) FY 1997 PLANS:
- o ($1.461K) HBCU/MI program will award 10 contracts as a target.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 02/03 (Expl. Dev. / Advanced Development)

PE: 0602173C/0603173C (Proj: 1660)
PE Title: Support Tech (U)

Acquisition Strategy: These competitively awarded programs are in response to an annual announcement of research opportunities. Proposals received are judged according to BMD relevance, cost, and capabilities of the offeror.

B. (U) PROGRAM CHANGE SUMMARY:

SPT Tech Exp Dev:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	31,543	46,460	46,774	53,820	178,597
Appropriated Value		39,896			39,896
Adjustments to Appropriated Value		-1,400			(1,400)
Current Budget Submit	31,893	38,496	42,569	52,699	165,657

Spt Tech ATD:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	4,323	4,323	4,323	4,323	17,292
Appropriated Value		4,323			4,323
Adjustments to Appropriated Value		0			0
Current Budget Submit	4,323	4,323	4,302	4,323	17,271

Change Summary Explanation:
Funding: None.
Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 02/03 (Expl. Dev. / Advanced Development)

PE: 0602173C/0603173C (Proj: 1660)
PE Title: Support Tech (U)

Related RDT&E:
The SBIR and HBCU programs feed novel technologies into all other BMDO programs.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
SBIR Solicitation	X				X				X				X			

Planned Milestones Beyond FY1997: Milestones beyond FY97 dependent on new discoveries and innovations.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 2259)
PE Title: Support Tech (U)

Project Number / Title: 2259 Israeli Co-Operative Projects

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	0	3,000	0	0	0	0	0	0	

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Boost Phase Intercept (BPI) Study showed the feasibility and utility of using high-altitude, long-endurance UAVs to perform very stressing missile defense mission to protect the state of Israel. A preliminary cost and operational effectiveness assessment concluded that such a system could be very complementary to Arrow and developed quickly with indigenous Israeli technology.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1995 Plans:

- ($3.000M) Joint U.S./Israeli BPI Assessment
- Explore joint BPI missile defense against Theater Missiles in the Middle East using simulations, wargaming and personal interchanges, here and abroad, among appropriate government and military counterparts. Defines what the U.S. gets out of a U.S./Israel joint/BPI development program.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 2259)
PE Title: Support Tech (U)

- o Analyze common technology requirements between U.S. Air Force and Israeli BPI concepts.
- o Explore selected improvements for Israeli BPI missile, aircraft, and BM/C^3.
- o Prepare report.

(U) FY 1996 Plans: None

(U) FY 1997 Plans: None

Acquisition Strategy: This is a study program. No acquisition is contemplated at this time.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	0	0
Appropriated Value		3,000			3,000
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	3,000	0	0	3,000

Change Summary Explanation:
(U) The Israeli Boost Phase Intercept (BPI) study has been integrated into one budget item consisting of all Israeli Cooperative Projects. In previous budget submissions, the ITB was part of the Test and Evaluation Support (Project 3300) and the Israeli Systems Engineering and Integration (ISE&I) and Israeli Boost Phase Intercept (BPI) Study were part of the Architecture and Studies (Project 3201).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 2259)
PE Title: Support Tech (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency (Yes[1]/No)
3359 - System Test & Evaluation - 0603872C	Yes
3251 - Sys. Eng. & Tech Spt - 0603872C	Yes
3352 - Modeling & Simulations - 0603872C	Yes
2259 - Israeli Coop. Projs - 0603872C	Yes
1265 - Boost Phase Intercept- 0603878C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestone																
- Complete BPI Studies				X				X								

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3153)
PE Title: Support Tech (U)

Project Number / Title: 3153 Architecture Analysis and BMC3 Initiatives

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	0	7,392	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project supports the creation for FY95 of two new offices within BMDO to ensure that appropriate issues relating to system architecture and BMC3 are addressed in a coordinated and synergistic manner across all BMDO NMD and TMD efforts. The new offices, Architecture Integrator (DA) and the BMC3 Office (DB), report directly and independently to the BMDO Director (BMDO/D) to provide the necessary mission-area oversight to address and resolve BMC3 technical issues. Neither FY95 DA or DB efforts will be continued via this Program Element in FY96, but will be continued via TMD and NMD Program Element funding as appropriate. During FY95, this Program Element provides for the performance and transition of DA and DB system-level oversight activities to be continued via the NMD and TMD Program Elements, as appropriate, in FY96 and beyond.

(U) This project includes systems analyses of alternative ballistic missile defense architectures and concepts. These analyses are independent studies of element designs, architecture performance, alternative architectures and their performance, architecture costs, and insertion of emerging technologies into the system elements to reduce costs and increase effectiveness. Efforts also include mission analyses and simulations which focus on defining ballistic missile defense concepts; the impact of these concepts on international stability, deterrence, and arms control; and strategic and tactical effectiveness of proposed architectures. During FY95, DA activities performed under this Program Element comprise the continuation of architecture analysis and integration activities

beginning prior to FY95. In FY96, appropriate activities will be continued under the appropriate TMD and/or NMD Program Element(s).

(U) FY95 DB efforts will provide for the mission-area oversight and coordination of all BMDO BMC3 development and acquisition activities in the role of senior advisor to the Director, BMDO. This effort will provide for the synergistic evaluation of relevant BMC3 technical issues; the formulation of appropriate plans, programs, and policies to facilitate the coordination of all BMD Advanced Development BMC3 research, development, and acquisition activities across TMD and NMD program activities; promote appropriate reuse strategies to maximize BMD reuse capabilities; and minimize the duplication of BMC3 research and development efforts across all NMD and TMD development efforts. FY95 DB activities, not directly traceable to projects performed prior to FY95, will transition various activities funded via both TMD and NMD Program Elements, as appropriate, beginning in FY96.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:
Architecture Analysis (DA):
- o This effort was not funded via this P.E. during FY94.

BMC3 Initiatives (DB):
- o This effort was not funded via this P.E. during FY94.

(U) FY 1995 Plans:

Architecture Analysis (DA):

- ($ 2.500M) Compare the government baseline and specific contractor element designs in order to update architecture performance previously determined; continue investigations of special topics and unique system concepts; evaluate advanced technology concepts.

BMC3 Initiatives (DB):

- ($ 0.883M) Information Architecture--identify, evaluate and promote the implementation of emerging evolutionary development processes across the BMD Community; support BMDO efforts in external DoD initiatives as they relate to IA-based evolutionary development processes; develop the programs, processes, and policies to support the implementation of such process throughout the BMD BMC3 development efforts; and support the development and implementation of BMD BMC3 Domain Information Architecture (IA) capabilities. Provide a core team of experts to support the mission-area analysis, evolution, and implementation of capabilities to provide a seamless development environment for BMD BMC3 software development from requirements through design and production of BMC3 executable code.
- ($ 0.425M) TMD/NMD Reuse--define and develop the process by which BMDO may find reuse opportunities through activities such as the Feature-Oriented Design Process developed by the Software Engineering Institute (SEI). Specifically, determine reuse opportunities in the near term as related to using TMD products in NMD and vice-versa, i.e., establish links between instantiated TMD and NMD information/software/physical architectures. Coordinate with and leverage from various DoD reuse efforts in the identification of candidate reuse opportunities for BMDO implementation.
- ($ 0.322M) Reuse Library--analysis of various object libraries under development, analysis of overall BMDO reuse requirements, and definition of appropriate BMD Reuse Library construct and process requirements for the cost-effective implementation of reuse throughout the BMD community. Pursue the establishment of a BMC3 library consortium with the JSIMS SPO, CTAPS SPO, NTF BCCE effort, NRAD, ARC, BMDO, and other appropriate DoD BMC3 development

organizations. Address the BMD BMC3 reuse capability in the context of the broader spectrum of acquisition reform within the DoD community.

- o ($ 0.200M) DoD Initiatives/Policy--address various DoD initiatives such as the Software Reuse Initiative, Software Management Initiative, software standards, etc., and their implications for BMDO BMC3 development efforts. As a leading innovator in software engineering techniques and methodologies, BMDO will work to shape the outcome of these initiatives based upon BMDO Options Assessment (OA) contractor finding, results of BMC3 Support Center (BSC) (located at the NTF) activities, and related experiences. Inferences and related policy implications will be drafted as they pertain to larger acquisition reform issues. Impacts upon BMDO efforts will be assessed, decisions made on how to implement, and feedback provided to the DoD community when implementation discrepancies arise.
- o ($ 0.200M) Allied Initiatives--support activities such as SCORE, CNAD etc., in order to formulate BMC3 cooperative development opportunities beyond present generalized BMDO community objectives. Anticipated activities include demonstrations, WALEX-type exercises, etc., primarily focused on NATO and other multi-national concerns and activities.
- o ($ 0.470M) Demonstrations--provide support for demonstrations that address those BMD-wide implementation needs which are not addressed by focused TMD and/or NMD-related demonstrations. Support the development on integrated planning tools to ensure BMDO-wide activities are properly harmonized. These will include such demos as JWID95, Joint Interoperability efforts, etc., which will continue to help in the definition of operation and implementation requirements for BMC3 CONOPS, Domain Architecture, etc.
- o ($ 0.114M) Software Engineering--define and sustain the BMDO Software Improvement Process which will include as a minimum the inclusion of the Software Engineering Institute Software Capability Evaluation process across the BMDO community in source selections and in encouraging continuous process improvement across all BMDO software development activities. Develop the process by which the BMDO will address its internal capabilities/skills as a PM office, including implementation of the new SEI PM Process evaluation guidelines.

- o ($ 0.502M) Direct Support--provide DB with the overall direct support required to coordinate all of the above efforts, establish and provide oversight to the engineering processes used to translate operational BMC3 requirements into Joint and Combined interoperable systems; provide independent technical analyses in support of options being explored by the Architecture Integrator; establish liaison with and foster synergism with National Technical Means C3I planning elements; plus additional support for unanticipated requirements as they evolve. Provide for non-Government expert support to the above efforts.
- o ($ 0.926M) Hardware/Software--hardware and software purchases in support of the objectives listed above. Anticipated purchases include CASE tools to support IA development and maintenance efforts, hardware and software to support reuse library analysis and development, products to support BMC3 demonstrations, etc.
- o ($ 0.850M) Service Support--Army, Air Force, Navy, and National Test Bed (NTB) support in the performance and execution of above tasking to meet emerging DB goals and objectives to support evolving BMDO mission requirements.

(U) FY 1996 Plans:

- o Continuation of DA and DB FY95 program efforts under both TMD and NMD Program Elements.

(U) FY 1997 Plans:

- o Continuation of DA and DB FY95 program efforts under both TMD and NMD Program Elements.

Acquisition Strategy: The RFP for the architecture analysis follow-on contract was released in May 1994. Contract award is anticipated in the first quarter of FY 1995. Expertise of Government, FFRDC, SEIC, and SETA personnel will be leveraged in the execution of project activities, utilizing existing contracts to the maximum extent possible. Specifically, USASSDC and USAF/ESC Government and contractor personnel are expected to lead Information Architecture and development efforts; existing and follow-on SETA and SEIC contracts will provide the core of technical expertise for a variety of BMC3 activities; and existing contract vehicles

for IDA and other contractors will provide state-of-the-art technical expertise in Software Engineering and related technical areas. Additional contractor services will be procured as needed to meet emerging program requirements.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	8,000	8,000	8,000	24,000
Appropriated Value		8,000			8,000
Adjustments to Appropriated Value		-608			(608)
Current Budget Submit	0	7,392	0	0	7,392

Change Summary Explanation: Architecture analysis and integration efforts performed as part of this project were previously performed via CDS Project 3207 prior to FY95. Beginning in FY96, all activities comprising FY95 CDS Project 3153 will be funded and performed via a combination of both TMD and NMD Program Elements, as appropriate.

Funding: Reflects reductions in funding directed by Congress.
Schedule: None. This project is not an acquisition program, but supports BMD long-term planning.
Technical: Reductions in funding result in a reduced level of effort.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E: Funding Dependency (Yes[1]/No)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3153)
PE Title: Support Tech (U)

3153 Arch. Anal.& BMC3 Initiatives P.E. 0603871C No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
- Software Policy Update																
- BMD IA (CONOPS)					x											
- Software Engineering Documentation Updates								x								
T&E Milestone																
Contract Milestone																
- Award Arch. Analysis Support Contract					x											
Other Program Events																
- Annual Contract Program Review								x								
- Tech. Analyses, Reports, & Briefings As Req'd.					x	x	x	x								

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3157)
PE Title: Support Tech (U)

Project Number / Title: 3157 Environment, Siting and Facilities

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	5,506	5,606	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides environmental program guidance, environmental impact analyses and documentation, real property facility siting, and facility management and acquisition support for the BMDO National Missile Defense (NMD) system and Theater Missile Defense (TMD) system. Plans, programs, budgets, and oversees the NMD and TMD facility acquisition through Military Construction (MILCON) and RDT&E construction projects. Provides guidance and leads BMDO NMD and TMD environmental compliance, pollution prevention, other environmental efforts, and the Environmental Assessment and Environmental Impact Statement process for NMD and TMD activities. Develops guidance for Executing Agents on facility siting, facility acquisition, and environmental matters to support NMD and TMD activities. Provides MILCON design funds to support design of BMDO's NMD and TMD major and minor MILCON projects. Provides MILCON Minor Construction funds to support TMD's out-of-cycle unforeseen MILCON projects under $1.5M.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3157)
PE Title: Support Tech (U)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1994 Accomplishments:

- ($ 3.856M) Continued facility siting development, environmental compliance programs, and environmental analysis and documentation for critical test and evaluation programs for TMD: (Completed the TMD Programmatic EIS, THAAD EA, Hera EA, and Wake Island Reuse EA and Baseline Study; continued to work the TMD Extended Test Range EIS. Initiated siting analysis for extended test range testing for TMD. Completed siting analysis for THAAD User Operational Evaluation System [UOES] and THAAD First Objective Battalion fielding.) The Facilities, Siting and Environmental project delivered documentation, analysis and facilities to support the BMDO contingency NMD capability based on a 1997 deployment decision. These supported the test and evaluation for the NMD program. An Environmental Impact Analysis was developed as required by the National Environmental Policy Act (BMD Programmatic EIS). A siting study was conducted for the deployment of the NMD system. Continued facility siting development, environmental compliance programs, and environmental analysis and documentation for critical test and evaluation programs and NMD (Completed the BMD Programmatic Environmental Impact Statement [EIS] and the USAKA Supplemental EIS. Initiated siting analysis for System Test Sites.)

- ($ 0.512M) Continued real estate facility planning in support of TMD and NMD with emphasis on future TMDI test facilities and NMD fielding sites.

- ($ 1.138M) Executed and managed TMD's and NMD's FY 94-96 Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and activities to progress with the TMD initiative's and NMD's facility requirements: (TMD GBR maintenance facility and UOES site work, THAAD training/maintenance storage, and target launch

complexes. Also did facility constructibility, construction methods, and materials planning for a return to the SAFEGUARD site.)

- o ($2.977) MILCON Design Activities

(U) FY 1995 Plans:

- o ($ 4.588M) Develop siting, basing deployment plans, environmental compliance, environmental analysis, and documentation for TMD and NMD: (Facilitate and expedite a contingency deployment of an NMD capability. Site specific issues for TMDI garrisoning and fielding. TMD Flight Test EA, Supplement to TMD Extended Test Range EIS, integration of environmental documents). Complete current SETA contract. Award new SETA contract.
- o ($ 0.268M) Complete facility planning in support of test and evaluation activities, acquisition programs, and NMD contingency deployment planning, with emphasis on TMDI garrison facilities and launch complex issues.
- o ($0.750M) Execute and manage the TMD and NMD FY 95-97 Military Construction, Minor Military Construction, and RDT&E facility design and construction projects and activities with emphasis on completing the TMD initiative's facility requirements. (Complete design of THAAD First Objective Battalion facilities at Fort Bliss, Texas, design for THAAD test facilities at USAKA, and completion of facilities on Wake Island.)
- o (0.530M) MILCON Design Activities.

Acquisition Strategy: BMDO contractor support (Currently under a small business Cost Plus Fixed Fee contract; this contract will be recompeted for similar contract-type award in FY 95) will be utilized for technical and overview assistance of Facilities, Siting, and Environmental activities. Other similar small business contracts, as well as full and open competition Cost Plus Fixed Fee and Fixed Price contracts, by U.S. Army Space and Strategic Defense Command and the U.S. Army Program Executive Office-Missile Defense will be utilized for additional technical assistance for the development of Facilities, Siting, and Environmental documentation

requirements. BMDO tasks the Services through Program Management Agreements to perform the required tasks in support of the BMDO program. BMDO performs quarterly on-site reviews to verify and validate completed tasks.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	5,606	5,606	5,606	5,606	22,424
Appropriated Value		5,606			5,606
Adjustments to Appropriated Value		0			0
Current Budget Submit	5,506	5,606	0	0	11,112

Change Summary Explanation:
Funding: None
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY:

Related RDT&E:		Funding Dependency? (Yes[1]/No)	
3160	Readiness Planning	0603871C	No
2154	Ground Based Radar	0603862C	No
1267	Kinetic Kill Vehicle	0603871C	No

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3157)
PE Title: Support Tech (U)

1460 Battle Management C3 0603871C No

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Contract Milestone							Xa/Xb									

Xa Complete current SETA contract.
Xb Award new SETA contract.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3270)
PE Title: Support Tech (U)

Project Number / Title: 3270 Threat and Countermeasures Program

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	31,243	30,167	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) Threat and Countermeasures Program. This Project, PE 0603173C is transitioning to PE 0603871C (NMD Technology) and PE0603872C (other TMD) for all future work. It was previously funded under Projects 3202, 3203, and 3206 in the FY95 President's Budget. The BMDO National Missile Defense (NMD) and Theater Missile Defense (TMD) Threat Programs define potential adversary military forces principally theater and strategic missiles, which the Ballistic Missile Defense (BMD) system could confront. To accomplish this mission, BMDO has a threat development program which is based on Intelligence Community projections and is traceable to quantifiable analysis. The Program comprises three component tasks: Intelligence Threat, Countermeasures Integration, and System Threat Scenario Generation.

