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

Exhibit R-2, RDT&E Budget Item Justification

DATE: May 2009

BUDGET ACTIVITY: 07 Operational System Development

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

	Cost ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	146.341	125.710	176.040	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
411L	Airborne Warning & Control System (AWACS)	146.341	125.710	176.040	0.000	0.000	0.000	0.000	0.000	Continuing	TBD

(U) A. Mission Description and Budget Item Justification

Mission: AWACS is the premier airborne platform providing command and control (C2)/battle management (BM) to Commander In Chief and combatant commander tasking for Joint, Allied, and Coalition operations, Humanitarian Relief, and Homeland Defense. AWACS provides a real-time picture of friendly, neutral, and hostile air activity. Its capabilities include all-altitude/all-weather surveillance of the battle space; early warning of enemy actions; a real-time ability to find, fix, track, and assess airborne or maritime threats; and detection, location, and identification of electronic emitters.

Budget Justification: This funding is in Budget Activity 7, Operational Systems Development, since the efforts support a fielded, operational weapon system. This funding will be used to investigate, develop, and integrate 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. 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 (NATO, United Kingdom, France, and Saudi Arabia). The efforts will coordinate with and participate in projects developing international standards (including NATO standards) to ensure joint, allied, and coalition interoperability.

This program element funds the following modernization efforts (RDT&E, AF):

1. 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, improve 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.

Block 40/45 completed mission system testing and an operational assessment in FY08, met a Milestone C in FY09 and expects to award a production contract later in FY09.

2. The Next Generation Identification Friend or Foe (NGIFF) Program provides AWACS with enhanced IFF interrogator operation to add a more secure Mode 5 capability. NSA declared IFF Mode 4 unsecure and obsolete on 5 Nov 2003. Joint Requirements Oversight Council Memo 047-07 requires IFF Mode 5 interrogation capability by FY14. The new Mode 5 interrogation capability extends the effective range of the AWACS interrogator, while helping discriminate against closely spaced cooperative targets.

Exhibit R-2, RDT&E Budget Item Justification	DATE May 2009
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0207417F Airborne Warning and Control System (AWACS)

This program met a Milestone B in FY08 and will develop and integrate a basic Mode 5 capability on Block 30/35 starting in FY08 and full Mode 5 on Block 40/45 starting in FY10. Hardware will be common between the two platforms.

NGIFF will also integrate Mode S, a civilian air traffic control capability residing in the NGIFF hardware, as funding allows.

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; and to incorporate new technology into the navigation sensor.

In FY08 the program resolved some integration difficulties that surfaced during testing and successfully passed Milestone C in July. The program will begin production in FY09 and continue to IOC in 1Q CY10 and FOC in CY11. The production phase began in Sept 08.

4. DRAGON (DMS Replacement of Avionics for Global Operations and Navigation) completes the FAA/International Civil Aviation Organization (ICAO)/ EUROCONTROL mandated air traffic control system upgrades and equips the E-3 fleet with flight instrument 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 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 beginning in 2010, are included in the DRAGON program. The common requirements of the US and NATO AWACS drives this program towards a cooperative development effort and the US is currently pursuing a cooperative risk reduction effort with NATO. Technology Demonstration (TD) for DRAGON began in FY08, and the DRAGON Engineering and Manufacturing Development (EMD) phase is planned as a US and NATO cooperative effort which begins in FY10.

5. Net-Centric Capability (NCC): FY10 will begin Technology Development (TD) for improving net-centric enabling capabilities such as Internet Protocol (IP) enabled communications links, airborne network management systems, gateways, Information Assurance (IA), and Service-Oriented Architecture (SOA) based C2 applications to support collaborative efforts with other sensor platforms as well as with US and Coaltion ground and air C2 nodes. Net-centric capabilities will be developed through prototyping, experimentations, and participation in Joint and Coaltion exercises such as Empire Challenge (EC) and Coalition Warrior Interoperability Demonstrations (CWIDs).

