PE NUMBER: 0302015F
PE TITLE: E-4B NATIONAL AIRBORNE OPERATIONS CENTER

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER

	Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	34.661	11.074	18.909	6.489	8.436	13.034	17.476	0.000	0.000	210.293
4777	E-4B Aircraft Modernization	34.661	11.074	18.909	6.489	8.436	13.034	17.476	0.000	0.000	210.293

(U) A. Mission Description and Budget Item Justification

The E-4B National Airborne Operations Center (NAOC) modernization program upgrades the fleet of four highly modified Boeing 747-200 aircraft to add new capability and improve reliability for its two primary missions (nuclear command and control and senior national leader support). The E 4B NAOC fleet satisfies the military requirement to provide a survivable operations center as an alternate to the National Military Command Center (NMCC) located in the Pentagon. The E-4B NAOC fleet also satisfies the military need for an airborne operations center with communications capabilities that will permit senior national leadership to monitor and control military and civil national assets during all phases of national conflict or disaster. Developmental modifications include, but are not limited to, upgrades and enhancements to aircraft structures, propulsion system, fuel system, environmental control system, electrical generation and distribution systems, flight safety and navigation systems (with their associated communications equipment), and the related aircraft operations center facilities, equipment, and communications necessary for the E-4B fleet to execute its primary mission as an alternate NMCC.

Modifications currently underway or planned for accomplishment under this project in the next seven years include:
- Modification Block 1 (Mod Blk 1): A group designator for modifications being started and completed together on the same aircraft. The RDT&E elements of Mod Blk 1 include Audio Infrastructure Update (AIU) (formerly Block 5A) and Global Air Traffic Management (GATM) II. The Senior Leaders Communication System (SLCS) is also included in the Mod Blk 1 work, but is not considered R&D work. The SLCS modification is entirely funded with Aircraft Procurement (Aircraft Modification) funds.

-- Audio Infrastructure Update (AIU) affects the primary mission internal audio distribution and recording system. It replaces obsolete 1960s era analog equipment with digital technology that corrects a major sustainment issue associated with out-dated analog voice, data distribution, and recording equipment. The planning for the internal noise reduction modification of the senior leadership conference room (Area 4) was completed during FY03 as part of the "Block 5B - Data Concept Exploration." The exploration revealed installation of the Area 4 noise reduction would be most efficiently performed if done in conjunction with the AIU modification. Consequently, the internal noise reduction modification for Area 4 is being performed as part of the AIU modification.

-- Global Air Traffic Management (GATM) II is the second part of a 3-phased implementation of Global Access, Navigation, and Safety/Global Air Traffic Management modifications to permit unencumbered access to international airspace and to maintain the level of E-4B flight safety consistent with civil standards that become effective in CY05.

-- Senior Leader Communication System (SLCS): The FY02 Defense Emergency Response Funds (DERF) funded a SLCS study which concluded that the technical solution would not require research and development. Consequently, the SLCS modification is funded with Aircraft Procurement modification funds. SLCS will provide an 'office in the sky' capability for senior leaders that includes commercial Direct Broadcast Service (DBS), International Maritime Satellite (INMARSAT) access, and video teleconferencing capability, plus access to Defense Information System Network (DISN) and Public Switch Network (PSN) for secure/non-secure voice, video and data exchange on and off the airplane (external e-mail and Internet access).

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER

- Data LAN Infrastructure (DLI) (formerly part of Block 5B): A primary mission equipment modification that will greatly improve the ability to receive, store, manipulate, distribute and view information related to the aircraft's primary mission. DLI will increase bandwidth onto, throughout, and from the aircraft for the movement of intelligence, organizational messaging, war planning, and operational information. These enhancements will increase the accuracy, timeliness, and throughput of tactical and strategic information presented to embarked military decision-making commanders. (Internal Noise Reduction moved to AIU portion of Mod Blk 1). This modification may be installed either during depot level maintenance or during field maintenance.

- Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM-1): This modification is the third phase of implementing air traffic communications and management capabilities via a series DoD-wide projects formerly known as GATM. The CNS/ATM-1 modification implements capabilities that increases the precision of the E-4B air navigation thus permitting the aircraft to meet the evolving required navigation performance down to 0.3 nautical mile (RNP .3). This CNS/ATM I phase provides hardware, software and integration efforts for Automatic Dependent Surveillance-Broadcast (ADS-B), Wide Area Augmentation System (WAAS) and Local Area Augmentation System (LAAS). These modifications are required for compliance with both US and foreign air traffic management requirements. Failure to bring the E-4B into compliance with these requirements will result in circuitous routing and/or access denial to some air space typically used in support of E-4B missions. Installation of this modification requires a depot level maintenance availability.

