# Exhibit R-2, RDT&E Budget Item Justification

DATE **February 2008**

BUDGET ACTIVITY
**07 Operational System Development**

PE NUMBER AND TITLE
**0207417F Airborne Warning and Control System (AWACS)**

| Cost ($ in Millions) | | FY 2007 Actual | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate | FY 2012 Estimate | FY 2013 Estimate | Cost to Complete | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total Program Element (PE) Cost | 157.751 | 151.593 | 126.300 | 170.511 | 151.932 | 219.379 | 154.736 | Continuing | TBD |
| 411L | Airborne Warning & Control System (AWACS) | 157.751 | 151.593 | 126.300 | 170.511 | 151.932 | 219.379 | 154.736 | Continuing | TBD |

1. FY2008 funding totals do not include $72.5M FY2008 GWOT requirements still pending Congressional consideration.

**(U) A. Mission Description and Budget Item Justification**

A. Mission Description

The funding set forth in this document investigates, develops, and integrates system improvements to enable the E-3 AWACS to remain an effective airborne battle management and surveillance system for command and control of combat forces and for strategic defense of the U.S. This PE funds the following efforts:
Modernization Programs: (RDT&E, AF)

1) The Integrated DAMA (Demand Assigned Multiple Access) / GATM (Global Air Traffic Management) Program seeks to make communications and navigation improvements required to meet current mandated DAMA SATCOM (Satellite Communication) and Air Traffic Control (ATC) requirements.

A) DAMA SATCOM is a Chairman Joint Chiefs of Staff (CJCS)--mandated Ultra-High Frequency (UHF) satellite communications upgrade consisting of two new UHF DAMA terminals and new Radio Frequency (RF) components, to mitigate co-site interference, replacing the two non-DAMA UHF SATCOM radios on each aircraft. The DAMA enhancements will expand user availability of severely limited DoD UHF SATCOM channels, improving the interoperability and efficiency of DoD UHF SATCOM systems.

B) GATM is a FAA/International Civil Aviation Organization (ICAO)/EUROCONTROL--mandated ATC upgrade consisting of new Very High Frequency (VHF) radios with 8.33 kHz channel spacing, Traffic-alert Collision Avoidance System (TCAS)/Mode-S Identification Friend or Foe (IFF) transponder and Reduced Vertical Separation Minimum (RVSM) capability. The ATC enhancements will permit more aircraft to fly closer together in congested airspace worldwide, particularly in European airspace. Non-compliance has already resulted in airspace restrictions and denials, impacting AWACS's ability to support worldwide response in situations requiring immediate on-scene command and control (C2) battle management.

2) Block 40/45 is replacing AWACS 1970's vintage mission systems that are experiencing Diminishing Manufacturing Sources (DMS) issues, are difficult and expensive to upgrade, and limit overall AWACS system performance. The Block 40/45 upgrade will improve quality and timeliness of sensor data to the shooter, improve Combat Identification (CID), improve AWACS contribution to Time Critical Targeting via Data Link Infrastructure, improved electronic support measures processing, and enable more effective, faster upgrades via an open systems, Ethernet based architecture. The upgrade will also update the ground support infrastructure including training systems.

3) NAVWAR (Navigation Warfare) is mandated by Chairman Joint Chiefs Staff Instruction (CJCSI) 6140.01A (31 Mar 04) and requires all DoD Global Positioning System (GPS) users to incorporate National Security Agency (NSA) Selective Availability Anti-Spoofing Module (SAASM) provisions for the transition to 'black

keys'; to eliminate requirements to acquire GPS satellites using the civil signal (C/A); and to incorporate new technology into the navigation sensor.

4) Next Generation Identification Friend or Foe (NGIFF): Upgrades the existing Mark XII IFF Interrogator with a Mode 5/S Interrogator extending the effective range of the AWACS Interrogator while helping discriminate between closely-spaced targets. The requirement is documented in the Required Operational Capability (ROC), ADC/TAC-1-66 & Combat ID (CID) Capstone Requirement Document (CRD), 19 March 2001, JROCM 047-07 signed 5 Mar 2007, and USAF CDR 003-97. Mode 5 IFF is designed to augment the obsolete Mode 4 waveform, providing a more secure IFF function. The Mode S capability provides civil airspace IFF interrogation for Homeland Defense and airspace control.