(U) Intelligence Threat Task. The purpose of the BMD Intelligence Threat task is to provide Intelligence Community-validated NMD and TMD threat descriptions. The Intelligence Threat task divides the threat into four major categories: Operational Threat Environment, Targets, System Specific Threats (SST), and Reactive Threats. The Operational Threat Environment includes assessments of the NMD and TMD operational and technological environments and projects the effects of developments and trends on mission capability. The Targets category includes a projection of foreign theater and strategic missile systems and the countermeasures that enhance their performance. This includes force structure, performance characteristics, and sample signatures.

System Specific Threat includes reconnaissance, surveillance, and target acquisition; lethal and non-lethal threats; and regional integrated SST assessments. Reactive Threats are those that an adversary may develop as a result of deployment of U.S. NMD and TMD systems.

(U) System Threat Scenario Generation Task. The accurate specification and characterization of ballistic missiles and the appropriate development and integration of scenarios using these characterizations are critical to the analysis of alternative ballistic missile architectures, the performance assessments of potential technology applications, and the operational performance evaluations of candidate designs. This task provides baseline and excursion scenario descriptions in documentary and electronic form for use in BMDO TMD COEA evaluations and NMD system and architecture analyses. These descriptions are the only approved threat employment portrayals authorized for acceptable BMDO analysis. This task:

(1) Identifies user needs for threat scenario descriptions.
(2) Identifies analyses needed to fully specify and characterize the threat missile systems, penetration aids, tactics, etc., and ensures the analyses is accomplished.
(3) Provides the analysis results to all interested agencies for review and comment.
(4) Addresses critical threat issues which arise during the analysis process.
(5) Ensures all supporting agencies' views on threat issues are fully aired.
(6) Reviews, approves, produces, and distributes all System Threat Scenario Descriptions.
(7) Produces threat computer tapes and supporting documentation for use by the development and acquisition communities.

(U) Countermeasures Integration Task. The BMDO Countermeasure Integration (CMI) Program assists BMD acquisition program offices in developing ballistic missile defense systems that are robust to potential countermeasures which are practical and within the means of anticipated adversaries. Included in this mission is CMI Program support to the BMD threat development process and advance warning to BMDO system designers. The CMI program determines the effectiveness of potential countermeausers through

analysis, high fidelity simulations, and ground and flight tests. The BMDO CMI Program reviews BMD systems for susceptibilities and identifies potential countermeasure concepts. CMI then analyses the potential effectiveness of each countermeasure concept and characterizes credible countermeasures by providing designs and performance parameters. CMI informs intelligence and system threat developers of potential countermeasures, informs BMD system designers with advance warning of potential countermeasures, and assists BMD system designers in developing counter-countermeasures. Providing vulnerability and susceptibility information to the system designers early enables them to build robustness into their designs during the early stages of the system development process, a cost-effective means for providing a flexible high-performance design.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) Intelligence Threat. The key project accomplishments have been the production of BMDO Capstone System Threat Assessment Reports (STARs), Intelligence Production Requirements, and system level descriptions of most adversarial ballistic missiles and penaids. In addition, the Intelligence Threat task detailed lethality-oriented and test target designs, extensively assessed System Specific Threats, and began country-by-country evaluations of military doctrine for missile employment. An unclassified ballistic missile proliferation report was widely distributed.

(U) System Threat Scenario Generation. This task was designed to provide threat data in a form that could be used by system designers to evaluate the effectiveness of missile defenses. From the creation of the FY 88-89 Design-to-Threat documentation to the FY 91 Global Protection Against Limited Strikes (GPALS) 91 series of scenarios to the current production of Theater Campaign

Scenarios, the System Threat Scenario Generation task sought to provide a more detailed description of the total threat environment U.S. missile defense systems will face in the future. The scenarios created since the inception of the program expanded the threat description from single ballistic missile flights to descriptions of environments that include missiles, aircraft, UAVs, cruise missiles, rockets, electronic warfare, and red defensive systems such as SAMs. All threat data contained in the scenarios are drawn from Intelligence Community estimates and modeled by the National Test Facility. The scenarios developed in FY94 are the result of joint BMDO and U.S. Army Air Defense Artillery School efforts with support from U.S. Navy and U.S. Air Force elements.

(U) Countermeasures Integration. The Countermeasures Integration program completed susceptibility analyses of the THAAD, GBR, and PAC-3 (ERINT) systems to potential enemy countermeasures and communicated the results to the BMD acquisition community. A countermeasures "skunkworks" was established to conceive, design, assemble, and test simple inexpensive TMD countermeasures in a "Rest of World" (ROW) environment. The skunkworks completed one highly successful countermeasures flight test and commenced work on three other potentially effective countermeasures. Additionally, the Countermeasures Integration program established a data base on the countermeasures technologies available to potential ROW adversaries. This data base will assist the BMD developers in designing systems that are robust to potential countermeasures. Counter-countermeasures parametric studies (CCMPS) were initiated to assist BMD program offices in assessing the design, cost, and schedule impact of implementing counters to potential countermeasures. The Countermeasures program completed a comprehensive analysis (technical/non-technical) of the effect of countermeasures upon TMD systems in the low endoatmospheric region (the Low Endo Red/Blue Exchange) and planned a similar exchange directed at countermeasures to the entire TMD architecture in all regions

(U) FY 1994 Accomplishments:

- ($8.053M) Intelligence Threat task: STAR and STAR Annexes, Specialty Threats, Targets Analyses, System-Specific Threat (SST) Studies, Operational Threat Environment (OTE) Intelligence Assessments.

- o ($6.890M) System Threat Scenario Generation task: Developed threat system characterizations and scenario descriptions in response to the analysis needs of the system/element developers, Continued to upgrade the threat modeling capability and produce threat tapes and supporting documentation through the NTF, Developed scenarios depicting threat systems employed in theater environments.
- o ($16.300M) Countermeasures Integration task: TMD CM Red/Blue activities and Counter-countermeasure Parametric Studies, TMD CM technical experiments and evaluations, CM Skunkworks (3 countermeasures missions), Analysis, oversight, and database management.

(U) FY 1995 Plans:

- o ($7.550M) Intelligence Threat task: Capstone STAR, National Missile Defense Threat Assessment Report, Targets Analyses, Operational Threat Environment Intelligence Assessments, Threat Reference Guide, Management Planning and Support.
- o ($5.617M) System Threat Scenario Generation task: Developed threat system characterizations and scenario descriptions in response to the analysis needs of the system/element developers, Continue to upgrade the threat modeling capability and produce electronic media and supporting documentation through the NTF, Develop scenarios depicting employed threat systems
- o ($17.000M) Countermeasures Integration task: TMD CM Red/Blue activities and Counter-countermeasure Parametric Studies, TMD CM technical experiments and evaluations, CM Skunkworks teams conduct CM concept, design, fabrication, and flight tests (3 countermeasures missions), Non-technical analysis, oversight, and database management.

(U) FY 1996 Plans: None

(U) FY 1997 Plans: None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3270)
PE Title: Support Tech (U)

Acquisition Strategy: The acquisition strategy for the Threat Program is to ensure continuity in the threat development and scenario generation process. Funding is provided to Executing Agents who accomplish tasks under existing contracts (via MIPRS, SETAs, and FFRDCs).

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	31,243	33,243	33,243	33,243	130,972
Appropriated Value		33,243			33,243
Adjustments to Appropriated Value		-3,076			(3,076)
Current Budget Submit	31,243	30,167	0	0	61,410

Change Summary Explanation:
Funding: There was a reduction in the FY95 CMI Program by $1.303M.
Schedule: None.
Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1/]/NO)
1266 Sea-based Theater-wide Defense (Upper Tier) 0603868C	No
2154 TMD-GBR 0603861C	No
2257 PATRIOT 0208865C	No

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3270)
PE Title: Support Tech (U)

2260 THAAD 0603861C/0604861C	No
2263 Navy Area TBMD 0603867C/0604867C	No
3352 Modeling and Simulations 0603871C/0603872C	No
3270 Threat and Countermeasures 0603872C/0603173C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
STAR Published					X											
CM Skunkworks (Flight tests)			X													
Threat Scenario Generation (as required)																

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3352)
PE Title: Support Tech (U)

Project Number / Title: 3352 Modeling and Simulations

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	0	3,000	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) This project provides for the development of validated models and simulation techniques and tools that are critical in assessing the performance capabilities of BMD systems. This is a highly complex problem requiring high-performance vector and parallel processing super-computers as well as scalar processors and advanced graphic work stations. This cost effective approach will reduce high cost missile test programs and will establish requirements for future technology. A portion of this capability is housed at the National Test Facility (NTF). This facility is capable of operating in a distributed integrated simulation environment and hosts modeling and simulation wargames that provide the analysis, integration, demonstration, and performance verification capability for BMD systems. This facility is provided to all Services and procedures have been established that ensure efficient utilization and sound verification, validation, and accreditation.

(U) The funding for this facility is distributed across three Program Elements (PEs) in FY95 (NMD,TMD, and Support Technology). This cost sharing approach maximizes synergy and minimizes duplication of modeling and simulation resources. These Pes cover the total costs for operations and maintenance of this facility which includes: computer hardware and software, communications networks, security, and other essential capabilities necessary to develop and operate reconfigurable, multiple experiment test bed environments. This document describes the Support Technology portion of funding for these activities.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3352)
PE Title: Support Tech (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project's effort provides super-computing resources at the NTF and integration support including operations and maintenance of the facility, computer hardware and software, communication networks, security, and other essential capabilities that support Ballistic Missile Defense.

(U) FY 1994 Accomplishments:
Not Applicable

(U) FY 1995 Plans:
- ($3.000M) Provide super-computing resources at the NTF and integration support including operations and maintenance of the facility, computer hardware and software, communication networks, security, and other essential capabilities that support Ballistic Missile Defense.

(U) FY 1996-1997 Plans:
Not Applicable

(U) Acquisition Strategy: The tasks in this project have been met through full and open contractual competition to support Technology Follow-on M&S requirements. Overall BMDO M&S oversight is provided by BMDO/AQM.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3352)
PE Title: Support Tech (U)

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	3,000	3,000	3,000	9,000
Appropriated Value		3,000			3,000
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	3,000	0	0	3,000

Change Summary Explanation:
Funding: This project evolved from project 3300 funding in the FY1995 President's Budget. Provides a one year infusion of Support Technology funding and compliments NMD and TMD funding for development and operations at the NTF.
Schedule: None
Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
3352, Modeling and Simulation, PE 0603871C	Yes
3352, Modeling and Simulation, PE 0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE:0603173C (Proj: 3352)
PE Title: Support Tech (U)

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone																
Engineering Milestone																
T&E Milestone																
Contract Milestone																
Other Program Events																

Planned Milestones Beyond FY97:
None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3360)
PE Title: Support Tech (U)

Project Number / Title: 3360 Test Resources

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0603173C RDT&E	0	6,963	0	0	0	0	0	0	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The goal of the Technology Development program is to develop and demonstrate technologies to insure that ballistic missile defense elements can perform their missions in all expected environments against all deployed and expected threats. The technologies can be used to enhance the performance of ongoing acquisition and technology readiness programs and to enable new capabilities against existing threats. Project 3360 provides for BMDO planning oversight and coordination of integrated Test and Evaluation activities and inter-element, as well as inter-service Test and Evaluation efforts and provides for test infrastructure for common ground test facilities and range instrumentation. The common ground test facilities include: the Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) at Eglin AFB, Fort Walton Beach, FL; the Hypervelocity Wind Tunnel Number 9 (Tunnel 9) at the Naval Surface Warfare Center, White Oak, MD; the Aero-optical Evaluation Center (AOEC) located at Calspan Corp., Buffalo, NY; the Army Missile Optical Range (AMOR) at the U.S. Army Missile Command, Huntsville, AL; the Portable Optical Sensor Tester (POST) and the Characterization of Low Background Mosaics (CALM) at Rockwell International, Anaheim, CA; the Naval Research and Development (Nrad) faciiity located at the Naval Command, Control and Ocean Surveillance Center, San Diego, CA; and the infra-red and blackbody standards at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. The range instrumentation includes special test equipment, data collection assets, and range instrumentation upgrades including the Kwajalein Missile Range Safety System (KMRSS) located at the Kwajalein Missile Range (KMR) in the Marshall Islands. These ground test and instrumentation assets provide valuable program risk reduction and test implementation capability in support of the Technology

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3360)
PE Title: Support Tech (U)

Development test and evaluation program. The ground test facilities provide a cost effective method of testing and evaluating applicable component and sub-system level technologies. The range instrumentation provides a cost effective capability to collect test vehicle characteristics and performance data on flight tests. These facilities and capabilities support component design, verification and validation of target realism, and the evaluation of test results. Project 3360 has combined all of the projects which have previously been designated 3310, 3311, and 3313. The FY95 RDT&E Descriptive Summary of these previous projects was combined in CDS 3300 with other test and evaluation support projects. This program element no longer exists after FY95. Please refer to Project 3360 Other TMD and 3360 NMD Technology for further descriptions.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the Mission Description and Budget Item Justification section of each Program Element Summary.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY1994 Accomplishments: None

(U) FY 1995 Plans:

- ($ 6.143M) Provide ground test facility infrastructure and upgrades for BMDO testing including: hardware-in-the-loop testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, sensor testing at POST, CALM and Nrad, and phenomenology characterization at AMOR and KHILS. IOC of the WISP at KHILS and IOC of AOEC.
- ($ 0.820M) Provide range instrumentation, upgrades, data collection, and analyses for BMDO testing including the KMRSS at KMR.

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RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3360)
PE Title: Support Tech (U)

(U) FY 1996 Plans: None

(U) FY 1997 Plans: None

Acquisition Strategy: The 3360 (test resources) project for the Technology Development program provides support to Technology in the form of ground test facilities and test range instrumentation. In the selection and acquisition of test facilities and range instrumentation, the BMDO implements a Reliance process which a) maintains perspective of national technical test capabilities; b) is responsive to program requirements; c) uses existing test resources where possible; d) requires coordination prior to development of new resources; and e) consolidates management of existing resources where possible and practicable. This policy results in a variety of acquisition methods. Executing Agent Project Managers for the elements and tasks under this project include the three services and the BMDO, to take best advantage of existing strengths and capabilities. Service Project Manager organizations specifically include : the U.S. Army Space and Strategic Defense Command (USASSDC), the U.S. Navy Office of Naval Research, Navy Ballistic Missile Defense Technology and the U.S. Air Force Phillips Laboratory. The majority of the ground test facilities are government owned and operated, many with some degree of contractor support, which support multiple BMDO users.

B. (U) PROGRAM CHANGE SUMMARY:

	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	5,950	4,250	4,250	14,450
Appropriated Value		7,950			7,950
Adjustments to Appropriated Value		-0,987			(987)
Current Budget Submit	0	6,963	0	0	6,963

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3360)
PE Title: Support Tech (U)

Change Summary Explanation:

Funding: Project 3360 has combined all of the projects which have previously been designated 3310, 3311, and 3313. The FY95 RDT&E Descriptive Summary of these previous projects were combined in CDS 3300 with other test and evaluation support projects.