- C-3 Ultra High Frequency (UHF) Digitization: The UHF radio link between the airborne elements (which includes the E-4B) and the Northstar ground entry points (GEPs) is in the process of converting from an analog to a digital format to both reduce long term network costs and to provide additional communication capabilities to its users. The funds for this modernization is for work on just the E-4B aircraft and will provide Internet Protocol (IP) based connectivity to the Internet at both the unclassified and the secret classification levels. It will also provide Video Teleconference Conference (VTC) capabilities, Voice over IP (VoIP) and access to Secure Internet Protocol Router (SIPRNET) with data rate processing up to 1.544Mbps via the digital UHF link to the GEPs. This modification may be installed either during depot level maintenance or during field maintenance.

- Super High Frequency (SHF) Multiplexer (MUX) Upgrade: This modification combines secure and non-secure digital signals into one data stream for transmission over the Frequency Division Multiple Access (FDMA) modem or USC-28. The multiplexer replacement is a dual V-100 MUX. The technical risk of integrating the new multiplexer into the E-4B communication suite is sufficiently high to justify the use of RDT&E funding on the prototype aircraft. This modification may be installed either during depot level maintenance or during field maintenance.

The E-4B program is categorized as a budget activity 7 - Operational System Development, because it develops modifications for a fielded system.

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER

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

		FY 2004	FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	44.000	11.172	6.323	0.286
(U)	Current PBR/President's Budget	34.661	11.074	18.909	6.489
(U)	Total Adjustments	-9.339	-0.098		
(U)	Congressional Program Reductions				
	Congressional Rescissions		-0.098		
	Congressional Increases				
	Reprogrammings	-8.040			
	SBIR/STTR Transfer	-1.299			

(U) Significant Program Changes:

The Department has updated the estimated cost of the DLI project and has subsequently revised the mix of RDT&E and Procurement funds in FY06 and FY07. The increased amount of R&D requested in FY06 and FY07 is a reflection of the revised program estimate and is indicative of an expanded development to program to more thoroughly identify and solve technical problems associated with accreditation and operation of a COTS-based, airborne, multi-level secure (MLS) LAN. Additionally, a new project begins in FY06 to redesign and replace a component (multiplexer) in the aircraft's SHF communication system. This replacement is required to correct a design fault that has degraded the reliability of this mission critical communication system. The reprogramming of about $8.0M of FY04 funds out of the program was done when contracts were awarded below estimated costs. No program content nor schedule change resulted from this transfer of funds.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2005
BUDGET ACTIVITY: 07 Operational System Development	PE NUMBER AND TITLE: 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER	PROJECT NUMBER AND TITLE: 4777 E-4B Aircraft Modernization	

Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
4777 E-4B Aircraft Modernization	34.661	11.074	18.909	6.489	8.436	13.034	17.476	0.000	0.000	210.293
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

The E-4B National Airborne Operations Center (NAOC) modernization program upgrades the fleet of four highly modified Boeing 747-200 aircraft to add new capability and improve reliability for its two primary missions (nuclear command and control and senior national leader support). The E 4B NAOC fleet satisfies the military requirement to provide a survivable operations center as an alternate to the National Military Command Center (NMCC) located in the Pentagon. The E-4B NAOC fleet also satisfies the military need for an airborne operations center with communications capabilities that will permit senior national leadership to monitor and control military and civil national assets during all phases of national conflict or disaster. Developmental modifications include, but are not limited to, upgrades and enhancements to aircraft structures, propulsion system, fuel system, environmental control system, electrical generation and distribution systems, flight safety and navigation systems (with their associated communications equipment), and the related aircraft operations center facilities, equipment, and communications necessary for the E-4B fleet to execute its primary mission as an alternate NMCC.

Modifications currently underway or planned for accomplishment under this project in the next seven years include:
- Modification Block 1 (Mod Blk 1): A group designator for modifications being started and completed together on the same aircraft. The RDT&E elements of Mod Blk 1 include Audio Infrastructure Update (AIU) (formerly Block 5A) and Global Air Traffic Management (GATM) II. The Senior Leaders Communication System (SLCS) is also included in the Mod Blk 1 work, but is not considered R&D work. The SLCS modification is entirely funded with Aircraft Procurement (Aircraft Modification) funds.