5) DRAGON (DMS Replacement of Avionics for Global Operations and Navigation) (formerly AMP) completes the FAA/International Civil Aviation Organization (ICAO)/EUROCONTROL mandated air traffic control system upgrades and equips the E-3 fleet with flight deck and other avionics capabilities that will allow AWACS to comply with mandated global Required Navigation Performance (RNP), surveillance and communication standards. Non-compliance will result in airspace restrictions and denials that will impact AWACS ability to support worldwide responses to situations requiring immediate on-scene command and control (C2 battle management). The DRAGON modifications to the flight deck include the addition of data link communications, upgrade or replacement of emergency locating technologies, voice and data link digital radios, improved visual displays and flight management system, as well as automatic position reporting via data link. Replacement of critical avionics subsystems that become unsustainable beyond 2010, are included in the DRAGON.

6) Command & Control, Intelligence, Surveillance and Reconnaissance (C2ISR): C2ISR System Architecture Improvements provide timely enhancements to improve critical areas of the AWACS mission system, primarily in two distinct areas:
A) Mission Capable (MC) rate improvement: Reliability, Maintainability & Availability (RM&A) analysis and development projects provide system improvements that help meet/exceed the MC rate standard of this critical C2 platform, therefore increasing airframe longevity in order to support its flight commitment to end of operational life. Such efforts focus on increasing reliability of the air vehicle, command and control, computer, sensor systems and infrastructure improvements as well as providing solutions to diminishing manufacturing sources. Efforts will also focus on insertion of new technologies with the aim of reducing maintenance man-hours along with periodic depot maintenance improvements to increase aircraft availability. Programs will focus on risk reduction, development, and fielding.
B) C2ISR enhancement and integration: AWACS seeks to fulfill the requirements of Joint Vision 2020 as well as Aerospace Expeditionary Forces (AEF) and other Task Force Concept of Operations to meet the needs of the operator. AWACS seeks to enhance network-centric warfare capabilities with other C2ISR systems by horizontally integrating machine-to-machine interfaces into AWACS in order to digitize the kill chain. Sensor and communications improvements, such as the ability to send, receive and fuse the air (and ground) picture via data link to fighter aircraft, will be developed through rapid prototyping, modeling, simulation, and participation in live and simulated Joint exercises (e.g., Joint Combat Identification Evaluation Team (JCIET) and Joint Distributed Engineering Plant (JDEP)). Collaborative efforts with other sensor platforms through capabilities such as network-centric operations will also enhance horizontal integration efforts. Certain near-term efforts, required by the operator to improve the timeliness and accuracy of information passed to/from fighter aircraft in the engagement zone and to provide consistent and re-playable mission data once the mission is complete, are quick reaction capabilities that can be developed & fielded to support the air war. The program includes concept exploration, technology development and demonstration efforts that support continuous improvements to C2ISR capabilities of manned & unmanned platforms, space, data links and advanced Battle Management decision tools. C2ISR continues to support and develop self-protection capabilities to enable current and future threat deterrence. Fielding strategies will provide for immediate field retrofit when able, otherwise fielding will occur in subsequent modernization programs. All programs are designed to integrate with & transition into the next C2ISR Platform. The AWACS program will coordinate with and participate in

projects developing international standards (including NATO standards) to ensure joint, allied, and coalition interoperability.

7) The Training, Support, and Infrastructure programs cover an array of cross cutting programs and activities in support of AWACS modification and enhancement programs. These programs include managing the AWACS developmental infrastructure, support equipment concurrency, modernization planning/analysis, and trainer/simulator integration and concurrency. The E-3 Radar Systems Integration Lab/Software Development Facility must be maintained, operated and supported by contract to provide customers with a functioning E-3 radar configuration in support of AWACS radar development, production and sustainment programs. New support equipment technologies and test strategies need to be analyzed to ensure concurrent capability to sustain current, modified and upgraded E-3 equipment. Trainer/simulator concurrency analysis and definition is required to ensure trainers and simulators are kept current with the AWACS baseline. Associate contractor agreements are used to establish concurrency between prime integrators and training service providers.