6. Reliability, Maintainability and Availability (RM&A) and Support the War Fighter (STWF): RM&A - STWF efforts support AWACS capability to create and sustain the force. Examples of these activities include, but are not limited to:

o Designing, developing, and modernizing equipment and systems to ensure that AWACS can respond to urgent wartime/contingency acquisition requirements (e.g. Urgent Operational Needs (UONs) and Wartime Urgent & Compelling Needs (WUCNs).

o Upgrading key capabilities to meet contingency needs, modernizing test systems, integrating battle management and data link enhancements, and supporting RM&A initiatives.

o Improving the Mission Capable (MC) rate through RM&A analysis and development projects to provide system improvements that help meet or exceed the

required MC rate. These efforts focus on increasing reliability of the air vehicle, command and control systems, voice and data communications systems, computer, sensor systems and infrastructure improvements.

o Solving diminishing manufacturing sources (DMS) logistics problems.

o Inserting new technologies with the aim of reducing maintenance man-hours along with periodic depot maintenance (PDM) improvements to increase aircraft availability.

New and Ongoing RM&A Efforts (through FY10):

ESM LMP is scheduled to complete development and begin a transition to production in FY10

RM&A Efforts completed RDT&E and transitioned to production/installation (through FY10):

Fuel Quantity Indication System began production and install in FY07

Low Power Filters completed RDT&E in FY07, production starts in FY09 with FY08 GWOT funds.

Solid State Trigger Pulse Amplifier is scheduled to begin production and installation in FY10

RM&A Efforts Completed or completing production/installation (through FY10):

140KVA Bus Input Power completed installation in FY07

Falcon View completed installation in FY07

DC Power Reliability Improvement completed in FY08

Auxiliary Power Unit Insulation Replacement is scheduled to complete in FY09

High Voltage Filters is scheduled to complete installation in FY09

Wideband Klystron Power Amplifier is scheduled to complete installation in FY09

Rotary Couplers is scheduled to complete installation in FY10

This program element funds the following efforts to synchronize modernization requirements across the entire weapon system-from depot and field test equipment, to maintenance trainers, to simulators, to integration labs, to the TS-3 Developmental Test and Evaluation Aircraft (RDT&E, AF):

7. Test System-3/AWACS Integration Test Support (AITS): 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 system level DT&E 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.

8. The Training, Support, and Infrastructure (TSI) programs cover required cross cutting programs and activities in support of AWACS modernization and enhancement efforts. These include managing the AWACS developmental infrastructure, support for equipment concurrency, modernization planning/analysis, and trainer/simulator integration and concurrency. The E-3 Radar Systems Integration Lab/Software Development Facility (SIL/SDF) is maintained, operated to provide customers with a functioning E-3 radar configuration in support of AWACS US, FMS and International radar development, production, and sustainment programs.

Exhibit R-2, RDT&E Budget Item Justification	DATE May 2009
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0207417F Airborne Warning and Control System (AWACS)

New support equipment technologies and test strategies need to be analyzed to ensure concurrent capability to sustain existing, 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.

This program element also funds efforts that look toward the future-investigating enhanced capabilities and exploring new mission areas (RDT&E, AF):

9. Command & Control, Intelligence, Surveillance and Reconnaissance (C2ISR) System Improvements: C2ISR System Improvements investigate and develop future capabilities of the AWACS weapon system, or next C2ISR platform. These efforts also include the investigation, analysis and development to assure that AWACS successfully integrates with Joint and Coalition forces in a net-centric environment. Examples of these activities include, but are not limited to:

o Evaluate emerging operational needs, concepts, and technologies to enable integration of AWACS' capabilities to align with integrated C2ISR network architectures as defined in Joint Vision 2020, Air Expeditionary Force CONOPS, C2 Constellation CONOPS, Air Force CONOPS, and C2ISR Mission area plans.

o Improving sensors, communications, and multi-sensor integration such as the ability to send, receive, and fuse the air (and ground) picture via data link to fighter aircraft, through rapid prototyping, modeling, simulation, and participation in Joint exercises (e.g., Joint Expeditionary Forces Experiment (JEFX) and Empire Challenge (EC)).

o Improving the timeliness and accuracy of information passed to/from fighter aircraft in the engagement zone by providing consistent and re-playable post-mission data to provide quicker reaction capabilities to support the air war.

o Exploring concepts, developing technology, and demonstrating efforts that support continuous improvements and self-protection for C2ISR capabilities of manned & unmanned platforms, space, data links, and advanced Battle Management decision tools.

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

		FY 2008	FY 2009	FY 2010
(U)	Previous President's Budget	151.593	126.300	170.511
(U)	Current PBR/President's Budget	146.341	125.710	176.040
(U)	Total Adjustments	-5.252	-0.590	
(U)	Congressional Program Reductions		-0.249	
	Congressional Rescissions		-0.341	
	Congressional Increases			
	Reprogrammings	-1.248		
	SBIR/STTR Transfer	-4.004		

(U) Significant Program Changes:

1. The increase in the Current PBR/President's Budget from FY 2009 to FY 2010 is due to changing from a fee-for-service contract strategy to secure Block 40/45 Mission Crew Trainers to a development and acquisition of a Block 40/45 Mission Crew Trainer capability, and the beginning of the Engineering and Manufacturing Development (EMD) Phase for the DRAGON modification.