-- Audio Infrastructure Update (AIU) affects the primary mission internal audio distribution and recording system. It replaces obsolete 1960s era analog equipment with digital technology that corrects a major sustainment issue associated with out-dated analog voice, data distribution, and recording equipment. The planning for the internal noise reduction modification of the senior leadership conference room (Area 4) was completed during FY03 as part of the "Block 5B - Data Concept Exploration." The exploration revealed installation of the Area 4 noise reduction would be most efficiently performed if done in conjunction with the AIU modification. Consequently, the internal noise reduction modification for Area 4 is being performed as part of the AIU modification.

-- Global Air Traffic Management (GATM) II is the second part of a 3-phased implementation of Global Access, Navigation, and Safety/Global Air Traffic Management modifications to permit unencumbered access to international airspace and to maintain the level of E-4B flight safety consistent with civil standards that become effective in CY05.

-- Senior Leader Communication System (SLCS): The FY02 Defense Emergency Response Funds (DERF) funded a SLCS study which concluded that the technical solution would not require research and development. Consequently, the SLCS modification is funded with Aircraft Procurement modification funds. SLCS will provide an 'office in the sky' capability for senior leaders that includes commercial Direct Broadcast Service (DBS), International Maritime Satellite (INMARSAT) access, and video teleconferencing capability, plus access to Defense Information System Network (DISN) and Public Switch Network (PSN) for secure/non-secure voice, video and data exchange on and off the airplane (external e-mail and Internet access).

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER	PROJECT NUMBER AND TITLE 4777 E-4B Aircraft Modernization

- Data LAN Infrastructure (DLI) (formerly part of Block 5B): A primary mission equipment modification that will greatly improve the ability to receive, store, manipulate, distribute and view information related to the aircraft's primary mission. DLI will increase bandwidth onto, throughout, and from the aircraft for the movement of intelligence, organizational messaging, war planning, and operational information. These enhancements will increase the accuracy, timeliness, and throughput of tactical and strategic information presented to embarked military decision-making commanders. (Internal Noise Reduction moved to AIU portion of Mod Blk 1). This modification may be installed either during depot level maintenance or during field maintenance.

- Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM-1): This modification is the third phase of implementing air traffic communications and management capabilities via a series DoD-wide projects formerly known as GATM. The CNS/ATM-1 modification implements capabilities that increases the precision of the E-4B air navigation thus permitting the aircraft to meet the evolving required navigation performance down to 0.3 nautical mile (RNP .3). This CNS/ATM I phase provides hardware, software and integration efforts for Automatic Dependent Surveillance-Broadcast (ADS-B), Wide Area Augmentation System (WAAS) and Local Area Augmentation System (LAAS). These modifications are required for compliance with both US and foreign air traffic management requirements. Failure to bring the E-4B into compliance with these requirements will result in circuitous routing and/or access denial to some air space typically used in support of E-4B missions. Installation of this modification requires a depot level maintenance availability.

- C-3 Ultra High Frequency (UHF) Digitization: The UHF radio link between the airborne elements (which includes the E-4B) and the Northstar ground entry points (GEPs) is in the process of converting from an analog to a digital format to both reduce long term network costs and to provide additional communication capabilities to its users. The funds for this modernization is for work on just the E-4B aircraft and will provide Internet Protocol (IP) based connectivity to the Internet at both the unclassified and the secret classification levels. It will also provide Video Teleconference Conference (VTC) capabilities, Voice over IP (VoIP) and access to Secure Internet Protocol Router (SIPRNET) with data rate processing up to 1.544Mbps via the digital UHF link to the GEPs. This modification may be installed either during depot level maintenance or during field maintenance.

- Super High Frequency (SHF) Multiplexer (MUX) Upgrade: This modification combines secure and non-secure digital signals into one data stream for transmission over the Frequency Division Multiple Access (FDMA) modem or USC-28. The multiplexer replacement is a dual V-100 MUX. The technical risk of integrating the new multiplexer into the E-4B communication suite is sufficiently high to justify the use of RDT&E funding on the prototype aircraft. This modification may be installed either during depot level maintenance or during field maintenance.

The E-4B program is categorized as a budget activity 7 - Operational System Development, because it develops modifications for a fielded system.