Schedule: None

Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:	Funding Dependency? (Yes[1]/No)
1151, Sensors, 0603871C	No
1155, Phenomenology Program, 0603871C	No
1161, Advanced Sensor Technology, 0603173C	No
1265, Boost Phase Interceptor, 0603870C	No
1267, Ground Base Interceptor, 0603871C	No
1270, Advanced Interceptors, 0603173C	No
1651, Innovative Science and Technology, 0602173C	No
2358, HAWK System BMC3, 0603863C	No
3157, Environmental, Siting and Fac, 0603173C	No
3354, Targets, 0603871C	No
3359, System Test and Evaluation, 0603871C	No
3360, Test Resources, 0603871C,72C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 03 (Advanced Development)

PE: 0603173C (Proj: 3360)
PE Title: Support Tech (U)

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

Milestones	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
KHILS WISP IOC								X								
Tunnel 9 Full Flight Dup IOC						X										
Tunnel 9 Phenomenology Support							X									
AOEC IOC							X									
AOEC AIT Support						X	---	---	---	---	---	---	---	---	---	---
AMOR KHILS Support								X	---	---	---	---	---	---	---	---
AMOR EKV Support								X								
POST Sensor Tech Support						X	---	---	---	---	---	---	---	---	---	---
CALM Sensor Tech Support					X	---	---	---	---	---	---	---				
Nrad Sensor Tech Support					X	---	---	---	---	---	---	---				
NIST IR Primary Standard						X	---	---	---	---	---	---				

Planned Milestones Beyond FY1997: NONE

THAAD System
PE 0208861C / 0603861C / 0604861C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C/0604861C (Proj: 2154)
PE Title: THAAD SYSTEM (U)

Project Number / Title: 2154 Theater Missile Defense Ground-Based Radar

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0208861C PROC	0	0	0	0	11,941	156,234	289,580	433,872	2,396M
0603861C RDT&E	235,705	171,828	162,558	8,188	0	0	0	0	732M
0604861C RDT&E	0	0	0	204,000	173,000	134,000	79,000	33,000	760M

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The Theater Missile Defense Ground-Based Radar (TMD-GBR) is the acquisition and fire control radar of the Theater High Altitude Area Defense (THAAD) weapon system. TMD-GBR is designed to provide threat early warning, threat type classification, interceptor fire control, external sensor cueing, launch and impact point estimates for the THAAD weapon system (project 2260). Also, the TMD-GBR is required to provide cueing support to other TMD systems such as PATRIOT. TMD-GBR is based on state-of-the-art solid-state X-band radar technologies. The TMD-GBR program will purchase one demonstration/validation (Dem/Val) radar and two User Operational Evaluation System (UOES) radars. The TMD-GBR Dem/Val radar will be used to support the initial radar integration and interceptor tests at White Sands Missile Range in FY1995, continuing radar characterization tests at U.S. Army Kwajalein Atoll in FY1996. At the end of the TMD-GBR Dem/Val program the Dem/Val radar and its associated equipment will be transferred to the National Missile Defense Radar Technology Demonstrator program. The UOES radars will continue integrated THAAD weapon system testing in FY1996 and be available for Limited User Tests and contingency deployments in FY1997. The engineering and manufacturing development program will expand the UOES performance characteristics to meet the ORD objective system requirements. Included in the TMD-GBR program is a solid state demonstration array (SSDA) program, concentrating on increased transmit/receive (T/R) module performance and producibility and maintaining the ability for competitive award of the EMD effort.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C/0604861C (Proj: 2154)
PE Title: THAAD SYSTEM (U)

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The TMD-GBR UOES completed its CDR in Dec 1993. T/R module production began in January 1994, and the TMD-GBR Block 1 software successfully entered DT&E in April 1994. The design entered factory system testing in July 1994, and is scheduled to begin delivery to White Sands Missile Range in March 1995.

(U) FY 1994 Accomplishments:

- ($ 87.700M) Complete TMD-GBR Dem/Val radar fabrication and begin factory string/system test.
- ($ 10.100M) Complete Build 1 and Build 2 of system software.
- ($ 6.000M) Complete TMD-GBR UOES CDR.
- ($128.400M) Begin TMD-GBR UOES fabrication.
- ($ 3.505M) Continue systems engineering analysis of radar performance, countermeasures, and integration into THAAD weapon systems.

(U) FY 1995 Plans:

- ($ 73.506M) Complete manufacturing of Dem/Val radar and continue fabrication and production of UOES Number 1 and 2 radars.
- ($ 61.045M) Continue development of advanced prime power units (PPU), SSDA, and other supporting technologies (fiber optic cable (FOCPAT), nuclear environment (OPINE), electronic countermeasures, and anti-radiation missiles (ARM)); provide for government and contractor program and logistics management support.

- o ($ 31.450M) Conduct factory integration testing; conduct radar testing at Ft. Devens; deliver TMD-GBR Dem/Val radar to WSMR; complete integration of Dem/Val radar at WSMR; begin flight testing with THAAD.
- o ($ 5.827M) Complete engineering design for TMD-GBR Dem/Val and UOES radars.

(U) FY 1996 Plans:

- o ($ 77.864M) Complete technology developments (SSDA, Advanced PPU, FOCPAT, OPINE, ARM) and transfer to EMD requirements; provide government and contractor program and logistics management; develop EMD requirements, request for proposal, prepare for source selection and support preparation for Milestone II in FY97
- o ($ 45.490M) Complete fabrication of UOES No. 1 and 2 radars.
- o ($ 35.432M) Complete factory string tests on UOES No. 1 and 2; deliver UOES No. 1 and 2 radars to WSMR; complete integration and support THAAD flight testing; conduct radar characterization tests at WSMR (RST-1) and USAKA (in conjunction with the Theater Critical Measurements Program (TCMP)).
- o ($ 3.772M) Provide system engineering support to THAAD flight tests and compare test results to predicted performance simulations.

(U) FY 1997 Plans:

- o ($ 63.122M) Begin piece part purchases and fabrication of EMD radars.
- o ($ 49.362M) Award EMD contract and begin objective system design engineering; conduct requirements and design reviews on objective GBR.
- o ($ 27.514M) Provide government and contractor program and logistics support of EMD program.
- o ($ 17.800M) Release EMD RFP, conduct source selection and support Milestone II Defense Acquisition Board; provide program management support on conclusion of Dem/Val.
- o ($ 23.606M) Complete Dem/Val flight test support; support THAAD limited user tests and UOES characterization tests.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C/0604861C (Proj: 2154)
PE Title: THAAD SYSTEM (U)

- o ($ 12.290M) Begin planning for Development, test & evaluation test program; purchase dedicated target for FY99 radar test.
- o ($ 8.188M) Monolithic Microwave Integrated Circuit producibility and yield improvements for EMD.
- o ($ 10.306M) Complete manufacturing of radar component spares and provide CLS for UOES radars.

Acquisition Strategy: A full and open competition resulted in the award of the GBR Family of Strategic and Theater Dem/Val radars contract to Raytheon Company on 17 September 1992. The Dem/Val phase includes the development and test of the TMD-GBR Dem/Val radar and two TMD-GBR UOES radars. A contract for the development and test of the TMD-GBR EMD radar and fourteen Production radars will be competitively awarded following a Milestone II decision in 1QFY97.

B. (U) PROGRAM CHANGE SUMMARY:

DEM/VAL:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	234,000	173,200	157,450	49,220	613,870
Appropriated Value		173,200			173,200
Adjustments to Appropriated Value		-1,372			(1,372)
Current Budget Submit	235,705	171,828	162,558	8,188	578,279

EMD:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	9,790	145,130	154,920
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	0	204,000	204,000

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C/0604861C (Proj: 2154)
PE Title: THAAD SYSTEM (U)

Change Summary Explanation:
Funding: This project was funded under Project 2104 in the FY95 President's Budget. For FY94 additional funds were transferred to TMD-GBR due to the contract overrun experienced by Raytheon. These funds were needed to maintain the contract schedule for the Dem/Val radar. In FY95, while Congress appropriated the full President's Budget request, they also made an undistributed reduction to the RDT&E appropriations. The $6.357M reduction was the TMD-GBR share of this amount. For FY97, an accounting error was made between the Dem/Val and EMD RDT&E program elements. An additional $42.100M will be reprogrammed in the FY97 President's Budget from EMD to Dem/Val for completion of the Dem/Val program.

Schedule: The Milestone II decision date slipped from 4QFY96 to 1QFY97 due to the THAAD program delay resulting from funding reductions in the FY95 Congressional appropriations for THAAD. The UOES #1 and #2 radars and the RST-1 and RST-2 radar tests have moved due to funding shortfalls in FY95. These shortfalls are the combined result of the FY95 Congressional reduction in RDT&E funds for DoD and contract overruns at Raytheon.

Technical: None

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:	Funding Dependency? (Yes[1]/No)
*1155, Phenemonology Program, 0603872C	Yes
*1161, Radar Survivability 0603872C	Yes
*1170, TMD Risk Reduction, 0603872C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C/0604861C (Proj: 2154)
PE Title: THAAD SYSTEM (U)

*3251, Sys Eng and Tech Support, 0603872C	Yes
*3261, BM/C3I, 0603872C	Yes
*3265, User Experiments, 0603864C/0604864C	Yes
*3354, Targets, 0603872C	Yes
*3359, System Test and Evaluation, 0603872C	Yes
*3157, Envir Siting & Facilities, 0603872C	Yes
*3260, Test Resources, 0603872C	Yes
*3352, Modeling and Simulation,	Yes
*2259, Israeli Cooperative Projects, 0603872C	Yes

* These projects provide essential technical, engineering, and/or infrastructure support to MDAP programs.

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone													Xm			
Engineering Milestone	Xuc	Xtr	Xsw				Xdv			Xu1		Xu2				
T&E Milestone								Xi			Xr1	Xr2				
Contract Milestone													Xe			
Other Program Events						Xt										

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C/0604861C (Proj: 2154)
PE Title: THAAD SYSTEM (U)

Xuc = UOES CDR Complete
Xdv = Dem/Val Radar Delivery
Xu1 = UOES Radar 1 Delivery
Xu2 = UOES Radar 2 Delivery
Xm = Milestone II
Xe = Engineering Manufacturing and Development Contract Award
Xtr = Begin T/R Module Production
Xi = Integration System Tests Start (with THAAD)
Xt = Testbed Radar Integration and Testing Complete
Xr1 = Radar System Test 1
Xr2 = Radar System Test 2
Xsw = Begin Software DT&E

Planned Milestones Beyond FY1997:

Milestone III	1QFY02
Production & Deployment	FY02

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 04 - Dem/Val

February 1995

Project and Title - 2154 TMD-GBR

P.E. Number: 0603861C
P.E. Title: THAAD System (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Prime Contract Development	194,764	97,976	92,016	2,817
b. Supporting Contracts Effort	23,555	41,444	33,024	4,408
c. Other Government Agencies	9,605	21,988	26,577	0
d. Program Management Support	7,781	10,420	10,941	963
Totals	235,705	171,828	162,558	8,188

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Raytheon	C CPIF/AF	SEP 92	428,013	451,902	94,431	194,764	92,991	92,016	2,817	0	477,019
Dynetics	C CPFF	FEB 93	21,195	21,195	1,121	2,650	5,000	5,000	0	0	13,771
TBE	C CPAF	APR 92	41,463	41,463	5,460	8,253	9,822	9,250	3,108	0	35,893
GTRI	SS COST	NOV 94	0	0	0	0	1,000	1,000	1,300	647	3,947
Colsa, Inc.	SS CPFF	JUN 89	16,530	16,530	2,192	3,976	5,362	5,000	0	0	16,530
Undetermined	C CPFF	NOV 95	0	0	0	0	4,985	1,000	0	0	5,985
WEC	CPIF	SEP 92	27,472	27,472	(7,245)	(14,550)	5,477	200	0	0	5,677
Undetermined	C CPFF	JUN 95	0	0	0	0	650	8,000	0	0	8,650
ESD/MIT-LL	SS COST	OCT 92	25,368	25,368	3,500	3,868	6,000	6,000	0	0	19,368
Belvoir	C CPFF	SEP 94	0	0	0	430	3,863	3,459	0	0	7,752
CECOM/MITRE	SS CPFF	OCT 92	7,561	7,561	1,111	1,450	2,100	2,500	0	0	7,161
Misc	C COST	DEC 93	0	0	1,570	10,648	19,474	12,492	0	0	44,184
T&E WSMR	C CPFF	OCT 93	7,270	7,270	0	870	3,000	3,200	0	0	7,070
STRICOM	C CPFF	MAR 95	0	0	0	0	1,684	2,500	0	0	4,184
M&S			0	0	0	7,781	10,420	10,941	963	0	30,105

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property HEMTT, M983 TRUCK	FFP	JUL 94			0	1,015	0	0	0	0	1,015
Support & Mgmt. Property											
Test & Eval. Property											

Subtotal Product Dev.					109,385	235,705	171,828	162,558	8,188	647	688,311
Subtotal Support & Mgmt.											
Subtotal Test & Evaluation											
Total Project					109,385	235,705	171,828	162,558	8,188	647	688,311

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 05 - EMD

February 1995

Project and Title - 2154 TMD-GBR

P.E. Number: 0604861C
P.E. Title: THAAD System (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Prime Contract Development	0	0	0	148,068
b. Supporting Contracts Effort	0	0	0	32,547
c. Other Government Agencies	0	0	0	15,078
d. Program Management Support	0	0	0	8,307
Totals	0	0	0	204,000

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Undetermined	C CPIF/AF	SEP 96			0	0	0	0	148,068	201,511	349,579
Undetermined	C CPIF/AF	MAR 97			0	0	0	0	7,000		7,000
CECOM	C CPFF	OCT 92	3,000	3,000	0	0	0	0	3,000		3,000
Belvior	C CPFF	SEP 94			0	0	0	0	2,078		2,078
ESD/MIT-LL	SS Cost	MAR 97			0	0	0	0	6,000		6,000
Misc	C Cost	MAR 97			0	0	0	0	13,405		13,405
T&E WSMR	C CPFF	OCT 96			0	0	0	0	4,000		4,000
Management Support					0	0	0	0	8,307		8,307
					0	0	0	0			
Dynetics	C CPFF	FEB 93			0	0	0	0	5,000	2,424	7,424
TBE	C CPAF	APR 92			0	0	0	0	6,142	0	6,142
Undetermined	C CPFF	NOV 95			0	0	0	0	1,000	3,000	4,000

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property											
Support & Mgmt. Property											
Test & Eval. Property											

Subtotal Product Dev.								0	204,000	206,935	410,935
Subtotal Support & Mgmt.											
Subtotal Test & Evaluation											
Total Project					0	0	0	0	204,000	206,935	410,935

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C / 0604861C (Proj: 2260)
PE Title: THAAD SYSTEM (U)

Project Number / Title: 2260 THAAD

Program Name:	FY1994 Actual	FY1995* Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0208861C PROC	0	0	0	0	0	489,599	426,906	342,321	5,143M
0603861C RDT&E	474,388	480,073	413,769	64,000	0	0	0	0	1,793M
0604861C RDT&E	0	0	0	460,000	665,000	485,100	133,000	53,000	1,974M
0604861C MILCON	0	0	13,600	4,700	18,000	4,900	0	0	43M

*See OTHER PROGRAM FUNDING SUMMARY section

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The THAAD system is being designed to negate theater ballistic missiles (TBM) at long ranges and high altitudes. Its long-range intercept capability will make possible the protection of broad areas, dispersed assets, and population centers against TBM attacks. THAAD combined with the Theater Missile Defense Ground-Based Radar (TMD-GBR), forms the THAAD system. The TMD-GBR (Project 2154) provides fire control and surveillance for the THAAD system. THAAD will be interoperable with both existing and future air defense systems. This netted and distributed Battle Management/Command, Control, Communications, Integration (BM/C3I) architecture will provide robust protection against the TBM threat spectrum. The THAAD element includes missiles, launchers, BM/C^{3}I units, and support equipment. THAAD is pursing integration of THAAD BM/C3I with the project, manager, Air Defense Command and Control System to take advantage of perivious Army devlopments that can be incorporated into the THAAD program.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C / 0604861C (Proj: 2260)
PE Title: THAAD SYSTEM (U)

(U) The Dem/Val program will develop a design for the objective THAAD system and demonstrate the capabilities of the system in a series of 14 flight tests. The residual hardware resulting from the THAAD demonstration/validation (Dem/Val) program will be used for a prototype "battalion" called the User Operational Evaluation System (UOES). The UOES will be used for early operational assessment, and for soldiers to influence the final desgin will also be available for limited use as a contingency capability during a national emergency. It is projected to consist of 40 missiles with 4 launchers, 2 BM/C3I units, 2 TMD-GBRs and support equipment. The objective system design will be developed and tested in the Engineering, Manufacturing, and Development (EMD) phase. This phase will lead to low rate initial production and subsequent fielding in 2002.

(U) During FY95 and FY96 the Dem/Val flight test program will be conducted at White Sands Missile Range (WSMR), New Mexico. The flight test schedule consists of 14 flights and system tests in 2QFY95. The targets for the flight test program will be developed under the Tactical Missile Defense (TMD) Targets contract (Project 3354). Integration and coordination with WSMR to facilitate initiation of flight tests are a high priority within the THAAD program.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) The THAAD program has continued the Dem/Val hardware and software design development and delivery in support of integration and acceptance testing for the first flight at WSMR. The first Ground Test Unit (GTU-01) was delivered to WSMR to support range integration/training activities. Four successful simulated hot launch tests have verified the canister launch environment. The BM/C3I hardware and initial software were delivered to Lockheed Missiles and Space Company's (LMSC)

Systems Integration Laboratory (SIL) for integration testing. The first flight kill vehicle is at WSMR undergoing final assembly and testing in preparation for the first flight in 2QFY95.

(U) FY 1994 Accomplishments

- o ($ 474.388M)
- o Successfully completed booster static firings and shroud separation testing.
- o Began TMD-GBR testbed integration testing and installed two processors into the SIL for Hardware-In-The-Loop testing.
- o Completed delivery of the Dem/Val interim launcher to WSMR.
- o Completed delivery of the initial palletized loading system truck and BM/C3I shelters to LMSC.
- o Completed FDR and FDRU
- o Conducted guidence & control testing
- o Conducted launcher & BM/C3I Brassboard Testing
- o Sensor handover requirements program underway
- o Evaluated Insb seeker design & completed prototype
- o Software code approval and release continuing

(U) FY 1995 Plans:

- o ($ 358.014M) Major Contract: Conduct missile flight test program. Begin THAAD system tests with TMD-GBR and launcher. Complete system requirements review. Complete system design review.
- o ($ 41.373M) Support Contracts: Continue software independent verification and validation. Continue nuclear environment survivability design analysis. Continue hit assessment, discrimination, and guidance, navigation and control algorithm development. Continue hit to kill test range lethality analysis. Continue environmental assessment of WSMR and potential EMD test ranges.

