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

June 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

	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	Total
<u>Program Name:</u>	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Program</u>
0603872C RDT&E	64,771	47,356	56,558	40,000	40,000	40,000	40,000	40,000	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 Architecture and Integration (ISA&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.

(U) After U.S. planning activities in FY 94/95, the Arrow Deployability Project (ADP) 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

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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 model, adaptive weapons 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.

(U) The ISA&I tasks provide on-going analysis and assessment of the baseline, evolutionary, and responsive threats, and for the definition and evaluation of an initial Israeli Reference Missile Architecture (IRMA). Evolutionary Growth paths to enhance the IRMA robustness against future threats will be identified. Critical TMD system architecture issues and technologies will be analyzed, and the conformance of various Israeli anti-tactical ballistic missile (ATBM) programs, including the Arrow missile development activity, the Arrow Deployability Program (ADP), and the Israeli Test Bed to established requirements will be conducted. Finally, previously developed simulations and models will be used selectively to address significant TMD issues. Collectively, the tasks conducted under this cooperatively sponsored Israeli System Architecture & Integration Program will provide critical insights and technical data to both the U.S. and Israeli governments for improving near-term and evolutionary defenses against ballistic missile threats.

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(U) The Israeli Cooperative Research and Development Project will advance emerging TMD technologies for 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 begin 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 a 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 ISA&I Project activities demonstrated that defense of the State of Israel from tactical ballistic missile (TBM) attacks is feasible and cost-effective. The ISA&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.

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- (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:
 - (\$29.307M) 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.

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- o Develop and use high fidelity seeker models to analyze seeker performance.
(\$14.976M) 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.
(\$0.837M) 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.

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- o Conduct experiments on near-term improvements to the TMD system.
(\$1.891M) ISA&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:
(\$34.000M) 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.
- (\$2.500M) Israel Cooperative Research and Development
 - o Support U.S. technology base needs.
 - o Pursue interoperability with U.S. TMD systems.
 - o Transfer design data to U.S. TMD programs.
- (\$2.000M) 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.
- (\$1.500M) ISA&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.

- (U) FY 1998 Plans:
(\$34.000M) Arrow Deployability Project and Support
 - o Evaluate Predictions for Arrow Weapons System Progress.
 - o Evaluate Progress of Lethality Study.

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- o Review Contractors Producibility Study Results.
(\$2.500M) Israeli Cooperative Research and Development
- o Support U.S. technology base needs.
- o Pursue interoperability with U.S. TMD systems.
- o Transfer design data to U.S. TMD programs.
(\$2.000M) ITB
- o Begin extensive experiments plan for near-term & future TMD systems.
- o Complete ABMC Concepts.
- o Update models including weapons, radars, and threat.
(\$1.500M) ISA&I
- o Continue Assessment of Interoperability Requirements.
- o Analyze TMD System Evolution to Respond to Evolving Threat.

- (U) FY 1999 Plans:
(\$34.000M) Arrow Deployability Project and Support
 - o Pre/Post Test Predictions of Arrow Weapons Systems Tests.
 - o Pre/Post Test Performance Evaluation of AWS Tests.
 - o Continue to evaluate Progress of Studies & Analyses.
(\$2.500M) Israel Cooperative Research and Development
 - o Support U.S. technology base needs.
 - o Pursue interoperability with U.S. TMD systems.
 - o Transfer design data to U.S. TMD programs.
(\$2.000M) ITB
 - o Continue extensive experiments plan for near-term and future TMD systems.
(\$1.500M) ISA&I
 - o Assess near-term TMD System based on ADP System Engineering Test Flights.
 - o Analyze evolutionary architecture alternatives for future threats.

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- (U) FY 2000 Plans:
 - (\$34.000M) Arrow Deployability Project and Support
 - o Pre/Post Test Predictions of Arrow Weapons Systems Tests.
 - o Pre/Post Test Performance Evaluation of AWS Tests.
 - o Continue to Evaluate Progress of Studies & Analyses.
 - (\$2.500M) Israel Cooperative Research and Development
 - o Support U.S. technology base needs.
 - o Pursue interoperability with U.S. TMD systems.
 - o Transfer design data to U.S. TMD programs.
 - (\$2.000M) ITB
 - o Enhance ITB by incorporating next generation TMD systems & threats.
 - o Begin experiments using next generation TMD systems.
 - (\$1.500M) ISA&I
 - o Continue analysis of evolutionary TMD architectures responsive to future threats.

- (U) FY 2001 Plans:
 - (\$34.000M) Arrow Deployability Project and Support
 - o Pre/Post Test Predictions of Arrow Weapons Systems Tests.
 - o Pre/Post Test Performance Evaluation of AWS Tests.
 - o Continue to evaluate Progress of Studies & Analyses.
 - (\$2.500M) Israel Cooperative Research and Development
 - o Support U.S. technology base needs.
 - o Pursue interoperability with U.S. TMD systems.
 - o Transfer design data to U.S. TMD programs.
 - (\$2.000M) ITB

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- o Complete next generation enhancements
- o Continue experiments using next generation TMD systems. (\$1.500M) ISA&I
- o Provide independent assessment of evolutionary TMD system to include capability conformance and test plan traceability with operational specifications.

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 ISA&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:

	<u>FY1996</u>	<u>FY1997</u>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>TOTAL COST</u>
Previous President's Budget	56,558	44,200	47,539	51,849	52,075	52,277	304,498
Current Budget Submit	56,558	40,000	40,000	40,000	40,000	40,000	256,558

Change Summary Explanation:

Funding:

- o Negotiations for an extended ADP reduced Cooperative R&D budget after the U.S. -GOI agreement to cap PMA 2259 at \$40M per year.

Schedule: None.

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Technical: None.

C. (U) OTHER PROGRAM FUNDING SUMMARY

<u>Related RDT&E:</u>	<u>Funding Dependency (Yes¹/No)</u>
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

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

D. (U) <u>Schedule Profile</u>	
o Complete IBIS Follow-On	2Q/FY96
o Complete Four Arrow II Flight Tests	4Q/FY96
o Complete Arrow Interceptor Development	4Q/FY96
o Complete ITB Enhancement	2Q/FY97
o Arrow Weapon System Test Completion	1Q/FY97
o Initiate Integrated Flight Tests	1Q/FY97

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- o Initiate Arrow Weapon System Flight Tests
- o Arrow Weapon System Test Completion

1Q/FY98
1Q/FY00