8) Test System 3/Integration Labs: The E-3 AWACS Developmental Test and Evaluation (DT&E) aircraft, Test System 3 (TS-3, tail number 73-1674) and the Avionics Integration Laboratory (AIL) are Government owned/contractor managed, maintained and operated assets. These test-ready assets support AWACS modernization, including advanced projects and sustainment projects, and allow AWACS to participate in live-fly (e.g., Joint Expeditionary Force Experiment) and ground-based interoperability testing. These assets also support multiple international Airborne Early Warning and Control (AEW&C) projects on a fee basis, including French, RSAF, UK, Japan, and NATO.

9) Communication projects provide the AWACS system with an effective method for electronically transmitting and receiving critical mission information such as the Air Tasking Order (ATO). Comm projects will focus on engineering and retrofitting the entire fleet.

10) Collaborative and cooperative efforts will examine re-engining the E-3 airframe replacing the existing, original engines with new engines. New engines will ensure long-term viability of the platform and increase fuel-efficiency, improve reliability, and increase power quantity and quality available to on-board mission systems. The efforts will pursue synergies and leverage the efforts of other U.S. 707-based airframes as well as the International AWACS partners that operate the 707 AWACS (United Kingdom, France, and Saudi Arabia).

11) The Support the Warfighter program supports AWACS capability requirements to create and sustain the force. This program includes the design, development, and modernization of equipment and systems to ensure that E-3 can respond to urgent wartime/contingency acquisition requirements. Efforts include the upgrade of key capabilities to meet contingency needs, the modernization of test systems, the integration of battle management and data link enhancements, and support for reliability, maintainability and availability initiatives.

This program is in Budget Activity 7, Operational Systems Development, due to efforts supporting a fielded, post Milestone III operational weapon system.

# Exhibit R-2, RDT&E Budget Item Justification

DATE
**February 2008**

BUDGET ACTIVITY
**07 Operational System Development**

PE NUMBER AND TITLE
**0207417F Airborne Warning and Control System (AWACS)**

**(U) B. Program Change Summary ($ in Millions)**

| | | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|---|
| (U) | Previous President's Budget | 164.982 | 152.721 | 127.984 |
| (U) | Current PBR/President's Budget | 157.751 | 151.593 | 126.300 |
| (U) | Total Adjustments | -7.231 | | |
| (U) | Congressional Program Reductions | | -0.160 | |
| | Congressional Rescissions | | -0.968 | |
| | Congressional Increases | | | |
| | Reprogrammings | -2.873 | | |
| | SBIR/STTR Transfer | -4.358 | | |

(U) Significant Program Changes:

1. Avionics Modernization Program (AMP) was redesignated as the DMS Replacement of Avionics for Global Operations and Navigation (DRAGON). The change captures the dual requirements to replace aging avionics equipment, and to upgrade the navigational systems to comply with US and International Air Traffic Control mandates.

# Exhibit R-2a, RDT&E Project Justification

DATE **February 2008**

BUDGET ACTIVITY
**07 Operational System Development**

PE NUMBER AND TITLE
**0207417F Airborne Warning and Control System (AWACS)**

PROJECT NUMBER AND TITLE
**411L Airborne Warning & Control System (AWACS)**

| Cost ($ in Millions) | | FY 2007 Actual | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate | FY 2012 Estimate | FY 2013 Estimate | Cost to Complete | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 411L | Airborne Warning & Control System (AWACS) | 157.751 | 151.593 | 126.300 | 170.511 | 151.932 | 219.379 | 154.736 | Continuing | TBD |
| | Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

1. FY2008 funding totals do not include $72.5M FY2008 GWOT requirements still pending Congressional consideration.

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A. Mission Description

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# Exhibit R-2a, RDT&E Project Justification