- o ($ 40.503M) GFE/Other: Complete infrastructure devlopment and begin flight test at WSMR. Begin Divert and Attitude Control System (DACS) propellant loading. Continue integration and testing of joint tactical information data systems, launch support, BM/C3I, weapon system deck model, and simulation efforts. Continue system threat vulnerability assessment. Maintain integrated logistics and product assurance efforts.
- o ($ 13.161M) In-house Support: Maintain government salaries, benefits, travel, and training.
- o ($ 18.322M) THAAD Dem/Val Targets: Continue development and delivery of targets to support THAAD and TMD-GBR flight tests. Maintain infrastructure to support TMD targets.
- o ($ 7.200M) THAAD Lethality Analysis: Continue sled testing for hit-to-kill analysis. Continue lethality simulation code validation.
- o ($ 1.500M) Operational Test and Evaluation

(U) FY 1996 Plans:

- o ($ 282.00M) Major Contract: Conduct system flight test program. Conduct system specification review. Exercise UOES missile option.
- o ($ 34.800M) Support Contracts: Continue nuclear environment survivability analysis. Continue software independent verification and validation. Continue environmental assessments. Continue lethality analysis. Continue algorithm development.
- o ($ 44.868M) GFE/Other: Continue range facility and flight test support and evlauation at WSMR. Continue DACS propellant loading. Continue integration and testing of joint tactical information data systems, launch support, BM/C3I, weapon system deck model, and simulation efforts. Continue system threat vulnerability assessment. Maintain integrated logistics and product assurance efforts.
- o ($ 14.285M) In-house Support: Maintain government salaries and benefits, travel, training.
- o ($ 3.981M) Essential Technologies: Continue lethality simulation code validation.

- o ($ 28.859M) THAAD Dem/Val Targets: Complete delivery of targets to support THAAD and TMD-GBR Dem/Val flight tests. Maintain infrastructure to support TMD targets.
- o ($ 4.976M) Continue GEL Propellant DACS risk reduction support.
- o ($ 13.600M) Military Construction

(U) FY 1997 Plans:

- o ($ 44.200M) Dem/Val: Conduct Milestone II DAB review. Complete analysis of system flight test data. Deliver UOES missiles.
- o ($ 460.000M) EMD: Begin developmental test and operation. Begin software maintenance. Award EMD contract.
- o ($ 3.500M) Essential Technologies: Complete lethality simulation code validation.
- o ($ 16.300M) THAAD EMD Targets: Begin development and delivery of targets to support THAAD and TMD-GBR EMD flight tests. Maintain infrastructure to support TMD targets.
- o ($ 4.677M) Military Construction

Acquisition Strategy: The Concept Definition phase, completed in 1992, involved three contractor teams and defined concepts and preliminary designs for the THAAD system. The THAAD Dem/Val contract was competitively awarded to Lockheed Missiles and Space Corporation in September 1992. The Dem/Val program will develop a design for the objective THAAD system and the contract contains an option for production of the UOES missiles which will be based on the design demonstrated in the Dem/Val flight test program. The EMD phase contract is expected to be a sole-source award to the Dem/Val contractor.

B. (U) PROGRAM CHANGE SUMMARY:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C / 0604861C (Proj: 2260)
PE Title: THAAD SYSTEM (U)

THAAD DEM/VAL:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	481,910	535,540	499,800	24,870	1,542,120
Appropriated Value		470,000			470,000
Adjustments to Appropriated Value		10,073			10,073
Current Budget Submit	474,388	480,073	413,769	64,000	1,432,230

THAAD EMD:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	0	0	403,300	403,300
Appropriated Value		0			0
Adjustments to Appropriated Value		0			0
Current Budget Submit	0	0	0	460,000	460,000

Change Summary Explanation:
Funding: This project was funded under Project 2210 in the FY95 Presidents Budget. Due to a loss of $18M in FY96 and $41.167M in FY97 resulting from the reduction in appropriations and undistributed budget cuts, the program cannot assure UOES deployability in FY97. The FY97 President's Budget will be realigned, to be consistent with current program execution plans for EMD and Dem/Val.

Schedule: The FY95 reduction in funding to $480.073 delays exercising the UOES missile option by one quarter to 1QFY96, reduces the number of test flights in FY95 from 5 to 4, and delays the completion of the Dem/Val contract and all subsequent milestones by one month.

Technical: Technical risk is increased by elimination/reduction of alternate/enhancing support technology programs due to funding constraints in supporting technology (PE 0603173C)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C / 0604861C (Proj: 2260)
PE Title: THAAD SYSTEM (U)

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:	Funding Dependency? (Yes[1]/No)
*1155, Phenemonology Program, 0603872C	Yes
*1161, Radar Survivability, 0603872C	Yes
*1170, TMD Risk Reduction, 0603872C	Yes
2154, Theater Missile Defense Ground-Based Radar, 0603862C	Yes
*3251, Systems Engineering and Technical Support, 0603872C	Yes
*3261, BM/C3I, 0603872C	Yes
*3265, CINC TMD Assessment Program/TMD/NMD User Interface 0603864C/0604864C	Yes
*3354, Targets, 0603872C	Yes
*3359, System Test and Evaluation, 0603872C	Yes
*3157, Environmental Siting & Facilities, 0603872C	Yes
*3260, Test Resources, 0603872C	Yes
*3352, Modeling and Simulation, 0603872C	Yes
*2259, Israeli Cooperative Projects, 0603872C	Yes

* These projects provide essential technical, engineering, and/or infrastructure support to MDAP programs.

These Programs Provide(d) Alternate/Enhancing Support Technologies to THAAD:
1270 Window Mechanical Properties

1270	GEL Divert Engine
1170	Advanced Electro-Optics
1151	ALIRT
1155	Optical Signature Code
1161	Electro-magnetic Environmental Effects
1651	Miniature Interceptor Technology
3160	Sapphire Window Production
1270	Advanced Composite Materials

Due to a reduction in technology support funding, all of these programs will be terminated in FY95.

(U) FY 1995 efforts totalling $27.022M that are funded in the Other TMD Activities Program Element (PE 0603872C) are included in the program element totals shown on this R-2 Exhibit.

Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

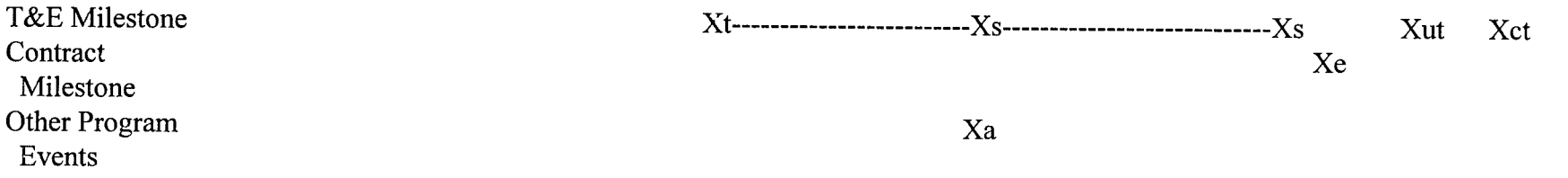
D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestone													Xm		Xd	Xp
Engineering Milestone	Xf		Xu			Xrr		Xdr/Xi			Xsr					

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603861C / 0604861C (Proj: 2260)
PE Title: THAAD SYSTEM (U)



Xm = Milestone II
Xd = UOES Delivery
Xf = Final Design Review
Xu = Final Design Review Update
Xt = Flight Testing Begins
Xs = System Testing
Xe = EMD Contract Award
Xrr = System Requirements Review
Xdr = System Design Review
Xsr = System Specifications Review
Xp = Preliminary Design Review
Xut = Limited User Testing
Xct = User Characterization Testing
Xa = UOES Option Award
Xi = Integrated System Tests (with TMD-GBR)

Planned Milestones Beyond FY1997:
1QFY02 = Milestone III
1QFY02 = First Unit Equipped
1Q FY99= CDR
3QFY99 = LRIP
2QFY01 = IOT&E

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 04 - Dem/Val

February 1995

Project and Title - 2260 THAAD

P.E. 0603861C
P.E. Title: THAAD System (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Prime Contract	349,559	358,014	282,000	61,000
b. OGAs	45,700	40,503	44,868	0
c. Support Contracts	33,670	41,373	34,800	0
d. Program Management	9,431	13,161	14,285	0
e. Targets	36,028	18,322	28,859	0
f. Lethality	0	7,200	0	0
g. OT&E	0	1,500	0	0
h. Essential Technologies	0	0	3,981	3,000
i. GEL Propellant DACS	0	0	4,976	0
TOTAL	474,388	480,073	413,769	64,000

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Development Organization											
LMSC	C/CPFF	SEP 92			337.0	349.6	358.0	282.0	61.0	0	1387.6
TEC MASTERS	C/CPFF	JUN 92			4.4	14.5	11.9	8.2	0	0	39.0
TACOM	MIPR	DEC 93			0	1.3	0	0	0	0	1.3
ESC	MIPR	NOV 93			0	13.3	0	1.0	0	0	14.3
Support & Management Organizations											
WSMR		DEC92			4.7	6.0	19.0	30.0	0	0	59.7
CRC	MIPR	Dec 92			7.4	14.2	21.3	13.0	0	0	55.9
OTHER	C/CPAF				13.4	28.473	36.273	37.361	3.0	0	118.51
Test & Evaluation Organizations											
MICOM	MIPR	FEB 92			0	0	4.3	8.2	0	0	12.5
ASGI	C/CPAF	JAN 94			0	1.9	0	0	0	0	1.9
OTHER					0	.1	3.0	3.0	0	0	6.1
OT&E											

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property											
Support & Mgmt. Property											
Test & Eval. Property											

Subtotal Product Dev.					341.4	378.7	369.9	291.2	61.0	0	1442.2
Subtotal Support & Mgmt.					25.5	48.673	76.573	80.361	3.0	0	234.107
Subtotal Test & Evaluation					0	2.0	7 3	11.2	0	0	20.5
Total Project					366.9	429.373	453.773	382.761	64.0	0	1696.807
Targets					0	36.028	17.6	29.0	0	0	82.628
Lethality					0	8.987	7.2	2.008	0	0	18.195
MILCON					0	0	0	(13.6)	0	0	(13.6)
OT&E					0	0	1.5	0	0	0	1.5
GRAND TOTAL					366,900	474,388	480,073	413,769	64,000	0	1799.130

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

Budget Activity 05 - EMD

February 1995

Project and Title - 2260 THAAD

P.E. 0604861C
P.E. Title: THAAD System (U)

A. Project Cost Breakdown (In Thousands)

Project Cost Categories	1994	1995	1996	1997
a. Prime Contract	0	0	0	357,600
b. OGAs	0	0	0	51,100
c. Support Contracts	0	0	0	36,200
d. Program Management	0	0	0	15,100
Totals	0	0	0	460,000

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Development Organization										TBD	TBD
TACOM		OCT 96							1.0		
LMSC	C/CPEF	SEP 96							357.6		
TEC-MASTERS		JUN 92							5.4		
ESC		OCT 96							15.5		
Support & Management Organizations											
WSMR											
Other		DEC 92							10.0		
CRC									33.5		
USAKA	MIPR	DEC 92							13.0		
Test & Evaluation Organizations									10.0		
MICOM											
Other		FEB 92							4.0		
									10.0		

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award Obligation Date	Performing EAC	Project Office EAC	Total Prior to 1994	Budget 1994	Budget 1995	Budget 1996	Budget 1997	Budget to Complete	Total Program
Product Dev. Property											
Support & Mgmt. Property MILCON											
Test & Eval. Property											

Subtotal Product Dev.					0	0	0	0	379,500		
Subtotal Support & Mgmt.					0	0	0	0	66,500		
Subtotal Test & Evaluation					0	0	0	0	14,000		
Total Project					0	0	0	0	460,000	891,325	1351,325
MILCON									(4,700)		(22.9)
OT&E									0	5,039	5.039
GRAND TOTAL									460,000	896,364	1356,364

Battle Management, Command, Control, Communications And Intelligence

(BM/C^{3}I)

PE 0208864C / 0603864C / 0604864C

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603864C/0604863C (Proj: 3261)
PE Title: TMD BM/C^{3}I (U)

Project Number / Title: 3261 BM/C^{3}I Concepts

Program Name:	FY1994 Actual	FY1995 Estimate	FY1996 Estimate	FY1997 Estimate	FY1998 Estimate	FY1999 Estimate	FY2000 Estimate	FY2001 Estimate	Total Program
0208864C PROC	0	0	32,242	20,300	60,931	0	0	0	Continuing
0603864C RDT&E	12,617	20,009	24,231	24,425	25,237	20,751	22,193	22,278	Continuing
0604864C RDT&E	0	534	14,301	17,976	25,977	20,861	29,201	29,314	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

(U) The primary mission of this project is to provide the warfighter with an integrated and interoperable TMD Battle Management/Command, Control, Communications, and Intelligence (BM/C3I) capability having the flexibility to meet a wide range of threats and expected needs. The BM/C3I architecture for TMD is built upon the existing command and control (C2) structure for Theater Air Defense (TAD) and adds the communications linking TMD C2 nodes, weapons, and sensors, and the TMD interfaces to intelligence systems and other supporting capabilities. The BMDO, from its joint perspective, uses this project to oversee independent weapon systems development and to provide guidance, standards, equipment, integration, and analysis to maximize the performance of a multitude of sensors, interceptors, and C2 nodes and to synergize their individual contributions to an integrated Joint theater-wide TMD system. BMDO has three major thrusts to the TMD BM/C3I program.

(U) The first thrust establishes the links and means for receipt and in-theater dissemination of launch warning information from space-based and intelligence systems external to TMD. This project supports the system engineering of their capability and prototype development of items such as gateways between National Technical Means and the Joint Data Network Some elements of this thrust

are funded separately under different programs such as the Joint Tactical Ground Station (JTAGS). This project focuses on the efforts to link these separate systems into the theater.

(U) The second thrust of the BM/C3I program focuses on the communication of information via the Joint Data Net and interoperability among systems. Interoperability includes both the communications equipment, links, and protocols and the common command and control procedures between different weapons systems to ensure a truly integrated theater-wide ballistic missile defense system. The cornerstone of TMD interoperability and the Joint Data Net is the Joint Tactical Information Distribution System (JTIDS) and the Tactical Data Information Link-JTIDS (TADIL-J) message format. This project builds upon existing TAD C2 networks to develop and implement new messages and links necessary for ballistic missile engagements. It includes the integration of JTIDS terminals into TBMD C2 platforms and the software upgrades necessary to utilize new TBMD information within the C2 systems. The significant increase in requested funding for FY96 reflects the increased activity associated with the initial procurement of JTIDS terminals for the Joint Data Net, the start of integrating terminals into multi-service platforms, and UOES implementation, this funding is critical for timely inter-Service interoperabiltiy.

(U) The third thrust of the BM/C3I program directs attention to the Service upgrades of C2 centers. Various command center upgrades are included in this project to reduce decision making time necessary to effectively engage ballistic missiles. Again, BMDO leverages off several existing Service funded theater air defense command center upgrades and this project funds only the specific TMD related aspects of these upgrades. BMDO's central direction and support of hardware and software developments will produce an integrated C2 capability for TMD.

(U) The effects of early warning, improved interoperability, integration, and command center upgrades on current and emerging TBMD doctrine are operationally analyzed through war games, simulation, and modeling to optimize the integrated Joint Theater Ballistic Missile Defense System in support of the Joint Forces Commander.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603864C/0604863C (Proj: 3261)
PE Title: TMD BM/C^{3}I (U)

(U) All of the efforts in this project are designed to provide a seamless interoperable architecture to provide timely warning and information necessary to reduce decision times and allow more opportunities to efficiently and effectively engage hostile missiles. The desired end result is to kill more missiles and reduce casualties to U.S. and friendly forces.

(U) This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) This project accomplished the following: The approval of the TADIL-J Interface Change Proposal (ICP) by the DoD Configuration Control Group; the formal introduction of the U.S. approved ICP to the NATO Allied Data System Interoperability Agency; initial analysis of correlation algorithm for the satellite broadcast systems disseminating TBMD messages; conducted the first joint Theater Missile Defense Wargame distributed simulation; demonstrated benefits of an Air Defense Command Post during joint exercises and completed the first phase of the TAD/TMD information exchange requirements needed for interoperability among the Services.

(U) FY 1994 Accomplishments:

- ($5.321M) BM/C3I Integration - Army: Began prototyping of Air Defense Command Post; demonstrated C2 connectivity to national assets; defined Information Exchange Requirements (IER) C4 systems.
- ($5.746M) BM/C3I Integration - Air Force: Demonstrated Operations Concept Demonstration (OCD) II and BM/C3I connectivity in Roving Sands 94 exercise; developed gateway concepts and conducted trade-offs; developed decision support aids for JFACC battle management.

- ($0.425M) BM/C3I Integration - Navy: Software Modifications to Simulation models for TMD Wargame Support; initiated the modeling of Navy Command and Control interfaces; defined IERs for C4 systems.
- ($1.125M) BM/C3I Integration - Joint/Combined: Conducted surveillance data fusion study; obtained Configuration Control Board approval of TMD message standard; initiated Tactical Information Broadcast Service (TIBS) correlation algorithm; applied open architecture approaches to TMD System Exerciser interfaces; initiated development of NATO TMD message standard; developed operational interfaces among TRAP/TIBS/CTPP message sets; conducted TMD wargame; initiated IERs for Theater Air Defense (TAD)/TMD Information Architecture (IA).