(U)	**B. Accomplishments/Planned Program ($ in Millions)**	FY 2004	FY 2005	FY 2006	FY 2007
(U)	Completed AIU (formerly part of Blk 5A, now a component of Mod Blk 1) System Engineering & Prototype Kit (MN-4381)	2.800			
(U)	Completed GATM II System Engineering and Prototype Kit (MN-9709)	0.618			
(U)	Contractor Technical and Program Management Support	2.371	1.504	1.185	0.165
(U)	Mod Blk 1 - AIU prototype installation (formerly called Block 5A)	25.083	8.470		
(U)	Mod Blk 1 - GATM II prototype installation	3.539	1.000		
(U)	Began Data LAN Infrastructure (formerly part of Blk 5B) - Data Concept Exploration (MN-4381B)	0.250	0.100		

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER	PROJECT NUMBER AND TITLE 4777 E-4B Aircraft Modernization

(U)	Engineering Development of DLI								10.872	1.368
(U)	Hardware Purchase for DLI Prototype								5.782	
(U)	Install of DLI Prototype									0.951
(U)	CNS/ATM-1 Requirements Study									0.286
(U)	Engineering Development of SHF MUX Upgrade (MN-4391)								0.895	0.278
(U)	Hardware Purchase for SHF MUX Prototype								0.175	
(U)	Install of SHF MUX Prototype									0.007
(U)	Engineering Development of C-3 UHF Digitization (MN-4389)									1.839
(U)	Hardware Purchase for C-3 UHF Digitization Prototype									1.595
(U)	Total Cost					34.661		11.074	18.909	6.489

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

		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U)	Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4381 (AIU--formerly Blk 5A); Mod 9709 (GATM Phase II)	28.504	75.325	63.235	28.570					0.000	195.634
(U)	Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4381 DLI				26.957	18.163				0.000	45.120
(U)	Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 9709D Communciation Navigation Surveillance/Air Traffic Management -1							5.800	20.261	34.466	60.527
(U)	Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE				0.188	0.121					0.309

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY **07 Operational System Development**	PE NUMBER AND TITLE **0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER**	PROJECT NUMBER AND TITLE **4777 E-4B Aircraft Modernization**

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

	0302015F; Mod 4391 SHF MUX Upgrade Aircraft Procurement AF, Budget Activity 5, Weapon				
(U)	System Code E00400, PE 0302015F; Mod 4389 C-3 UHF Digitization	3.258	2.894		6.152

(U) D. Acquisition Strategy

The E-4B is executing an incremental improvement of E-4B capabilities and in some cases replacing components due to aging aircraft sustainment issues. System engineering, design, and prototype installations will be obtained under a directed award (sole source), Cost Plus Incentive Fee (CPIF) contract.

Exhibit R-3, RDT&E Project Cost Analysis

DATE: **February 2005**

BUDGET ACTIVITY: **07 Operational System Development**

PE NUMBER AND TITLE: **0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER**

PROJECT NUMBER AND TITLE: **4777 E-4B Aircraft Modernization**

(U) Cost Categories (Tailor to WBS, or System/Item Requirements) ($ in Millions)	Contract Method & Type	Performing Activity & Location	Total Prior to FY 2004 Cost	FY 2004 Cost	FY 2004 Award Date	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost to Complete	Total Cost	Target Value of Contract
(U) Product Development														
Boeing - Wichita	Sole Source CPIF	Witchita Development & Modificaiton Center	29.506	32.241	Nov-03	9.570	Nov-04	17.724	Nov-05	6.324	Nov-06	36.101	131.466	TBD
Subtotal Product Development			29.506	32.241		9.570		17.724		6.324		36.101	131.466	TBD
Remarks:														
(U) Support														
Communications interoperability engineering and requirements development	Various MIPRs	DISA and other DoD Activities at Arlington, VA	1.742	0.673	Feb-04	0.115	Jan-05	0.100	Nov-05				2.630	TBD
Requirements development and programming support	MIPR	Air Combat Command (ACC) at Hampton, VA	0.364	0.185	Nov-05	0.377	Jan-05	0.200	Jan-06				1.126	TBD
DLI MLS Testing	MIPR	Space and Naval Warfare Systems Command (SPAWARS YSCOM) at San Diego, CA		0.240	Feb-04								0.240	TBD
Mod Blk 1 Test Development and Execution	MIPR	Joint Interoperability Test Command (JITC) at Fort Huachuca, AZ				0.079	Jan-05						0.079	TBD
Subtotal Support			2.106	1.098		0.571		0.300		0.000		0.000	4.075	TBD
Remarks:														
(U) Test & Evaluation														
Mod Blk 1 test plan development and test execution	Project Order	605th Flight Test	0.443	0.288	Oct-03	0.299	Nov-04	0.109	Nov-05				1.139	TBD