DATE **February 2008**

| BUDGET ACTIVITY | PE NUMBER AND TITLE | PROJECT NUMBER AND TITLE |
|---|---|---|
| **07 Operational System Development** | **0207417F Airborne Warning and Control System (AWACS)** | **411L Airborne Warning & Control System (AWACS)** |

**(U) B. Accomplishments/Planned Program ($ in Millions)**

| | | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|---|
| (U) | Accomplishments/Planned Programs | | | |
| (U) | Continuing Test System-3/AITS support and Program Sustaining efforts | 17.833 | 23.827 | 21.258 |
| (U) | Continuing Trainers, Simulators and Infrastructure (TSI) efforts | 3.059 | 5.148 | 5.106 |
| (U) | Continuing Block 40/45 SD&D effort including pre-production efforts | 127.796 | 86.059 | 57.270 |
| (U) | Continuing C2ISR System Architecture Improvements, Advanced Projects, MC Rate Improvements | 7.914 | 9.398 | 9.185 |
| (U) | Completing Navigational Warfare (NAVWAR) SD&D | 1.149 | 0.050 | 0.000 |
| (U) | Continuing RM&A - Support to the Warfighter Projects | 0.000 | 4.424 | 4.293 |
| (U) | Continuing Next Generation Identification Friend or Foe (IFF) | 0.000 | 22.687 | 29.188 |
| (U) | Total Cost | 157.751 | 151.593 | 126.300 |

**(U) C. Other Program Funding Summary ($ in Millions)**

| | | FY 2007 Actual | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate | FY 2012 Estimate | FY 2013 Estimate | Cost to Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| (U) | AF RDT&E | | | | | | | | | |
| (U) | Other APPN | | | | | | | | | |
| (U) | Aircraft Procurement, AF, E-3 Mods | 65.772 | 53.796 | 86.468 | 84.945 | 180.320 | 148.313 | 188.675 | Continuing | TBD |
| (U) | E-3 Initial Spares, AF | 5.829 | 7.221 | 6.304 | 10.980 | 18.767 | 19.140 | 19.517 | Continuing | TBD |

Note: APAF, E-3 Mods includes funds in PE 0809731F (1.325 in FY 2006 and 0.516 in FY 2007)

**(U) D. Acquisition Strategy**

Most major programs (Block 40/45, NAVWAR, TS-3 and lab support) will be sole source to the Boeing Corporation, Seattle, Wa.