(U) FY 1995 Plans:

- ($6.767M) BM/C3I Integration - Army: Integrate prototype capabilities into Air Defense TOC weapon systems; automate existing TOC capabilities; develop communications needline analysis; develop a BM/C3I joint Service capabilities/interfaces document; support Data/Interface standardization activities for interoperability.
- ($6.822M) BM/C3I Integration - Air Force: Develop TMD intelligence support templates (intelligence preparation of the battlespace); develop TMD message software; develop implementation plan for TMD messages on USAF platforms; continue TMD automation under CTAPS; continue gateway software development and testing; support data/interface standardization activities for interoperability.
- ($2.780M) BM/C3I Integration - Navy: Develop implementation plan for TMD messages on Navy platforms; Begin C^2 trade studies for Navy lower tier; Software modification to Navy simulation models for TMD wargame support; Support data/interface standardization activities for interoperability.
- ($3.640M) BM/C3I Integration - Joint/Combined: Continue TMD wargame; obtain NATO approval of TMD message standard; develop Air Defense Data model extensions to the DoD C2 Core; standardize TAD/TMD data elements and interfaces; complete TAD/TMD process models "As Is " and dictionary of service terms; develop TAD/TMD process models

for C4 system upgrades; perform analysis of IA to set environments for wargame, exercises, and simulations; prepare a command and control plan in response to OSD TMD Comprehensive Analysis.

(U) FY 1996 Plans:

- ($14.301M) BM/C3I Integration - Army: Demonstrate lower tier/Joint interoperability; participate in systems integration testing; continue prototype integration into TMD weapons systems BM/C3I capabilities; continue TMD BM/C3 automation to include initial JTIDS integration.
- ($17.160M) BM/C3I Integration - Air Force: Start integration of JTIDS on multiple USAF platforms; prototype the decision support aids for JFACC battle management; complete gateway software development and testing; multi-sensor tracking algorithm development; implement situation targeting algorithms; develop, simulate, and demonstrate prototypes of the recommended CTAPS application for the distributed C2 nodes; update IERs and resolve interoperability issues.
- ($4.200M) BM/C3I Integration - Navy: Enhance evolution of JMCIS TBMD segments; refine definition of optimum C2 architecture; participate in Joint TMD war games; complete testing of JTIDS C2P modifications; begin development of ICD for AEGIS/JMCIS interface; begin implementation of TBMD modifications necessary for ACDS. The last two efforts are critical to maintain schedule with Aegis and ACDS.
- ($2.871M) BM/C3I Integration - Joint/Combined: Conduct NATO TMD wargame; conduct command and control (C2) tests to refine C2 procedures; conduct modeling and analysis of JTIDS network structure in support of TMD; support inter-Service integration efforts.

(U) FY 1997 Plans:

- ($17.976M) BM/C3I Integration - Army: Integrate JTIDS into Army systems; demonstrate enclave interoperability; Integrate UOES upper/lower tier; continue TMD Cell/TOC automation.

- o ($17.079M) BM/C3I Integration - Air Force: Integrate JTIDS into additional existing platforms; AOC/CRC upgrades for TMD.
- o ($3.500M) BM/C3I Integration - Navy: Continue evolution of JMCIS/TBMD segment; participate in TMD war game; participate in joint TBMD interoperability demonstrations; complete development and begin implementation for AEGIS/JMCIS interface; continue implementation of TBMD modifications necessary for ACDS.
- o ($3.846M) BM/C3I Integration - Joint/Combined: Conduct TMD wargame; conduct C^2 tests to refine C^2 procedures; conduct tests of operational JTIDS networks; begin software integration of TMD messages.

Acquisition Strategy: The acquisition strategy for this project is to leverage off existing system acquisition programs (which are subject to milestone decisions and testing) as much as possible and accomplish supporting tasks to satisfy BM/C3I performance requirements. A significant portion of this project entails systems engineering to bring together separately funded and managed projects so that all systems will be interoperable when they are fielded.

B. (U) PROGRAM CHANGE SUMMARY:

TMD-BMC3 DEM/VAL:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	12,567	33,500	20,129	20,925	87,121
Appropriated Value		20,676			20,676
Adjustments to Appropriated Value		-667			(667)
Current Budget Submit	12,617	20,009	24,231	24,425	81,282

TMD-BMC3 EMD:	FY1994	FY1995	FY1996	FY1997	TOTAL COST
Previous President's Budget	0	555	16,166	22,976	39,697

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603864C/0604863C (Proj: 3261)
PE Title: TMD BM/C^{3}I (U)

Appropriated Value		555			555
Adjustments to Appropriated Value		-21			(21)
Current Budget Submit	0	534	14,301	17,976	32,811

Change Summary Explanation:
Funding: This project was funded under Project 3211 in the FY95 President's Budget. FY95 Dem/Val funding was reduced $13M by Congress. FY95 funding was further reduced $.667M as a result of allocation of undistributed Congressional reductions. FY96 Procurement was increased by $32.4M with a similar decrease in FY97 to accelerate the procurement and fielding of JTIDS terminals for the Joint Data Net and to correspond with the Milestone III decision point for the terminal.
Schedule: Procurement and fielding of the JTIDS terminals were accelerated one year to coincide with the JTIDS production decision and to meet UOES schedules of supported projects.

Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

MILCON/Procurement: As listed on Page 1.

Related RDT&E:		Funding Dependency? (Yes[1]/No)	
1266	Navy Theater TBMD	0603216C	Yes
2154	TMD-GBR	0603861C/0604861C	Yes

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603864C/0604863C (Proj: 3261)
PE Title: TMD BM/C^{3}I (U)

2257	PATRIOT	0604865C/0208865	Yes
2260	THAAD	0603861C/0604861C	Yes
2262	Corps SAM	0603869C	Yes
2263	Navy Area TBMD	0603867C/0604867C	Yes
2358	HAWK System	0603863C/0604863C	Yes
2160	TMD Existing Systems	0603872C	Yes
3251	System Engineering and Technical Support	0603872C	Yes

[1]Funding data for related RDT&E efforts that have a funding dependency can be found in the respective project summary/program element.

D. (U) Schedule Profile

	FY1994				FY1995				FY1996				FY1997			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestones																
THAAD/JTAGS Needline Analysis								X								
JTIDS Implementation Plan			*													
JTIDS Validation									X							
JTIDS Integration (multi-platforms)												X				X
Gateway Prototype			*													
TADAP/TCTA Integration													X			
IPB Syria Study				*												

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit) Feb 1995

RDT&E, Defensewide / BA 04/05 (Dem/Val / EMD)

PE: 0603864C/0604863C (Proj: 3261)
PE Title: TMD BM/C^{3}I (U)

IPB Iran Study				X								
Distributed Battle Management												X
AEGIS C2 System Upgrade						X						
T&E Milestones												
Interoperability Certification Test Plan						X						
War Game	*		X			X			X			
C3I Integration Test						X			X			
System Integration Test							X					X
Contract Milestones												
JTIDS Procurement Contract						X						

BMDO Procurement Annex

BALLISTIC MISSILE DEFENSE ORGANIZATION

PROCUREMENT JUSTIFICATION

Exhibit P-1 Procurement Summary

PATRIOT Exhibits

BMC3I Exhibits

HAWK Exhibits

Sea Based TMD Exhibits

PROCUREMENT, DEFENSEWIDE

	$ in Thousands
FY 1997 Estimate	**$545,899**
FY 1996 Estimate	**$453,708**
FY 1995 Estimate	**$271,470**
FY 1994 Actual	**$120,115**

Ballistic Missile Defense Organization

Purpose and Scope of Work

These funds provide for the purchase of the latest technologically advanced systems for locating, identifying, tracking, and destroying ground launched ballistic missiles.

Justification of Funds

The FY 1996($453,708 thousand) funding is for the Patriot Missile system, the USMC HAWK system, TMD-BM/C^3I, and the Sea-Based Area Theater Ballistic Missile Defense effort.

The PATRIOT Advanced Capability (PAC)-3 program is a result of a series of integrated, phased system improvements in combination with PAC-3 missile which utilizes hit-to-kill technology. Modification to the system, which includes radar enhancements, communication upgrades and increased command, control, and computer capability, will increase PATRIOT's effectivity, survivability, flexibility of defense design, footprint and detection of smaller low radar cross section targets. The program includes funds for the PAC-3 Missile, Remote Launch, Communication Upgrades, and technical support costs.

The USMC HAWK funding will upgrade the HAWK system to provide for a Tactical Ballistic Missile Defense capability. This will include a Battery Command Post (BCP) upgrade, improved lethality missile upgrades, missile fuze modifications, north finding modules, air defense communication platforms, and AN/TPS-59 long range surveillance radar upgrades.

The TMB-BM/C^3I procurement provides JTIDS terminals as Government Furnished Equipment for integration into various TMD platforms.

The Sea-Based Area Theater Ballistic Missile Defense (TBMD) provides support equipment, training equipment, and simulation capabilities for shore based facilities and for advance planning, design, cost, and feasibility studies and ship integration impact to support the introduction and integration of Theater Ballistic Missile Defense capabilities in AEGIS cruisers (CG47) and destroyers (DDG51).

BALLISTIC MISSILE DEFENSE ORGANIZATION

FY 1996/1997 BIENNIAL BUDGET ESTIMATES

APPROPRIATION: 300 D PROCUREMENT, DEFENSEWIDE

February 1995

Line No	Nomenclature	Ident Code	FY 1994 Cost (Quantity)	FY 1995 Cost (Quantity)	FY 1996 Cost (Quantity)	FY 1997 Cost (Quantity)
BUDGET ACTIVITY 1: MAJOR EQUIPMENT						
	PATRIOT	--	120.115	253.272	399.463	413.608 (90)
	BMC3I	--	0	0	32.242	20.300
	HAWK	--	0	3.804	5.106	20.430
	Sea Based TMD Initiative	--	0	14.394	16.897	91.561 (36)
Total			120.115	271.470	453.708	545.899

BUDGET ITEM JUSTIFICATION SHEET						DATE February 1995					
APPROPRIATION/BUDGET ACTIVITY PROCUREMENT/ACTIVITY 2						P-1 ITEM NOMENCLATURE TMD - PATRIOT					
	Prior Years	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	To Complete	Total Program
QUANTITY	N/A	N/A	N/A	N/A	90	215	240	250	165	240	*1200*
COST (In Millions)	*98.9*	*120.1*	*253.3*	*399.5*	*413.2*	*485.3*	*422.6*	*468.0*	*270.9*	*410.3*	*3342.0*
Initial Spares (In M)					*0.4*	*0.9*	*1.0*	*1.1*	*1.1*	*0.7*	*5.2*
TOTAL (in Millions)	*98.9*	*120.1*	*253.3*	*399.5*	*413.6*	*486.2*	*423.6*	*469.1*	*272.0*	*411.0*	*3347.2*
Unit Cost (in Millions)					*4.6*	*2.3*	*1.8*	*1.9*	*1.6*	*1.7*	*2.8*

DESCRIPTION: The PATRIOT Advanced Capability (PAC)-3 program is a result of a series of integrated, phased system improvements in combination with the PAC-3 missile which utilizes hit-to-kill technology. Modification to the system, which includes radar enhancements, communication upgrades and increased command, control, and computer capability, will increase PATRIOT's effectivity, survivability, flexibility of defense design, footprint and detection of smaller low radar cross section targets.

JUSTIFICATION: The FY 96/97 program includes funds for the PAC-3 Missile, Remote Launch, Communication Upgrades, and technical support costs. Per Army/BMDO agreement support costs for the total PATRIOT system are shared by BMDO and Army.

	P-1 SHOPP LIST NO.	PAGE NO. 1 OF 3	EXHIBIT P-40

WEAPON SYSTEM COST ANALYSIS EXHIBIT (P-5)		A. Appropriation/Budget Activity Title/No. **PROCUREMENT/ ACTIVITY 2**		B. WEAPON MODEL/SERIES/POPULAR NAME **TMD - PATRIOT**		C. MANUFACTURER NAME PLANT CITY/STATE LOCATION			D. DATE Month/Year **February 1995**
Weapon System Cost Elements	Ident. Code	FY94 Unit Cost	Qty Total Cost	FY95 Unit Cost	Qty Total Cost	FY96 Unit Cost	Qty Total Cost	FY97 Unit Cost	Qty	FY97 Total Cost
MISSILE COMPONENTS										
SEEKER SECTION								661.444	90	59,530
ACS SECTION								299.722	90	26,975
MIDSECTION								369.111	90	33,220
SRM SECTION								76.778	90	6,910
AFT SECTION								47.244	90	4,252
CANISTER								86.652	23	1,993
SUBTOTAL MISSILE COMPONENTS										132,880
GROUND SUPPORT EQUIP COMPONENTS										
FIRE SOLUTION CONTROL (FSC)								67.000	6	402
MISSILE MANAGEMENT STATION (MMS)								519.929	14	7,279
SUBTOTAL MSL HARDWARE RECURRING										7,681
TOTAL HARDWARE RECURRING										140,561
NONRECURRING COSTS										18,322
SUPPORT COSTS										
CONTRACTOR ENGINEERING			31,368		30,219		27,305			27,549
SOFTWARE SUPPORT			23,783		22,783		20,587			20,832
GOVERNMENT SEPM			28,184		23,435		21,164			21,416
INTEGRATED LOGISTICS SUPPORT			13,490		13,851		12,602			12,752
NAMSA			0		5,775		5,387			5,451
DMPE			2,090		4,807		4,521			4,575
FIELDING			0		5,021		4,714			4,770
GROSS WEAPON SYSTEM COST			98,915		105,891		96,280			256,228
NET P-1 COST			98,915		105,891		96,280			256,228
MODS ACTIVITY 3			21,200		147,381		303,183			157,380
TOTAL PROGRAM COSTS			120,115		253,272		399,463			413,608

Exhibit P-5 Weapon System Cost Analysis

BUDGET PROCUREMENT HISTORY AND PLANNING EXHIBIT (P-5A)

A. DATE: February 1995

B. APPROPRIATION/BUDGET ACTIVITY: PROCUREMENT, DEFENSEWIDE

C. P-1 ITEM NOMENCLATURE: TMD - PATRIOT

LINE ITEM/ FISCAL YEAR	CONTRACTOR AND LOCATION	CONTRACT METHOD AND TYPE	CONTRACTED BY	AWARD DATE	DATE OF FIRST DELIVERY	QUANTITY	UNIT COST	SPECS AVAILABLE NOW	SPEC REV REQ'D	IF YES WHEN AVAIL
Missile Components		Sole Source	Army	FY1997		90	1,476,444	N/A		
Ground Support Equip		Sole Source	Army	FY1997		14	548,649	N/A		

D. REMARKS:

REPORTS CONTROL SYMBOL DD-COMP (AR) 1092	BUDGET ITEM JUSTIFICATION SHEET	DATE February 1995

APPROPRIATION/BUDGET ACTIVITY PROCUREMENT/ACTIVITY 3	P-1 ITEM NOMENCLATURE TMD - PATRIOT MODIFICATION

	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
QUANTITY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COST IN MIL	21.2	147.4	303.2	157.4	11.7	0.0	0.0	0.0

DESCRIPTION: Modification to PATRIOT radar in support of TMD that will increase PATRIOT effectivity, survivability, flexibility of defense design, footprint and detection of smaller low radar cross section targets. Modification of the launcher for increased survivability, reload, and to support the incorporation of the PAC-3 missile, and communication upgrades.

JUSTIFICATION: The funds in FY96/97 are to provide lower cross section radar capability, communication upgrades, and Remote Launch capability.

Modification/ MC No. DESC	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
1-91-03-1234 Operational	Radar Enhancements (QRP) 14							
1-92-03-1237 Operational	Communication Upgrade Phase I 7.2	23.8	15.4					
1-89-03-1231 Operational	Radar Phase III	123.6	198.0	80.5				
1-92-03-1238 Operational	CDI Phase III (HRR)		27.0	34.2	11.7			
1-92-03-1233 Operational	Remote Launch III		61.6	41.5				
1-93-03-1243 Operational	Command & Control		1.2	1.2				

	P-1 SHOPP LIST NO.	PAGE NO.	EXHIBIT P-40

February 1995

MODIFICATION INSTALLATION SUMMARY
TMD-PATRIOT Weapon Systems Modification

(TOA, DOLLARS IN MILLIONS)

SYSTEM/MODIFICATION	FY94 & PRIOR	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	TO COMP	TOTAL
RADAR ENHANCEMENTS (QRP)	55.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	55.300
COMMUNICATION UPGRADE PHASE I	7.200	23.814	15.392	0.000	0.000	0.000	0.000	0.000	0.000	46.406
RADAR PHASE III	0.000	123.566	198.000	80.500	0.000	0.000	0.000	0.000	0.000	402.066
CDI PHASE III (HRR)	0.000	0.000	27.000	34.200	11.700	0.000	0.000	0.000	0.000	72.900
REMOTE LAUNCH III	0.000	0.000	61.566	41.520	0.000	0.000	0.000	0.000	0.000	103.086
COMMAND & CONTROL	0.000	0.000	1.200	1.200	0.000	0.000	0.000	0.000	0.000	2.400
TOTAL	62.500	147.380	303.158	157.420	11.700	0.000	0.000	0.000	0.000	682.158

EXHIBIT P-3N

P1 Shopping List No

(1-91-03-1234) February 1995

MODIFICATION TITLE: RADAR ENHANCEMENT (QUICK RESPONSE PROGRAM)
MODELS OF SYSTEMS AFFECTED:
DESCRIPTION/JUSTIFICATION:

This task has the objective of improving PATRIOT's survivability and war fighting capabilities by incorporating enhancements into the Radar Set (RS) receiver. Overall benefits include a reduction in receiver noise and antenna sidelobe levels. These improvements will be accompanied by changes to the hardware in the Radar Set (AN/MPQ-53).