Exhibit R-2a, RDT&E Project Justification			DATE: May 2009
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 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total
411L	Airborne Warning & Control System (AWACS)	146.341	125.710	176.040	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

Mission: AWACS is the premier airborne platform providing command and control (C2)/battle management (BM) to Commander In Chief and combatant commander tasking for Joint, Allied, and Coalition operations, Humanitarian Relief, and Homeland Defense. AWACS provides a real-time picture of friendly, neutral, and hostile air activity. Its capabilities include all-altitude/all-weather surveillance of the battle space; early warning of enemy actions; a real-time ability to find, fix, track, and assess airborne or maritime threats; and detection, location, and identification of electronic emitters.

Budget Justification: This funding is in Budget Activity 7, Operational Systems Development, since the efforts support a fielded, operational weapon system. This funding will be used to investigate, develop, and integrate 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. 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 (NATO, United Kingdom, France, and Saudi Arabia). The efforts will coordinate with and participate in projects developing international standards (including NATO standards) to ensure joint, allied, and coalition interoperability.

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Exhibit R-2a, RDT&E Project Justification		DATE May 2009
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)**

New support equipment technologies and test strategies need to be analyzed to ensure concurrent capability to sustain existing, 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.

This program element also funds efforts that look toward the future-investigating enhanced capabilities and exploring new mission areas (RDT&E, AF):

9. Command & Control, Intelligence, Surveillance and Reconnaissance (C2ISR) System Improvements: C2ISR System Improvements investigate and develop future capabilities of the AWACS weapon system, or next C2ISR platform. These efforts also include the investigation, analysis and development to assure that AWACS successfully integrates with Joint and Coalition forces in a net-centric environment. Examples of these activities include, but are not limited to:

o Evaluate emerging operational needs, concepts, and technologies to enable integration of AWACS' capabilities to align with integrated C2ISR network architectures as defined in Joint Vision 2020, Air Expeditionary Force CONOPS, C2 Constellation CONOPS, Air Force CONOPS, and C2ISR Mission area plans.

o Improving sensors, communications, and multi-sensor integration such as the ability to send, receive, and fuse the air (and ground) picture via data link to fighter aircraft, through rapid prototyping, modeling, simulation, and participation in Joint exercises (e.g., Joint Expeditionary Forces Experiment (JEFX) and Empire Challenge (EC)).

o Improving the timeliness and accuracy of information passed to/from fighter aircraft in the engagement zone by providing consistent and re-playable post-mission data to provide quicker reaction capabilities to support the air war.

o Exploring concepts, developing technology, and demonstrating efforts that support continuous improvements and self-protection for C2ISR capabilities of manned & unmanned platforms, space, data links, and advanced Battle Management decision tools.

(U)	**B. Accomplishments/Planned Program ($ in Millions)**	FY 2008	FY 2009	FY 2010
(U)	Accomplishments/Planned Programs			
(U)	Continuing Block 40/45 EMD effort including pre-production efforts and MCTs	92.363	61.770	98.016
(U)	Continuing Next Generation Identification Friend or Foe (IFF)	8.206	24.688	19.135
(U)	Completing Navigational Warfare (NAVWAR) EMD (FY08 Completion)	0.026	0.000	0.000
(U)	Beginning EMD effort on DRAGON in FY10	0.000	0.000	13.167
(U)	Beginning Technology Development on Net-Centric Capability (NCC)	0.000	0.000	2.000
(U)	Continuing RM&A - Support the War Fighter (STWF) projects	3.299	3.703	7.392
(U)	Continuing Test System-3/AITS support and Program Sustaining efforts	24.981	21.258	23.063
(U)	Continuing Training, Support and Infrastructure (TSI) efforts	6.398	5.107	5.321
(U)	Continuing C2ISR System Improvements and Advanced Projects	11.068	9.184	7.946
(U)	Total Cost	146.341	125.710	176.040

Exhibit R-2a, RDT&E Project Justification		DATE May 2009
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) C. Other Program Funding Summary ($ in Millions)

	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total Cost
(U) AF RDT&E										
(U) Other APPN										
(U) Aircraft Procurement, AF, E-3 Mods (PE 0207417F)	76.834	86.155	76.807						Continuing	TBD
(U) Aircraft Procurement, AF, E-3 Mods (PE 0809731F)			2.456						Continuing	TBD
(U) E-3 Initial Spares, AF	5.875	6.287	10.785						Continuing	TBD

Note: FY2008 APAF, E-3 Mods (PE 27417F) funding totals include $23.038 in GWOT funding for Low Power Filters.