# Exhibit R-3, RDT&E Project Cost Analysis

DATE **February 2008**

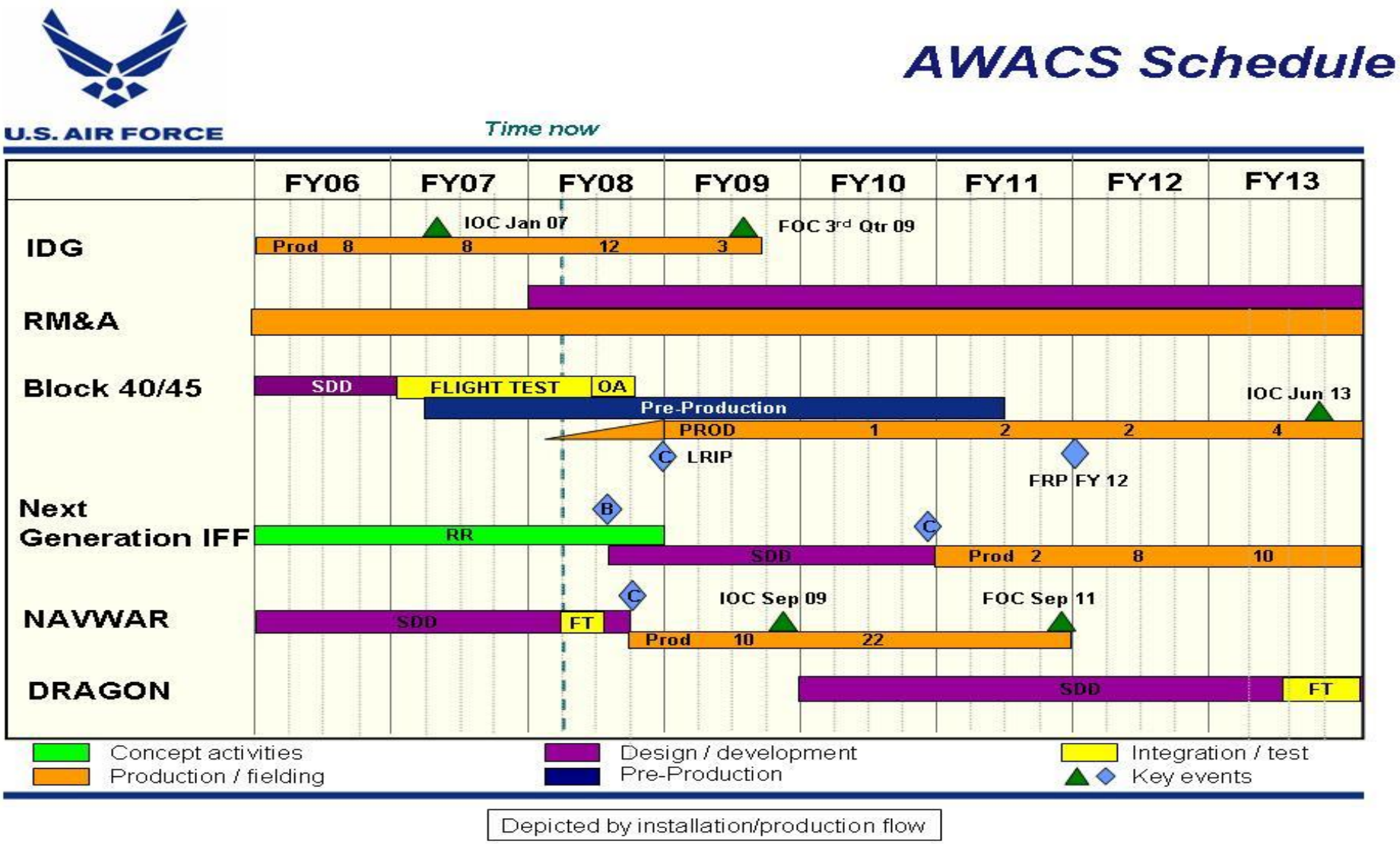
BUDGET ACTIVITY
**07 Operational System Development**