DEVELOPMENT STATUS: Complete

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Preliminary Design Review	4QFY91	4QFY91
Critical Design Review (CDR)	1QFY92	1QFY92
Contractor Test and Evaluation (CTE)	2QFY92	2QFY92
Development Test and Evaluation (DTE)	2QFY92	3QFY92
Initial Operational Test and Evaluation (IOTE)	4QFY93	4QFY93

FINANCIAL PLAN: ($M)	FY94 & PRIOR Qty	FY94 & PRIOR $	FY95 Qty	FY95 $	FY96 Qty	FY96 $	FY97 Qty	FY97 $	FY98 Qty	FY98 $	FY99 Qty	FY99 $	FY00 Qty	FY00 $	FY01 Qty	FY01 $	TO COMP Qty	TO COMP $	TOTAL Qty	TOTAL $
RDTE *FUNDING PROVIDED BY FY91 ARMY SUPPLEMENTAL*																				
PROCUREMENT	82	52.600																	82	52.600
INSTALLATION KITS																				
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
OTHER																				
INTERIM CONTRACTOR SUPPORT																				
INSTALLATION OF HARDWARE																				
FY92 & PRIOR EQUIPMENT (62 KITS)	62	2.000																	62	2.000
FY93 EQUIPMENT																				
FY94 EQUIPMENT (20 KITS)	20	0.700																	20	0.700
FY95 EQUIPMENT																				
FY96 EQUIPMENT																				
FY97 EQUIPMENT																				
FY98 EQUIPMENT																				
FY99 EQUIPMENT																				
FY00 EQUIPMENT																				
TO COMP EQUIPMENT																				
TOTAL INSTALLATION COST	82	2.700																	82	2.700
TOTAL PROCUREMENT COST	82	55.300																	82	55.300

METHOD OF IMPLEMENTATION: The modification will be applied in kit form by contractor level field teams in conjunction with scheduled CONUS & OCONUS Sweepdowns.
ADMINITRATIVE LEADTIME: 6 months lead time. PRODUCTION LEADTIME: 12 months lead time.

CONTRACT DATES: FY92 Jul 92 FY93 May 93 FY94 Jan 94
DELIVERY DATE: FY92 Jul 93 FY93 May 94 FY94 Mar 95

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT	41	12	12	5	12														82
OUTPUT	36	5	12	12	5	12													82

(1-92-03-1237) February 1995

MODIFICATION TITLE: COMMUNICATION UPGRADE PHASE I
MODELS OF SYSTEMS AFFECTED:
DESCRIPTION/JUSTIFICATION:

The communication upgrades includes the Routing Logic Radio Interface Unit Upgrade (RLRIU-U) and Joint Tactical Information Distribution System/Mobile Subscriber Equipment (JTIDS/MSE).

The Routing Logic Radio Interface Unit Upgrade (RLRIU-U) will replace the present RLRIU because of incompatibilities with the Mobile Subscribe Equipment (MSE). Advantage of the RLRIU-U include MSE capability, the ability to interface with the Joint Tactical Information Distribution System (JTIDS) terminals, provide synchronous digital outputs and has interfaces for remote sensors. The RLRIU-U will also allow a greater bandwidth which provides increased throughput.

DEVELOPMENT STATUS:

This modification provides for an upgrade to the interface between the EWCC and other communication subsystems. Decision Memorandum was signed in Aug 94. Contract award is scheduled for Nov 94.

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Preliminary Design Review	1QFY93	3QFY93
Critical Design Review	3QFY93	4QFY93
Contractor Test and Evaluation	2QFY94	
Development Test and Evaluation	1QFY95	
Initial Operational Test and Evaluation	N/A	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE *FUNDING PROVIDED BY DEPT. ARMY*																				
PROCUREMENT	3	6.900	11	22.714	7	14.692													21	44.306
INSTALLATION KITS																				
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
OTHER																				
INTERIM CONTRACTOR SUPPORT																				
INSTALLATION OF HARDWARE																				
FY92 & PRIOR EQUIPMENT																				
FY93 EQUIPMENT																				
FY94 EQUIPMENT (3 KITS)	3	0.300																	3	0.300
FY95 EQUIPMENT (11 KITS)			11	1.100															11	1.100
FY96 EQUIPMENT (7 KITS)					7	0.700													7	0.700
FY97 EQUIPMENT																				
FY98 EQUIPMENT																				
FY99 EQUIPMENT																				
FY00 EQUIPMENT																				
TO COMP EQUIPMENT																				
TOTAL INSTALLATION COST	3	0.300	11	1.100	7	0.700													21	2.100
TOTAL PROCUREMENT COST	3	7.200	11	23.814	7	15.392													21	46.406

METHOD OF IMPLEMENTATION: The modification will be applied in kit form by contractor level field teams in conjunction with scheduled CONUS & OCONUS Sweepdowns. Includes spares requirement.
ADMINITRATIVE LEADTIME: 3 months lead time. PRODUCTION LEADTIME: 12 months lead time.

CONTRACT DATES: FY94 JUL 94 FY95 APR 95 FY96 APR 96
DELIVERY DATE: FY94 JUL 95 FY95 APR 96 FY96 APR 97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT					1	2	2	3	3	3	3	3	1						21
OUTPUT						1	2	2	3	3	3	3	3	1					21

EXHIBIT P-3a COMMUNICATION UPGRADE PHASE I

February 1995

(1-89-03-1231)

MODIFICATION TITLE: RADAR PHASE III
MODELS OF SYSTEMS AFFECTED:
DESCRIPTION/JUSTIFICATION:

The objective of this modification is to increase the average power providing greater multifunction capability and increase the reliability and maintainability of the radar. Transmitter and receiver modifications will be made to the radar.

DEVELOPMENT STATUS: Initiated in FY91

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Preliminary Design Review	2QFY92	2QFY92
Critical Design Review (CDR)	3QFY93	3QFY93
Contractor Test and Evaluation (CTE)	4QFY94	
Development Test and Evaluation (DTE)	2QFY95	
Initial Operational Test and Evaluation (IOTE)	N/A	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE		62.799		7.700																70.499
PROCUREMENT			22	115.976	38	185.839	16	75.610											76	377.425
INSTALLATION KITS																				
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
OTHER																				
INTERIM CONTRACTOR SUPPORT																				
INSTALLATION OF HARDWARE																				
FY92 & PRIOR EQUIPMENT																				
FY93 EQUIPMENT																				
FY94 EQUIPMENT																				
FY95 EQUIPMENT (22 KITS)			22	7.590															22	7.590
FY96 EQUIPMENT (38 KITS)					38	12.161													38	12.161
FY97 EQUIPMENT (16 KITS)							16	4.890											16	4.890
FY98 EQUIPMENT																				
FY99 EQUIPMENT																				
FY00 EQUIPMENT																				
TO COMP EQUIPMENT																				
TOTAL INSTALLATION COST			22	7.590	38	12.161	16	4.890											76	24.641
TOTAL PROCUREMENT COST			22	123.566	38	198.000	16	80.500											76	402.066

METHOD OF IMPLEMENTATION: The modification will be applied in kit form by contractor level field teams in conjunction with scheduled CONUS & OCONUS Sweepdowns.
ADMINITRATIVE LEADTIME: 5 months lead time. PRODUCTION LEADTIME: 22 months lead time.

CONTRACT DATES: FY95 JUL 95 FY96 APR 96 FY97 APR 97
DELIVERY DATE: FY95 JUN 97 FY96 MAR 98 FY97 MAR 99

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE *	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT												4	6	6	6	9	9	36	76
OUTPUT													4	6	6	6	9	45	76

*THE SCHEDULED INPUT/OUTPUT BEYOND FY1998 IS NOT KNOWN

(1-92-03-1238) February 1995

MODIFICATION TITLE: CDI PHASE III (HRR)
MODELS OF SYSTEMS AFFECTED:
DESCRIPTION/JUSTIFICATION:

This is the final phase of the Classification, Discrimination, and Identification (CDI) Program. CDI Phase III involves the integration of state-of-the-art High Range Resolution (HRR) technology into the PATRIOT radar. This capability will provide for TBM/debris discrimination and categorization of ABTs.

DEVELOPMENT STATUS: Initiated in FY93

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Preliminary Design Review	2QFY94	2QFY94
Critical Design Review (CDR)	1QFY95	
Configuration Developmental Test and Evaluation (CDTE)	3QFY95	
Development Test and Evaluation (DTE)	1QFY96	
Follow-on Operational Test and Evaluation (FOTE)	N/A	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE		45.670		18.620		20.340														84.630
PROCUREMENT																				
INSTALLATION KITS					22	25.650	38	32.490	16	11.115									76	69.255
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
OTHER																				
INTERIM CONTRACTOR SUPPORT																				
INSTALLATION OF HARDWARE																				
FY92 & PRIOR EQUIPMENT																				
FY93 EQUIPMENT																				
FY94 EQUIPMENT																				
FY95 EQUIPMENT																				
FY96 EQUIPMENT (22 KITS)					22	1.350													22	1.350
FY97 EQUIPMENT (38KITS)							38	1.710											38	1.710
FY98 EQUIPMENT (16 KITS)									16	0.585									16	0.585
FY99 EQUIPMENT																				
FY00 EQUIPMENT																				
TO COMP EQUIPMENT																				
TOTAL INSTALLATION COST					22	1.350	38	1.710	16	0.585									76	3.645
TOTAL PROCUREMENT COST					22	27.000	38	34.200	16	11.700									76	72.900

METHOD OF IMPLEMENTATION: The modification will be applied in kit form by contractor level field teams in conjunction with scheduled CONUS & OCONUS Sweepdowns.
ADMINITRATIVE LEADTIME: 5 months lead time. PRODUCTION LEADTIME: 18 months lead time.

CONTRACT DATES: FY96 JUN 98 FY97 Jun 98
DELIVERY DATE: FY96 JAN 98 FY97 Jan 99

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE*	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT															4	6	9	57	76
OUTPUT																4	6	66	76

*THE INPUT/OUTPUT SCHEDULE BEYOND FY1998 IS NOT KNOWN

EXHIBIT P-3a COI PHASE III

(1-92-03-1233) February 1995

MODIFICATION TITLE: REMOTE LAUNCH III
MODELS OF SYSTEMS AFFECTED:
DESCRIPTION/JUSTIFICATION:

The Communication upgrade Phase II and Remote Launch effort focuses on improving communications at the "below" battalion level through the introduction of TADIL-J, new switching equipment and a new communications processor at the battery level in conjunction with at conversation to Band IV UHF throughout the battalion. Additionally, the project will develop and field a remote launch capability permitting emplacement of a remote launcher farm in excess of 30 Km from the parent ECS. This project is required to meet PAC-3 requirements for increased battlespace, lethality and rate of fire, additionally ORD requirements for interoperability and communications are satisfied by this effort.

DEVELOPMENT STATUS: Ongoing

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Preliminary Design Review	1QFY95	
Critical Design Review (CDR)	3QFY95	
Contractor Test and Evaluation (CTE)	4QFY95	
Development Test and Evaluation (DTE)	3QFY96	
Initial Operational Test and Evaluation (IOTE)	N/A	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE		10.823		20.880		0.600														32.303
PROCUREMENT					108	58.666	73	40.020											181	98.686
INSTALLATION KITS																				
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
OTHER																				
INTERIM CONTRACTOR SUPPORT																				
INSTALLATION OF HARDWARE																				
FY92 & PRIOR EQUIPMENT																				
FY93 EQUIPMENT																				
FY94 EQUIPMENT																				
FY95 EQUIPMENT																				
FY96 EQUIPMENT (36 KITS)					108	2.900													108	2.900
FY97 EQUIPMENT (24 KITS)							73	1.500											73	1.500
FY98 EQUIPMENT																				
FY99 EQUIPMENT																				
FY00 EQUIPMENT																				
TO COMP EQUIPMENT																				
TOTAL INSTALLATION COST					108	2.900	73	1.500											181	4.400
TOTAL PROCUREMENT COST					108	61.566	73	41.520											181	103.086

METHOD OF IMPLEMENTATION: The PATRIOT Communication Upgrades modification will be performed by a contractor modification team.
ADMINITRATIVE LEADTIME: 3 months lead time. PRODUCTION LEADTIME: 18 months lead time.

CONTRACT DATES: FY95 ____ FY96 2Q96 FY97 2Q97
DELIVERY DATE: FY95 ____ FY96 4Q97 FY97 4Q98

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE*	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT													13	27	27	27	27	60	181
OUTPUT														13	27	27	27	87	181

*THE INPUT/OUTPUT SCHEDULE BEYOND FY1998 IS NOT KNOWN

(1-93-03-1243) February 1995

MODIFICATION TITLE: COMMAND & CONTROL
MODELS OF SYSTEMS AFFECTED:
DESCRIPTION/JUSTIFICATION:

Command & Control of PATRIOT battalion elements. Planning and initialization of the ICC and Fire Units. Provides enhanced capability to plan & support Air Defense operations.

DEVELOPMENT STATUS: Initiated in FY92

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Preliminary Design Review	N/A	
Critical Design Review (CDR)	N/A	
Contractor Test and Evaluation (CTE)	3QFY95	
Development Test and Evaluation (DTE)	N/A	
Initial Operational Test and Evaluation (IOTE)	N/A	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT					5	0.990	5	0.990											10	1.980
INSTALLATION KITS																				
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
OTHER																				
INTERIM CONTRACTOR SUPPORT																				
INSTALLATION OF HARDWARE																				
FY92 & PRIOR EQUIPMENT																				
FY93 EQUIPMENT																				
FY94 EQUIPMENT																				
FY95 EQUIPMENT																				
FY96 EQUIPMENT					5	0.210													5	0.210
FY97 EQUIPMENT (24 KITS)							5	0.210											5	0.210
FY98 EQUIPMENT																				
FY99 EQUIPMENT																				
FY00 EQUIPMENT																				
TO COMP EQUIPMENT																				
TOTAL INSTALLATION COST					5	0.210	5	0.210											10	0.420
TOTAL PROCUREMENT COST					5	1.200	5	1.200											10	2.400

METHOD OF IMPLEMENTATION: The modification will be applied in kit form by contractor level field teams in conjunction with scheduled CONUS & OCONUS Sweepdowns.
ADMINITRATIVE LEADTIME: 5 months lead time. PRODUCTION LEADTIME: 5 months lead time.

CONTRACT DATES: FY96 MAY 96 FY97 MAY 97
DELIVERY DATE: FY96 OCT 96 FY97 OCT 97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT										1	1	1	2	2	1	1	1		10
OUTPUT										1	1	1	2	2	1	1	1		10

REPORTS CONTROL SYMBOL	BUDGET ITEM JUSTIFICATION SHEET	DATE February 1995

APPROPRIATION/BUDGET ACTIVITY PROCUREMENT, DEFENSE WIDE	P-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS)	BMC3I

	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
QUANTITY								
COST IN MIL	0.0	0.0	32.242	20.300	60.931	0.0	0.0	0.0

DESCRIPTION: This procurement provides JTIDS terminals as Government Furnished Equipment for integration into various TMD platforms. The funds will be provided to the services and JTIDS Joint Program Office as the procurring activity via MIPR. These funds will be combined with other service and program funds to create a single contract buy at economical production rate. Procurement from this single budget line ensures a single configuration of the terminal for all platforms.

JUSTIFICATION: The JTIDS terminal and the Tactical Data Link-JTIDS (TADIL-J) are the cornerstones for TMD interoperability. These terminals will participate in the Joint Data Net to share early warning and cueing information with multiple interservice platforms. This interoperability will allow detection and tracking of targets at greater ranges and increase potential for multiple engagements and a higher probability of kill.

	P-1 SHOPPING LIST NO.	PAGE NO. 1 OF 1	EXHIBIT P-40

PROGRAM COST BREAKDOWN (P-5)

A. DATE: February 1995

B. APPROPRIATION/BUDGET ACTIVITY: OTHER PROCUREMENT, BMDO

C. P-1 ITEM NOMENCLATURE: BMC3I — Joint Tactical Information Distribution System (JTIDS)

COST CODE	ELEMENT OF COST	IDENT CODE	TOTAL COST IN THOUSANDS OF DOLLARS							
			FY 1994		FY 1995		FY 1996		FY 1997	
			QTY	TOTAL COST	QTY	TOTAL COST	QTY	TOTAL COST	QTY	TOTAL COST
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	JTIDS TERMINALS							32.242		20.300
	TOTAL							32.242		20.300

D. REMARKS:

BMDO Controlled resources only

BUDGET PROCUREMENT HISTORY AND PLANNING EXHIBIT (P-5A)

A. DATE: February 1995

B. APPROPRIATION/BUDGET ACTIVITY: PROCUREMENT, DEFENSEWIDE

C. P-1 ITEM NOMENCLATURE: BMC3I Joint Tactical Information Distribution System (JTIDS)

LINE ITEM/ FISCAL YEAR	CONTRACTOR AND LOCATION	CONTRACT METHOD AND TYPE	CONTRACTED BY	AWARD DATE	DATE OF FIRST DELIVERY	QUANTITY	UNIT COST	SPECS AVAILABLE NOW	SPEC REV REQ'D	IF YES WHEN AVAIL
JTIDS FY96	General Electric Corp Electronic Systems Corp Wayne, NJ	SS/FP	USAF	Nov-95	Nov-97			Yes	No	
JTIDS FY97	General Electric Corp Electronic Systems Corp Wayne, NJ	SS/FP	USAF	May-97	Nov-98			Yes	No	

D. REMARKS:

P-1 SHOPPING LIST

	BUDGET ITEM JUSTIFICATION SHEET	DATE FEBRUARY 1995
APPROPRIATION/BUDGET ACTIVITY: PROCUREMENT, DEFENSEWIDE/BUDGET ACTIVITY 1	P-1 ITEM NOMENCLATURE HAWK MODIFICATIONS (TMD)	

		FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
QUANTITY									
COST IN MIL		0.0	3.804	5.106	20.430	0.0	0.0	0.0	0.0

DESCRIPTION: This is a roll-up line to upgrade the USMC HAWK Missile system an AN/TPS-59 Long Range Surveillance Radar to provide for a Tactical Ballistic Missile Defense capability.