(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: May 2009

BUDGET ACTIVITY: 07 Operational System Development

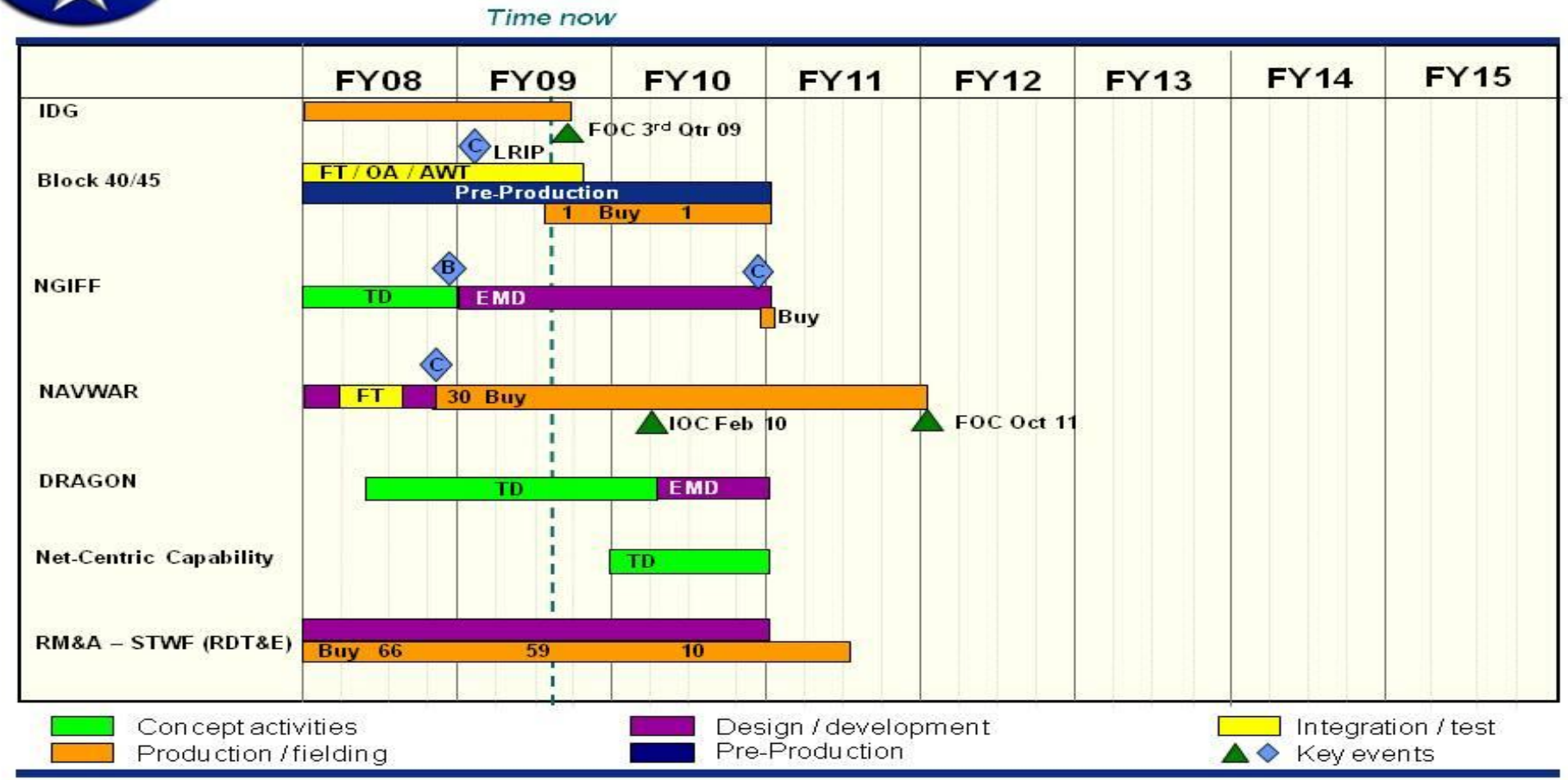
PE NUMBER AND TITLE: 0207417F Airborne Warning and Control System (AWACS)