PE NUMBER AND TITLE
**0207417F Airborne Warning and Control System (AWACS)**

PROJECT NUMBER AND TITLE
**411L Airborne Warning & Control System (AWACS)**

| (U) | Cost Categories (Tailor to WBS, or System/Item Requirements) ($ in Millions) | Contract Method & Type | Performing Activity & Location | Total Prior to FY 2007 Cost | FY 2007 Cost | FY 2007 Award Date | FY 2008 Cost | FY 2008 Award Date | FY 2009 Cost | FY 2009 Award Date | Cost to Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (U) | Product Development | | | | | | | | | | | | |
| | (U) Block 40/45 SD&D and Pre-Production | SS/CPAF | Boeing - Seattle, WA | 529.041 | 120.634 | Oct-06 | 67.132 | Oct-07 | 47.539 | Oct-08 | Continuing | TBD | TBD |
| | (U) C2ISR Sys Arch Imp | SS/FPIF & CPAF | Boeing - Seattle, WA | 46.684 | 5.059 | Oct-06 | 4.977 | Oct-07 | 5.484 | Oct-08 | Continuing | TBD | TBD |
| | (U) NAVWAR | SS/Muliple | Boeing - Seattle, WA | 10.250 | 1.149 | | 0.000 | | 0.000 | | 0.000 | 11.399 | 10.250 |
| | (U) IFF | TBD | TBD | 0.000 | 0.000 | | 20.972 | Jun-08 | 23.712 | Jun-09 | Continuing | TBD | TBD |
| | (U) Support to the Warfighter | TBD | TBD | 0.000 | 0.000 | | 3.508 | Jan-08 | 3.374 | Jan-09 | Continuing | TBD | TBD |
| | Subtotal Product Development | | | 585.975 | 126.842 | | 96.589 | | 80.109 | | Continuing | TBD | TBD |
| | Remarks: Note: Total Program does not include NATO funds. | | | | | | | | | | | | |
| (U) | Support | | | | | | | | | | | | |
| | (U)Support/ITSP MITRE, travel, other | Competitive Multiple | AWACS Program Office - Hanscom AFB, MA | 652.907 | 14.294 | | 32.103 | | 24.711 | | Continuing | TBD | TBD |
| | Subtotal Support | | | 652.907 | 14.294 | | 32.103 | | 24.711 | | Continuing | TBD | TBD |
| | Remarks: | | | | | | | | | | | | |
| (U) | Test & Evaluation | | | | | | | | | | | | |
| | (U) Test System-3 ADAPT Contract/AITS Contract / Other test activities | SS/Multiple | Boeing - Seattle, WA | 433.269 | 13.556 | | 17.753 | | 16.374 | | Continuing | TBD | TBD |
| | (U) Trainers, Simulators & Infrastructure (TSI) | SS/Multiple | Boeing - Seattle, WA | 7.603 | 3.059 | Jan-07 | 5.148 | Jan-08 | 5.106 | Jan-09 | Continuing | TBD | TBD |
| | Subtotal Test & Evaluation | | | 440.872 | 16.615 | | 22.901 | | 21.480 | | Continuing | TBD | TBD |
| | Remarks: | | | | | | | | | | | | |
| (U) | Management | | | | | | | | | | | | |
| | | | | | | | | | | | | 0.000 | |
| | Subtotal Management | | | 0.000 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.000 |
| | Remarks: | | | | | | | | | | | | |
| (U) | Total Cost | | | 1,679.754 | 157.751 | | 151.593 | | 126.300 | | Continuing | TBD | TBD |

| Exhibit R-4, RDT&E Schedule Profile | | DATE February 2008 |
|---|---|---|
| BUDGET ACTIVITY<br>07 Operational System Development | PE NUMBER AND TITLE<br>0207417F Airborne Warning and Control System (AWACS) | PROJECT NUMBER AND TITLE<br>411L Airborne Warning & Control System (AWACS) |



# Exhibit R-4a, RDT&E Schedule Detail

DATE
**February 2008**

| BUDGET ACTIVITY | PE NUMBER AND TITLE | PROJECT NUMBER AND TITLE |
|---|---|---|
| **07 Operational System Development** | **0207417F Airborne Warning and Control System (AWACS)** | **411L Airborne Warning & Control System (AWACS)** |

| | | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|---|
| **(U)** | **Schedule Profile** | | | |
| (U) | IDG IOC | 2Q | | |
| (U) | Reliability, Maintainability, & Availability (RM&A) Projects | | 1-4Q | 1-4Q |
| (U) | 40/45 Mission Systems Flight Testing Start | 1Q | | |
| (U) | 40/45 Airworthiness Testing | | 2-3Q | |
| (U) | 40/45 Operational Assessment | | 3Q | |
| (U) | 40/45 Pre-Production | 2-4Q | 1-4Q | 1-4Q |
| (U) | 40/45 LRIP Milestone C | | | 1Q |
| (U) | 40/45 Production | | | 1-4Q |
| (U) | Next Generation IFF Risk Reduction | 1-4Q | 1-4Q | |
| (U) | Next Generation IFF Milestone B | | 3Q | |
| (U) | Next Generation IFF SDD | | 3-4Q | 1-4Q |
| (U) | NAVWAR SDD | 1-4Q | 1-3Q | |
| (U) | NAVWAR Flight Test | | 2-3Q | |
| (U) | NAVWAR Milestone C | | 3Q | |
| (U) | NAVWAR Production | | 4Q | 1-4Q |
| (U) | NAVWAR IOC | | | 4Q |