JUSTIFICATION:

1) BCP UPGRADE:
Procurement of modification kits to Upgrade the Battery Command Post (BCP) to accept Tactical Ballistic Missile (TBM) data from the Air Defense Communications Platform (ADCP) Hardware/Software to allow the HAWK to engage short range TBMs providing the USMC a point defense capability.

2) IMPROVED LETHALITY MISSILE UPGRADES:
Replacement of the current missile warhead and fuze is required to increase HAWK lethality against TBMs. These modification kits will be installed in the HAWK Missile.

3) MISSILE FUZE MODIFICATIONS:
An ECP to the current ILM fuze is required to further increase probability of kill against various range TBMs.

4) NORTH FINDING MODULES:
This modification procures off-the-shelf North Finding Modules for accurate position location capability for the HAWK and AN/TPS-59 modifications.

5) AIR DEFENSE COMMUNICATION PLATFORMS:
Procurement of a Communications Platform comprised of COTS/GOTS for receipt, filtration, correlation and dissemination of TBM target data from local and remote sensor input (to include limited JTIDS capability) for target acquistion.

6) AN/TPS-59 LONG RANGE SURVEILLANCE RADAR UPGRADES:
This modification procures the improved ballistic missile detection and tracking capabilities improving the probability of detection of low radar cross section (RCS) targets, and improving reliability and transportability.

	P-1 SHOPPING LIST NO.	PAGE NO. 1 OF 1	EXHIBIT P-40

February 1995

MODIFICATION INSTALLATION SUMMARY
HAWK Modifications (TMD)

(TOA, DOLLARS IN MILLIONS)

SYSTEM/MODIFICATION	FY94 & PRIOR	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	TO COMP	TOTAL
BAT CMD POST UPGRADE	0.000	1.330	1.345	0.000	0.000	0.000	0.000	0.000	0.000	2.675
ILM UPGRADE	0.000	1.941	1.941	0.000	0.000	0.000	0.000	0.000	0.000	3.882
MISSILE FUZE MOD	0.000	0.533	0.533	0.000	0.000	0.000	0.000	0.000	0.000	1.066
NORTH FINDING MODULE	0.000	0.000	1.197	1.197	0.000	0.000	0.000	0.000	0.000	2.394
AIR DEFENSE COMM PLTFM	0.000	0.000	0.090	4.553	0.000	0.000	0.000	0.000	0.000	4.643
AN/TPS-59	0.000	0.000	0.000	14.680	0.000	0.000	0.000	0.000	0.000	14.680
TOTAL	0.000	3.804	5.106	20.430	0.000	0.000	0.000	0.000	0.000	29.340

EXHIBIT P-3N
PAGE 1 OF 1

P1 Shopping List No.

February 1995

MODIFICATION TITLE: BCP UPGRADE
MODELS OF SYSTEMS AFFECTED: BATTERY COMMAND POST (BCP) HAWK SYSTEM (ID #02626C)
DESCRIPTION/JUSTIFICATION:

The modifications being made under this title are hardware and software changes in the existent fielded system to allow the BCP to accept TBM information from a sensor, process the information, and acquire the target TBM.

DEVELOPMENT STATUS:

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
Contract Award		2/93
Development		2/93 - 12/93
Integration and Testing		1/94 - 4/94
Milestone III		7/94
Production	12/94 - 2/96	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT																				
INSTALLATION KITS			12	1.180	13	1.195													25	2.375
INSTALLATION KITS NON-RECURRING																				
INSTALLED EQUIPMENT RECURRING																				
INSTALLED EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT				0.100		0.100														0.200
SUPPORT EQUIPMENT				0.050		0.050														0.100
TOTAL PROCUREMENT COST			12	1.330	13	1.345													25	2.675

METHOD OF IMPLEMENTATION: The modification will be depot installed.
ADMINITRATIVE LEADTIME: PRODUCTION LEADTIME:

CONTRACT DATES: FY95 Oct 94 FY96 FY97
DELIVERY DATE: FY95 Oct 95 FY96 FY97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT*																			
CY (FY94)																			
BY(FY95)		4	4	4	5														17
BY+1(FY96)						4	4												8
OUTPUT																			
CY (FY94)																			
BY(FY95)			4	4	4														12
BY+1(FY96)						5	4	4											13

Contract for all kits awarded Oct 94
* Kits will be installed during Depot Master Work Schedule.

February 1995

MODIFICATION TITLE: HAWK IMPROVED LETHALITY MISSILE (ILM) UPGRADES
MODELS OF SYSTEMS AFFECTED: HAWK ILM MISSILES
DESCRIPTION/JUSTIFICATION:

This modification upgrades the missile warhead to provide an increased probability of kill against various range TBMs.

DEVELOPMENT STATUS/MAJOR MILESTONES:	PLANNED	ACCOMPLISHED
ECP (ARMY) Approval		4QFY92
Procurement	1QFY95	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT																				
INSTALLATION KITS			350	1.941	350	1.941													700	3.882
INSTALLATION KITS NON-RECURRING																				
INSTALLED EQUIPMENT RECURRING																				
INSTALLED EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
TOTAL PROCUREMENT COST			350	1.941	350	1.941													700	3.882

METHOD OF IMPLEMENTATION: The modification will be DEPOT INSTALLED.
ADMINITRATIVE LEADTIME: PRODUCTION LEADTIME:

CONTRACT DATES: FY95 Oct94 FY96 FY97
DELIVERY DATE: FY95 Apr95 FY96 FY97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT																			
CY (FY94)																			
BY(FY95)		88	88	88	86														350
BY+1(FY96)						88	88	88	86										350
OUTPUT																			
CY (FY94)																			
BY(FY95)			88	88	88														264
BY+1(FY96)						86	88	88	88										350
BY+1(FY97)										86									86

*Kits will be installed during missile rebuild/shelf life replacement master work schedule.

Contract award for all kits awarded Oct 94

February 1995

MODIFICATION TITLE: MISSILE FUZE MODIFICATION
MODELS OF SYSTEMS AFFECTED: HAWK MISSILE
DESCRIPTION/JUSTIFICATION:

This modification is to the current ILM fuze to allow for increased probability of kill against various range TBMs.

DEVELOPMENT STATUS:

MAJOR DEVELOPMENT MILESTONES:	PLANNED	ACCOMPLISHED
ECP Approval		3QFY94
Production	1QFY95	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT																				
INSTALLATION KITS			500	0.400	500	0.400													1000	0.800
INSTALLATION KITS NON-RECURRING				0.133		0.133														0.266
INSTALLED EQUIPMENT RECURRING																				
INSTALLED EQUIPMENT NONRECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
TOTAL PROCUREMENT COST			500	0.533	500	0.533													1000	1.066

METHOD OF IMPLEMENTATION: This modification will be depot installed.
ADMINITRATIVE LEADTIME: PRODUCTION LEADTIME:

CONTRACT DATES: FY95 Oct 94 FY96 FY97 -
DELIVERY DATE: FY95 Apr 95 FY96 FY97 -

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT*																			
CY (FY94)																			
BY(FY95)		125	125	125	125														500
BY+1(FY96)						125	125	125	125										500
OUTPUT																			
CY (FY94)																			
BY(FY95)			125	125	125														375
BY+1(FY96)						125	125	125	125										500
BY+2(FY97)										125									125

* Kits will be installed as an ECP with the ILM mod on the Master Work Schedule. Contract for all kits awarded Oct 94.

February 1995

MODIFICATION TITLE: HAWK NORTH FINDING MODULES (NFM)
MODELS OF SYSTEMS AFFECTED: HAWK SYSTEM
DESCRIPTION/JUSTIFICATION:

This modification procures off the shelf north finding modules for improving the position locating capability for the HAWK TBM system.

DEVELOPMENT STATUS/MAJOR MILESTONES:	PLANNED	ACCOMPLISHED
Procurement	1QFY96	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT																				
INSTALLATION KITS					21	1.197	21	1.197											42	2.394
INSTALLATION KITS NON-RECURRING																				
INSTALLED EQUIPMENT RECURRING																				
INSTALLED EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
TOTAL PROCUREMENT COST					21	1.197	21	1.197											42	2.394

METHOD OF IMPLEMENTATION: The modification will be depot installed.
ADMINITRATIVE LEADTIME: PRODUCTION LEADTIME:

CONTRACT DATES: FY96 Oct 96 FY97
DELIVERY DATE: FY96 Apr 97 FY97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT																			
CY (FY95)																			
BY(FY96)							7	7	7										21
BY+1(FY97)										7	7	7							21
OUTPUT																			
CY (FY95)								7	7										14
BY(FY96)										7	7	7	7						28
BY+1(FY97)																			

Contract for all kits will be awarded Oct 95.

February 1995

MODIFICATION TITLE: AIR DEFENSE COMMUNICATIONS PLATFORM (ADCP) TMD VARIANT
MODELS OF SYSTEMS AFFECTED: ADCP
DESCRIPTION/JUSTIFICATION:

This modification provides the communications capability required to provide AN/TPS-59 cueing data to the HAWK system and to other interceptor systems via the JTIDS.

DEVELOPMENT STATUS/MAJOR MILESTONES:	PLANNED	ACCOMPLISHED
Milestone II	1QFY95	
Milestone III	4QFY96	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT																				
INSTALLATION KITS					LLI	0.090	10	4.553											10	4.643
INSTALLATION KITS NON-RECURRING																				
INSTALLED EQUIPMENT RECURRING																				
INSTALLED EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT																				
TOTAL PROCUREMENT COST						0.090	10	4.553											10	4.643

METHOD OF IMPLEMENTATION: This modification will be performed by a contractor modification team.
ADMINITRATIVE LEADTIME: PRODUCTION LEADTIME:

CONTRACT DATES: FY95 ____ FY96 FY97 Dec 97
DELIVERY DATE: FY95 ____ FY96 FY97 Jun 97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT																			
CY (FY95)																			
BY(FY96)																			
BY+1(FY97)										1	3	3	3						10
OUTPUT																			
CY (FY95)																			
BY(FY96)																			
BY+1(FY97)												4	3						7
BY+2(FY98)														3					3

February 1995

MODIFICATION TITLE: AN/TPS-59 UPGRADES
MODELS OF SYSTEMS AFFECTED: AN/TPS-59
DESCRIPTION/JUSTIFICATION:

This modification includes adding a ballistic missile detection and tracking capability, increasing the detection probability on low radar cross section (RCS) targets, and improving overall system reliabilit Initiated in FY92

DEVELOPMENT STATUS/MAJOR MILESTONES:	PLANNED	ACCOMPLISHED
Milestone III	4QFY96	

FINANCIAL PLAN: ($M)	FY94 & PRIOR		FY95		FY96		FY97		FY98		FY99		FY00		FY01		TO COMP		TOTAL	
	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$	Qty	$
RDTE																				
PROCUREMENT*							6	14.000											6	14.000
INSTALLATION KITS																				
INSTALLATION KITS NON-RECURRING																				
EQUIPMENT																				
EQUIPMENT NON-RECURRING																				
ENGINEERING CHANGE ORDERS																				
DATA																				
TRAINING EQUIPMENT																				
SUPPORT EQUIPMENT								0.680												0.680
TOTAL PROCUREMENT COST							6	14.680											6	14.680

* Majority of procurement funding from USMC. Quantities and $s reflect allocated share.
See USMC, C1067 em\nd PMC, AN/TPS-59

METHOD OF IMPLEMENTATION: The modification will be applied in kit form by contractor level field teams in conjunction with scheduled CONUS & OCONUS Sweepdowns.
ADMINITRATIVE LEADTIME: 5 months lead time. PRODUCTION LEADTIME: 5 months lead time.

CONTRACT DATES: FY95 ____ FY97 May 97
DELIVERY DATE: FY95 ____ FY97 Dec 97

INSTALLATION SCHEDULE:

	FY94 & PR	FY 95				FY 96				FY 97				FY 98				TO COMPLETE	TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
INPUT																			
CY (FY95)																			
BY(FY96)																			
BY+1(FY97)											3	3							6
OUTPUT																			
CY (FY95)																			
BY(FY96)																			
BY+1(FY97)													3	3					6
BY+2(FY98)																			

EXHIBIT P-3a AN/TPS-59

BUDGET ITEM JUSTIFICATION SHEET						DATE February 1995					
APPROPRIATION/BUDGET ACTIVITY PROCUREMENT, DEFENSEWIDE						P-1 ITEM NOMENCLATURE Sea-Based Area Theater Missile Defense Initiative					
	Prior Years	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	To Complete	Total Program
QUANTITY (NAVY)	N/A				36	62	95	99	97		
QUANTITY (BMDO)					0	19	0	34	29		
TOTAL QUANTITY					36	81	95	133	126	865	1336
COST (In Millions)	N/A		14.394	16.897	91.561	123.037	124.261	210.846	209.194	1710.470	2500.660
Initial Spares (In M)											
TOTAL (in Millions)											
Unit Cost (in Millions)											

DESCRIPTION/JUSTIFICATION:

This program provides support equipment, training equipment, and simulation capabilities for shore based facilities and for advance planning, design, cost, and feasibility studies and ship integration impact to support the introduction and integration of Theater Ballistic Missile Defense (TBMD) capabilities in AEGIS cruiser (CG-47) and destroyer (DDG-51) class ships.

The FY95-01 funds will be used to upgrade four centers, the Combat System Engineering Development Site (CSED), the AEGIS Computer Center (ACC), the AEGIS Education Center (AEC), and the AEGIS Combat System Center (ACSC) to properly accomodate the CG-47 and DDG-51 combat system for 59 ships and associated Vertical Launch System (VLS) modifications. In addition, FY98, FY00, and FY01 funds will be used for the BMDO portion of the total SM-2 Block IVA missile procurement quantity planned to be shared with the Navy.

The STANDARD Missile Block IV which is the base for the Block IV-A Upgrade acquisition strategy , unit cost , total cost, and cost to complete information are under review by the Navy and is unavailable at this time. Data is scheduled to be available in Nov 1996.

	P-1 SHOPP LIST NO.	PAGE NO. 1 OF 3	EXHIBIT P-40

PROGRAM COST BREAKDOWN (P-5)

A. DATE: February 1995

B. APPROPRIATION/BUDGET ACTIVIT: OTHER PROCUREMENT, BMDO

C. P-1 ITEM NOMENCLATURE: Sea-Based Area Theater Ballistic Missile Defense

COST CODE	ELEMENT OF COST	IDENT CODE	TOTAL COST IN THOUSANDS OF DOLLARS							
			FY 1994		FY 1995		FY 1996		FY 1997	
	(1)	(2)	QTY (3)	TOTAL COST (4)	QTY (5)	TOTAL COST (6)	QTY (7)	TOTAL COST (8)	QTY (9)	TOTAL COST (10)
BMDO1	ADJUNCT PROCESSORS	A				2,071		408		2,155
BMDO2	SHIPALTS	A						2,717		14,368
BMDO3	ORDALTS	A				5,696		13,772		75,038
02	Aegis Combat System Interface Sim Upgrade	A				3,106				
04	Training Support Equipment	A				1,035				
05	Site Equipment	A				1,035				
06	Advance Planning	A				1,451				
	TOTAL					14,394		16,897		91,561

D. REMARKS:

BMDO Controlled resources only

P-1 SHOPPING LIST ITEM NO.