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 2008 Cost	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	FY 2010 Cost	FY 2010 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	812.520	85.017	Jun-08	48.685	Oct-08	82.568	Oct-09	Continuing	TBD	TBD
(U) Next Generation Identification Friend or Foe (IFF)	CPFF/CPIF	Boeing - Seattle, WA	1.002	7.247	Oct-08	21.960	Feb-09	16.820	Nov-09	Continuing	TBD	TBD
(U) NAVWAR	SS/Multiple	Boeing - Seattle, WA	12.905	0.026	Mar-08	0.000		0.000		0.000	12.931	10.250
(U) DRAGON	TBD	TBD	0.000	0.000		0.000		10.663	Mar-10	Continuing	TBD	TBD
(U) Net-Centric Capability (NCC)	TBD	Boeing - Seattle, WA	0.000	0.000		0.000		2.000	Oct-09	Continuing	TBD	
(U) RM&A - Support the War Fighter (STWF)	TBD	TBD	0.000	3.299	Jan-08	4.273	Jan-09	7.609	Jan-10	Continuing	TBD	TBD
(U) C2ISR System Improvement	SS/FPIF & CPAF	Boeing - Seattle, WA	75.478	5.145	Oct-07	9.141	Oct-08	7.934	Oct-09	Continuing	TBD	TBD
(U) Prior Platform Modifications	Multiple	Boeing - Seattle, WA	1,590.650								1,590.650	
Subtotal Product Development			2,492.555	100.734		84.059		127.594		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	347.717	22.706	Oct-07	20.271	Oct-08	25.197	Oct-09	Continuing	TBD	TBD
Subtotal Support			347.717	22.706		20.271		25.197		Continuing	TBD	TBD
Remarks:												
(U) Test & Evaluation												
(U) Test System-3 AWACS Development and Production Test (ADAPT) Contract/ AWACS Integration Test Support (AITS) Contract / Other test activities	SS/Multiple	Boeing - Seattle, WA	147.129	16.503	Oct-07	16.297	Oct-08	17.935	Oct-09	Continuing	TBD	TBD
(U) Training, Support & Infrastructure (TSI)	SS/Multiple	Boeing - Seattle, WA	10.307	6.398	Jan-08	5.083	Jan-09	5.314	Jan-10	Continuing	TBD	TBD
Subtotal Test & Evaluation			157.436	22.901		21.380		23.249		Continuing	TBD	TBD
Remarks:												
(U) Management												
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000 0.000	0.000
Remarks:												
(U) Total Cost			2,997.708	146.341		125.710		176.040		Continuing	TBD	TBD

Exhibit R-4, RDT&E Schedule Profile		DATE: May 2009
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)

AWACS Schedule



FY10 Staffer Brief

Depicted by installation/production flow

Exhibit R-4a, RDT&E Schedule Detail		DATE May 2009
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) **Schedule Profile**	FY 2008	FY 2009	FY 2010
(U) IDG Production	1-4Q	1-3Q	
(U) IDG FOC		3Q	
(U) 40/45 Flight Test/Operational Assessment (FT / OA)	1-4Q		
(U) 40/45 Airworthiness Testing (AWT)	4Q	1-4Q	
(U) 40/45 Pre-Production	1-4Q	1-4Q	1-4Q
(U) 40/45 LRIP Milestone C		1Q	
(U) 40/45 Production		3-4Q	1-4Q
(U) Next Generation IFF Technology Development Completion	1-4Q		
(U) Next Generation IFF Milestone B	4Q		
(U) Next Generation IFF EMD		1-4Q	1-4Q
(U) Next Generation IFF Milestone C			4Q
(U) Next Generation IFF Production			4Q
(U) NAVWAR EMD	1-4Q		
(U) NAVWAR Flight Test	2-3Q		
(U) NAVWAR Milestone C	4Q		
(U) NAVWAR Production	4Q	1-4Q	1-4Q
(U) NAVWAR IOC			2Q
(U) DRAGON Technology Development	2-4Q	1-4Q	1-2Q
(U) DRAGON EMD			2-4Q
(U) Net-Centric Capability (NCC) Technology Development			1-4Q
(U) RM&A - Support the War Fighter (STWF)	1-4Q	1-4Q	1-4Q