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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: 2160)

PE Title: Other TMD (U)

Project Number / Title:        2160    TMD Existing System Modifications

<u>Program Name:</u>	<u>FY1994</u> <u>Actual</u>	<u>FY1995</u> <u>Estimate</u>	<u>FY1996</u> <u>Estimate</u>	<u>FY1997</u> <u>Estimate</u>	<u>FY1998</u> <u>Estimate</u>	<u>FY1999</u> <u>Estimate</u>	<u>FY2000</u> <u>Estimate</u>	<u>FY2001</u> <u>Estimate</u>	<u>Total</u> <u>Program</u>
0603872C RDT&E	20,004	15,663	26,869	25,000	16,083	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.

(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

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ALERT programs.

(U) EAGLE. The EAGLE is developing and fielding a TBM detection, tracking, and cueing system aboard Air Force E-3 Airborne Warning and Control System (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 Navy Area TMD.

(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.

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(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:

- o (\$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.
- o (\$16.488M) Talon Shield. Completed Talon Shield DSP development tests; Prepared to begin Air Force Talon Shield (ALERT) operations.
- o (\$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 (\$0.998M) 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 (\$9.400M) EAGLE. Release request for proposals and award the EAGLE prototype design, development, fabrication, and test contract; complete System Requirements Review.
- o (\$1.291M) EAGLE. Confirm sensor field of regard requirements using real-time, interactive theater air defense

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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 and tests; conclude memoranda of agreement (MOA) discussions 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 (\$1.990M) 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 (\$19.000M) EAGLE. Complete System Design Review (SDR), Preliminary Design Review (PDR) and 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:

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- o (\$3.500M) Talon Shield. Continue Talon Shield test and evaluation activities; demonstrate fusion and processing of other intelligence data.
- o (\$1.500M) Cueing and Netting. Conduct operational MPQ-53/TPS-59/JTAGS tactical cueing demonstration and analyze results.
- o (\$21.000M) 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 prototype sensor aboard the TS-3 aircraft.
  
- (U) FY 1998 Plans:
  - o (\$2.917M) Talon Shield. Complete Talon Shield operational testing.
  - o (\$1.500M) Cueing and Netting. Complete MPQ-53/TPS-59/JTAGS hardware and software modifications to accept an external cue.
  - o (\$11.666M) EAGLE. Install the EAGLE prototype system on the TS-3 test aircraft; conduct EAGLE prototype flight testing; conduct a milestone review, chaired by the Air Force Acquisition Decision Authority (Air Force PEO/C3I), to approve EAGLE entry into Engineering and Manufacturing Development (EMD); award the EAGLE EMD contract.
  
- (U) FY 1999 Plans:
  - o (\$14.537M) EAGLE. Complete EAGLE EMD; conduct milestone review, chaired by the Air Force Acquisition Decision Authority (Air Force PEO/C3I), to approve EAGLE entry into production.
  
- (U) FY 2000 Plans:
  - o (\$0.000M) EAGLE. Completed all research and development tasks; award EAGLE Low-Rate Initial Production (LRIP) contract.
  
- (U) FY 2001 Plans:
  - o (\$0.000M) EAGLE. Complete EAGLE LRIP; initiate EAGLE full-scale production.

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Acquisition Strategy:

(U) 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).

(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 as a TBM detection and tracking system that will be installed aboard Air Force E-3 AWACS aircraft. Assuming favorable EAGLE EMD and production decisions, ESC will award a production contract in 1Q/FY00, with Low-Rate Initial Production (LRIP) beginning 2Q/FY00 of objective EAGLE sensor systems. Integration of production EAGLE sensor systems aboard operational Air force E-3 AWACS aircraft will be accomplished shortly thereafter.

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	26,869	25,000	14,583	14,537	0	0	80,989
Current Budget Submit	26,869	25,000	16,083	14,537	0	0	82,489

Change Summary Explanation:

Funding:

- o The increase of \$1.5 million provides for the completion of MPQ-53/TPS-59/JTAGS hardware and software modifications to accept an external cue.

Schedule:

- o None.

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Technical:

o None.

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C. (U) OTHER PROGRAM FUNDING SUMMARY

Related RDT&E:

Funding Dependency? (Yes<sup>1</sup>/No)

2154 TMD-GBR, PE 0603862C/PE 0604862C	No
2260 THAAD DEM/VAL, PE 0603861C	No
2263 Navy Area TBMD, PE 0603867C	No
2358 HAWK System BMC/3, PE 0603863C	No
3251 Systems Engineering and Technical Support, PE 0603872C	No
3261 BMC3I Concepts, PE 0603872C	No

<sup>1</sup>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

o Cueing Demo	1Q/FY94, 3Q/FY95
o EAGLE TMD Study	2Q/FY94
o EAGLE Ladar Eval	3Q/FY94
o Talon Shield Op Testing Complete	3Q/FY94
o Talon Shield Begin ALERT Opns	4Q/FY94
o EAGLE Negotiate Intl Participation	4Q/FY94, 1Q/2Q/3Q/4Q/FY95
o EAGLE Release RFP	2Q/FY95
o EAGLE Prototype Contract Award	4Q/FY95
o EAGLE SRR	4Q/FY95
o EAGLE SDR	1Q/FY96
o EAGLE Ground Lab Tests	1-3Q/FY96
o EAGLE PDR	2Q/FY96

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- o EAGLE CDR 3Q/FY96
- o EAGLE Field Ground Tests 3Q/4Q/FY96, 1Q/FY97
- o Talon Shield Processor Mods 4Q/FY96, 4Q/FY97
- o EAGLE Air Lab Tests 1Q/2Q/FY97
  
- o EAGLE Install On TS-3 1Q/FY98
- o EAGLE Contingency Deployment Availability 2Q/FY98
- o EAGLE Prototype Flight Tests 2Q/FY98 - 3Q/FY98
- o EAGLE Refine Prototype Design 2Q/FY98 - 4Q/FY98
- o EAGLE EMD Milestone Decision 3Q/FY98
- o Talon Shield Test and Evaluation Complete 4Q/FY98
- o EAGLE LRIP Milestone Decision 2Q/FY99
- o EAGLE Award Production Contract 1Q/FY00
- o EAGLE LRIP Production 2Q/FY00 - 1Q01
- o EAGLE Full-Rate Production Decision 4Q/FY01