BUDGET PROCUREMENT HISTORY AND PLANNING EXHIBIT (P-5A)

A. DATE: February 1995

B. APPROPRIATION/BUDGET ACTIVITY 1: PROCUREMENT, DEFENSEWIDE

C. P-1 ITEM NOMENCLATURE: Sea-Based Theater Missile Defense Initiative

LINE ITEM/ FISCAL YEAR	CONTRACTOR AND LOCATION	CONTRACT METHOD AND TYPE	CONTRACTED BY	AWARD DATE	DATE OF FIRST DELIVERY	QUANTITY	UNIT COST	SPECS AVAILABLE NOW	SPEC REV REQ'D	IF YES WHEN AVAIL
Adjunct Processor FY95	TBD	CP/FF	NAVSEA	4/95	TBD			No	No	
Adjunct Processor FY96	TBD	CP/FF	NAVSEA	4/96	TBD			No	No	
Adjunct Processor FY97	TBD	CP/FF	NAVSEA	4/97	TBD			No	No	

D. REMARKS:

BALLISTIC MISSILE DEFENSE ORGANIZATION

MILITARY CONSTRUCTION PROGRAM - FY 1996/1997

PRESIDENT'S BUDGET

DD FORMS 1390/1391/1391C

BALLISTIC MISSILE DEFENSE ORGANIZATION

MILITARY CONSTRUCTION PROGRAM - FY 1996/FY 1997

DD FORMS 1390

1. COMPONENT	FY 1996 MILITARY CONSTRUCTION PROGRAM	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. COMMAND	5. AREA CONSTR. COST INDEX
FORT BLISS, TX	BALLISTIC MISSILE DEFENSE ORGANIZATION	0.96

6. PERSONNEL STRENGTH:	PERMANENT			STUDENTS			SUPPORTED			
	OFFICER	ENLISTED	CIVILIAN	OFFICER	ENLISTED	CIVILIAN	OFFICER	ENLISTED	CIVILIAN	TOTAL
a. AS OF N/A										N/A
b. END FY 19 N/A										

7. INVENTORY DATA ($000)

a. TOTAL ACREAGE	N/A
b. INVENTORY TOTAL AS OF	N/A
c. AUTHORIZATION NOT YET IN INVENTORY	N/A
d. AUTHORIZATION REQUESTED IN THIS PROGRAM	13,600
e. AUTHORIZATION IN FOLLOWING PROGRAM	N/A
f. PLANNED IN NEXT THREE PROGRAM YEARS	N/A
g. REMAINING DEFICIENCY	N/A
h. GRAND TOTAL	13,600

8. PROJECTS REQUESTED IN THIS PROGRAM

CATEGORY CODE	PROJECT TITLE	SCOPE	COST ($000)	DESIGN STATUS START	DESIGN STATUS COMPLETE
	FY 1996				
312-200	THAAD 1st Objtv Bat O&M Facilities	LS	13,600	NOV 94	AUG 95
	TOTAL		13,600		
	FY 1997				
	NONE				

9. FUTURE PROJECTS: TYPICAL PLANNED NEXT THREE YEARS

NONE

10. MISSION OR MAJOR FUNCTION:

First fielding of weapons system for THAAD

11. OUTSTANDING POLLUTION AND SAFETY DEFICIENCIES:

a. Air Pollution:	0
b. Water pollution:	0
c. Occupational safety and health (OSH):	0

1. COMPONENT	FY 1997 MILITARY CONSTRUCTION PROGRAM	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. COMMAND	5. AREA CONSTR. COST INDEX
U.S. ARMY KWAJALEIN ATOLL (USAKA)	BALLISTIC MISSILE DEFENSE ORGANIZATION	2.54

6. PERSONNEL STRENGTH:	PERMANENT			STUDENTS			SUPPORTED			
	OFFICER	ENLISTED	CIVILIAN	OFFICER	ENLISTED	CIVILIAN	OFFICER	ENLISTED	CIVILIAN	TOTAL
a. AS OF N/A										
b. END FY 19 N/A										N/A

7. INVENTORY DATA ($000)

a. TOTAL ACREAGE	N/A
b. INVENTORY TOTAL AS OF	N/A
c. AUTHORIZATION NOT YET IN INVENTORY	N/A
d. AUTHORIZATION REQUESTED IN THIS PROGRAM	4,700
e. AUTHORIZATION IN FOLLOWING PROGRAM	N/A
f. PLANNED IN NEXT THREE PROGRAM YEARS	N/A
g. REMAINING DEFICIENCY	N/A
h. GRAND TOTAL	4,700

8. PROJECTS REQUESTED IN THIS PROGRAM

CATEGORY CODE	PROJECT TITLE	SCOPE	COST ($000)	DESIGN STATUS START	DESIGN STATUS COMPLETE
	FY 1997				
312-200	ADD TO AND ALTER THAAD/GBR TMD Test Facilities	LS	4,700	SEP 94	SEP 96
	TOTAL		4,700		

9. FUTURE PROJECTS: TYPICAL PLANNED NEXT THREE YEARS

NONE

10. MISSION OR MAJOR FUNCTION:

Research and development of various weapons systems

11. OUTSTANDING POLLUTION AND SAFETY DEFICIENCIES:

a. Air Pollution:	0
b. Water pollution:	0
c. Occupational safety and health (OSH):	0

BALLISTIC MISSILE DEFENSE ORGANIZATION

MILITARY CONSTRUCTION PROGRAM - FY 1996

(APPROPRIATION REQUEST IN THOUSANDS OF DOLLARS)

PROGRAM BUDGET DECISION NO. 377

MAJOR CONSTRUCTION PROGRAM

BASE/STATE	PROJECT TITLE	COST
FORT BLISS, TEXAS	THAAD 1ST OBJECTIVE BN O&M FACILITIES	13,600
	FY 1996 TOTAL:	13,600

1. COMPONENT	FY 1996 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
FORT BLISS, TEXAS	THAAD 1ST OBJECTIVE BATTALION O&M FACILITIES

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
0603216C	312-200	BMDO 381	13,600

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
PRIMARY FACILITIES				10,395
THAAD/GBR Training/Maintenance Fac	SF	63,200	115	(7,165)
POL Storage and Fueling Station	LS			(630)
Pavement (Organizational Vehicles)	SY	65,000	40	(2,600)
SUPPORTING FACILITIES				1,800
Utilities	LS			(400)
Pavement (Non-organizational Vehicles)	SY	10,000	30	(300)
Site Preparation	LS			(600)
Physical Security	LS			(500)
SUBTOTAL				12,195
CONTINGENCY (5.0%)				610
TOTAL CONTRACT COST				12,805
SUPERVISION, INSPECTION & OVERHEAD (6.0%)				768
TOTAL REQUEST				13,573
TOTAL REQUEST (ROUNDED)				13,600
INSTALLED EQUIPMENT (NON-ADDITIVE)				(0)

10. DESCRIPTION OF PROPOSED CONSTRUCTION: Construct a training and maintenance facility, oil storage, fueling station, hardstand, utilities, pavements, site preparation, physical security and other necessary support.

11. REQUIREMENT: LS ADEQUATE: 0 SUBSTANDARD: 0

PROJECT: Construct a Theater High Altitude Area Defense (THAAD) training and maintenance complex. Facilities to include maintenance shops, training areas, administrative offices, parking, oil storage, fueling station and necessary security fencing and lighting. (NEW MISSION)

REQUIREMENT: This project provides organizational operations and maintenance (O&M) facilities to support the THAAD 1st Objective Battalion. BMDO requires adequate space for personnel to perform training and maintenance, storage of spare parts, and administrative activities. This project will support up to 800 personnel and over 480 organizational vehicles, including HMMWV's and HEMMT's with launchers, command, control and communications elements, TMD radars and other support equipment. These O&M facilities will also support upgraded engineering manufacturing and development (EMD) hardware that will be used for the Objective System new equipment training.

CURRENT SITUATION: Existing facilities at Fort Bliss, Texas will provide support operations, i.e., dining, living quarters, etc. There are no adequate facilities that can be (Continued on next page)

1. COMPONENT	FY 1996 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION

FORT BLISS, TEXAS

4. PROJECT TITLE	5. PROJECT NUMBER
THAAD 1ST OBJECTIVE BATTALION O&M FACILITIES	BMDO 381

11. (Continued) used for the training and maintenance requirements of the THAAD system. The Army plans to activate two new battalions for the THAAD Objective System at Fort Bliss. Ft. Bliss was selected as the location for this program by Army (DCSOPS) because Ft. Bliss meets Army requirements for a training base and a national emergency contingency capability. It is also the location of the Army Air Defense Artillary School; it already has the basic facilities to support a large training/maintenance mission. Fort Bliss does not have facilities to support unique requirements associated with the Life Cycle Contractor Logistic Support (LCCLS) planned for the TMD THAAD/GBR system.

IMPACT IF NOT PROVIDED: If this project is not provided, BMDO cannot accomplish THAAD training and maintenance and required administrative support. The THAAD Objective System cannot be fielded with adequate support to maintain its readiness requirements which would render the THAAD system less than 100% effective in the event of an operational order to deploy to a theater. As a result, the potential deployment of a prototype system required by the Missile Defense Act of 1991 will not be possible.

PHYSICAL SECURITY: This project has been coordinated with the physical security plan, and all physical security and/or combating terrorism (CBT/T) measures are included.

ENVIRONMENTAL COMPLIANCE: The environmental impacts of this project will be provided as a Record of Environmental Consideration.

12. SUPPLEMENTAL DATA:

a. Estimated Design Data:

(1) Status:	
(a) Date Design Started:	November 1994
(b) Percent Complete as of January 1995	35%
(c) Percent Complete as of September 1995	100%
(d) Design Complete:	August 1995
(2) Basis:	
(a) Standard or Definitive Design:	____YES__X__NO
(b) Where design was most recently used:	NA
(3) Total Cost (c) = (a) + (b) = (d) + (e):	
(a) Production of Plans & Specifications:	$766,080
(b) All Other Design Cost:	$510,720
(c) Total:	$1,276,800
(d) Contract:	$1,021,440
(e) In-house:	$255,360
(4) Construction Start:	January 1996

b Installed Equipment (Non-Additive): NONE

BALLISTIC MISSILE DEFENSE ORGANIZATION

MILITARY CONSTRUCTION PROGRAM - FY1996

(APPROPRIATION REQUEST IN THOUSANDS OF DOLLARS)

PROGRAM BUDGET DECISION NO. 314

PLANNING AND DESIGN/MINOR CONSTRUCTION PROGRAM

BASE/STATE	PROJECT TITLE	COST
VARIOUS LOCATIONS	PLANNING AND DESIGN	500
VARIOUS LOCATIONS	MINOR CONSTRUCTION	2,909
	FY 1996 TOTAL:	3,409

1. COMPONENT	FY 1996 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 1 3 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
VARIOUS LOCATIONS	PLANNING AND DESIGN

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
		BMDO-396	500

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
PLANNING AND DESIGN	LS			500

10. DESCRIPTION OF PROPOSED CONSTRUCTION: The funds requested will be used to provide financing for architectural and engineering services and for construction design of Ballistic Missile Defense Organization (BMDO) Military Construction projects.

11. REQUIREMENT: As required (New Mission)

REQUIREMENT: These planning and design funds are required to complete the design of facilities in the FY 1997 BMDO Military Construction program, initiate design of facilities in the FY 1998 BMDO Military Construction program, and accomplish planning and design for major and complex technical projects with a long lead-time to be included in subsequent BMDO Military Construction programs.

1. COMPONENT	FY 1996 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
VARIOUS LOCATIONS	UNSPECIFIED MINOR CONSTRUCTION

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
		BMDO-395	2,909

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
UNSPECIFIED MINOR CONSTRUCTION	LS			2,909

10. DESCRIPTION OF PROPOSED CONSTRUCTION: Provide a lump sum amount for unspecified construction projects, not otherwise authorized by law, having a funded cost of $1,500,000 or less, including construction, alteration or conversion of permanent or temporary facilities, in accordance with 10 USC Section 2805.

11. REQUIREMENT: As required (New Mission)

REQUIREMENT: This package provides the means of accomplishing urgent projects that are not identified but which are anticipated to arise during FY 1996. Included would be projects to support new requirements, support new concepts, or other essential support to Ballistic Missile Defense Organization (BMDO) programs.

BALLISTIC MISSILE DEFENSE ORGANIZATION

MILITARY CONSTRUCTION PROGRAM - FY 1997

(APPROPRIATION REQUEST IN THOUSANDS OF DOLLARS)

PROGRAM BUDGET DECISION NO. 377

MAJOR CONSTRUCTION PROGRAM

BASE/STATE	PROJECT TITLE	COST
U.S. ARMY KWAJALEIN ATOLL (USAKA)	THAAD/GBR TMD TEST FACILITIES	4,700
	FY 1997 TOTAL:	4,700

1. COMPONENT	FY 1997 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
U.S. ARMY KWAJALEIN ATOLL (USAKA)	ADD TO AND ALTER THAAD/GBR TMD TEST FACILITIES

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
0603216C	312-200	BMDO 377	4,700

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
PRIMARY FACILITIES				3,347
Add to and Alter Missile Assembly Bldg	SF	4,684	291	(1,363)
Alter THAAD Maintenance Building	SF	2,600	113	(282)
Alter THAAD Missile Storage Building	SF	1,290	112	(145)
Ground Based Radar (GBR) Site	LS			(438)
Alter Admin/Launch Control Building	SF	4,500	66	(296)
Alter GBR Maintenance Building	SF	900	226	(203)
Mobilization/Demobilization	LS			(620)
SUPPORTING FACILITIES				680
Utilities/Communications	LS			(426)
Site Improvements	LS			(214)
Physical Security	LS			(40)
SUBTOTAL				4,027
CONTINGENCY (10.0%)				403
TOTAL CONTRACT COST				4,430
SUPERVISION, INSPECTION & OVERHEAD (6.5%)				288
TOTAL REQUEST				4,718
TOTAL REQUEST (ROUNDED)				4,700
INSTALLED EQUIPMENT (NON-ADDITIVE)				(0)

10. DESCRIPTION OF PROPOSED CONSTRUCTION: Add to and alter a missile assembly building (MAB), addition to match existing construction. Alter two maintenance buildings, two storage buildings, and an admin/launch control building. All alterations consist of reconfiguring building layouts, electrical distribution, fire protection systems, and air conditioning. Construct a new gravel hardstand and GBR site, and provide utilities, pavements, site improvements, physical security, information systems and other necessary support.

11. REQUIREMENT: 13,974 SF ADEQUATE: 0 SUBSTANDARD: 13,974 SF
PROJECT: Add to and alter existing and construct new facilities to support the Theater Missile Defense (TMD) Theater High Altitude Area Defense (THAAD) missile and the Ground Based Radar (GBR) developmental and engineering and manufacturing development (EMD) tests at Kwajalein Missile Range. (NEW MISSION)
REQUIREMENT: BMDO requires long range testing at Kwajalein Atoll, supported by adequate launch, radar, and support facilities, to demonstrate the system capability and support developmental and EMD tests of the TMD THAAD/GBR system. These facilities support the launch requirements of the TMD THAAD and GBR systems.
CURRENT SITUATION: Existing facilities at the Kwajalein Missile Range cannot satisfy this requirement without (continued on next page)

1. COMPONENT	FY 1997 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION
U.S. ARMY KWAJALEIN ATOLL (USAKA)

4. PROJECT TITLE	5. PROJECT NUMBER
ADD TO AND ALTER THAAD/GBR TMD TEST FACILITIES	BMDO 377

11. (Continued) alterations and modifications. In addition, some new construction must be provided. BMDO cannot accomplish complete testing on the THAAD system in EMD at existing short-range over-land ranges. As a result, BMDO must use the over-water range at Kwajalien Atoll to satisfy the long range and high altitude test requirements.
IMPACT IF NOT PROVIDED: Although the THAAD system is designed as a self-contained missile requiring no maintenance, the test missiles must be assembled at the launch site (for safety and test control). It would be impractical to ship assembled test missiles to the launch site since the risk of maintenance delays without an on-site MAB could significantly drive up mission cost. Without adequate test facilities, BMDO cannot accomplish realistic testing and operational check out of the TMD THAAD/GBR systems. As a result, BMDO cannot fully assess system reliability nor identify the need for system improvements.

PHYSICAL SECURITY: This project has been coordinated with the physical security plan, and all physical security and/or combating terrorism (CBT/T) measures are included.

ENVIRONMENTAL COMPLIANCE: The U.S. Army Kwajalein Atoll Supplemental Environmental Impact Statement and the Ground Based Radar Environmental Assessment provide environmental coverage for this construction.

12. SUPPLEMENTAL DATA:

a. Estimated Design Data:	
(1) Status:	
(a) Date Design Started:	September 1994
(b) Percent Complete as of January 1995	35%
(c) Percent Complete as of September 1996	100%
(d) Design Complete:	September 1996
(2) Basis:	
(a) Standard or Definitive Design:	____YES__X__NO
(b) Where design was most recently used:	NA
(3) Total Cost (c) = (a) + (b) = (d) + (e):	
(a) Production of Plans & Specifications:	$265,800
(b) All Other Design Cost:	$177,200
(c) Total:	$443,000
(d) Contract:	$354,400
(e) In-house:	$88,600
(4) Construction Start:	January 1997
(b) Installed Equipment (Non-Additive):	NONE.

BALLISTIC MISSILE DEFENSE ORGANIZATION

MILITARY CONSTRUCTION PROGRAM - FY1997

(APPROPRIATION REQUEST IN THOUSANDS OF DOLLARS)

PROGRAM BUDGET DECISION NO. 314

PLANNING AND DESIGN/MINOR CONSTRUCTION PROGRAM

BASE/STATE	PROJECT TITLE	COST
VARIOUS LOCATIONS	PLANNING AND DESIGN	1,895
VARIOUS LOCATIONS	MINOR CONSTRUCTION	2,040
	FY 1997 TOTAL:	3,935

1. COMPONENT	FY 1997 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
VARIOUS LOCATIONS	PLANNING AND DESIGN

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
		BMDO-397	1,895

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
PLANNING AND DESIGN	LS			1,895

10. DESCRIPTION OF PROPOSED CONSTRUCTION: The funds requested will be used to provide financing for architectural and engineering services and for construction design of Ballistic Missile Defense Organization (BMDO) Military Construction projects.

11. REQUIREMENT: As required (New Mission)

REQUIREMENT: These planning and design funds are required to complete the design of facilities in the FY 1998 BMDO Military Construction program, initiate design of facilities in the FY 1999 BMDO Military Construction program, and accomplish planning and design for major and complex technical projects with a long lead-time to be included in subsequent BMDO Military Construction programs.

1. COMPONENT	FY 1997 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
BMDO		JAN 13 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
VARIOUS LOCATIONS	UNSPECIFIED MINOR CONSTRUCTION

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
		BMDO-398	2,040

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
UNSPECIFIED MINOR CONSTRUCTION	LS			2,040

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11. REQUIREMENT: As required (New Mission)

REQUIREMENT: This package provides the means of accomplishing urgent projects that are not identified but which are anticipated to arise during FY 1997. Included would be projects to support new requirements, support new concepts, or other essential support to Ballistic Missile Defense Organization (BMDO) programs.