Exhibit R-3, RDT&E Project Cost Analysis

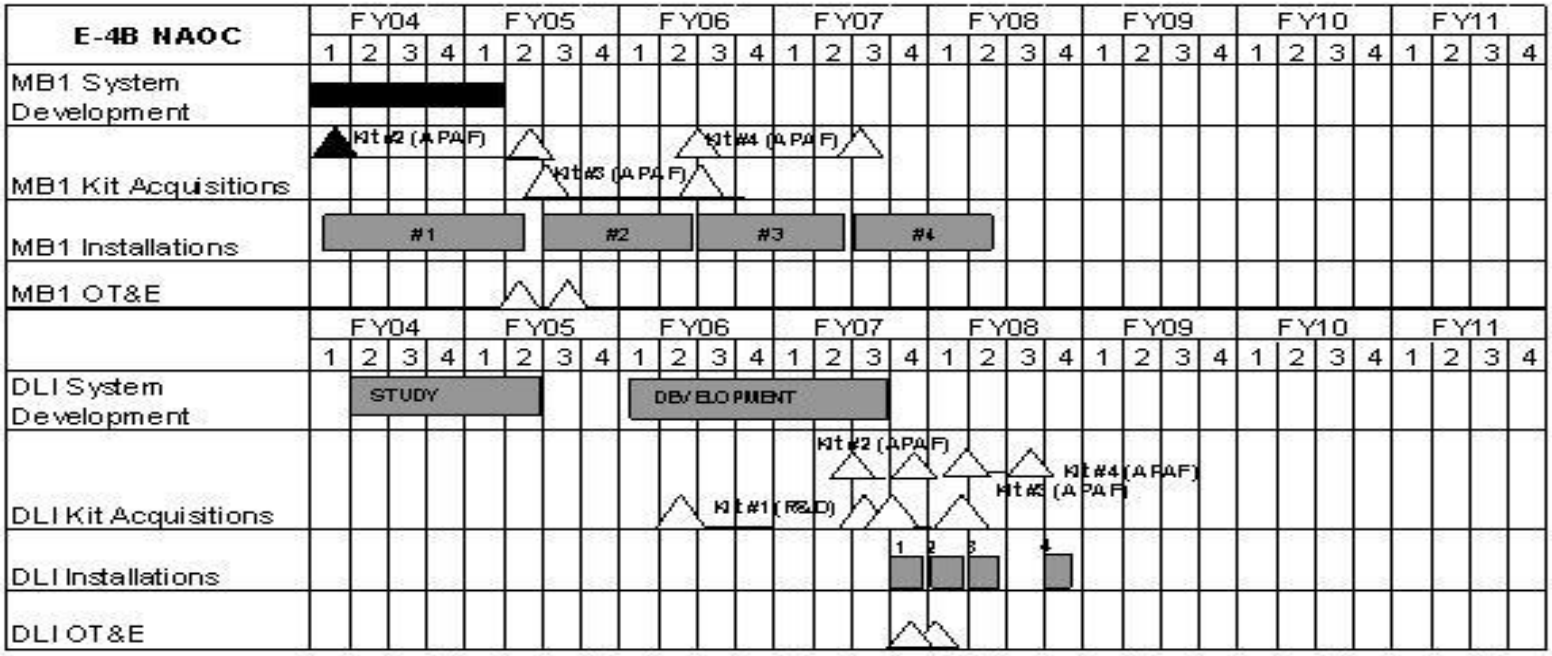
DATE: **February 2005**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
07 Operational System Development	**0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER**	**4777 E-4B Aircraft Modernization**

			Squadron at Eglin AFB, FL														
	CNS/ATM I test plan development and execution	TBD	TBD												0.000		TBD
	Subtotal Test & Evaluation			0.443	0.288		0.299		0.109		0.000		0.000		1.139		TBD
	Remarks:																
(U)	Management																
	E-4B Program Office contractor support	Sole Source T&M	Northrop Grumman at Oklahoma City, OK	2.956	1.034	Jan-04	0.634	Jan-05	0.776	Jan-06					5.400		TBD
	Recompete of above E-4B Program Office support	TBD	TBD	0.000							0.165	Jan-07	2.717		2.882		
	Subtotal Management			2.956	1.034		0.634		0.776		0.165		2.717		8.282		TBD
	Remarks:																
(U)	Total Cost			35.011	34.661		11.074		18.909		6.489		38.818		144.962		TBD

Exhibit R-4, RDT&E Schedule Profile		DATE: February 2005
BUDGET ACTIVITY: 07 Operational System Development	PE NUMBER AND TITLE: 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER	PROJECT NUMBER AND TITLE: 4777 E-4B Aircraft Modernization

E-4B, National Airborne Operations Center (NAOC)



Planned Activity(s)
Completed Activity
Completed Event
Planned Task(s)

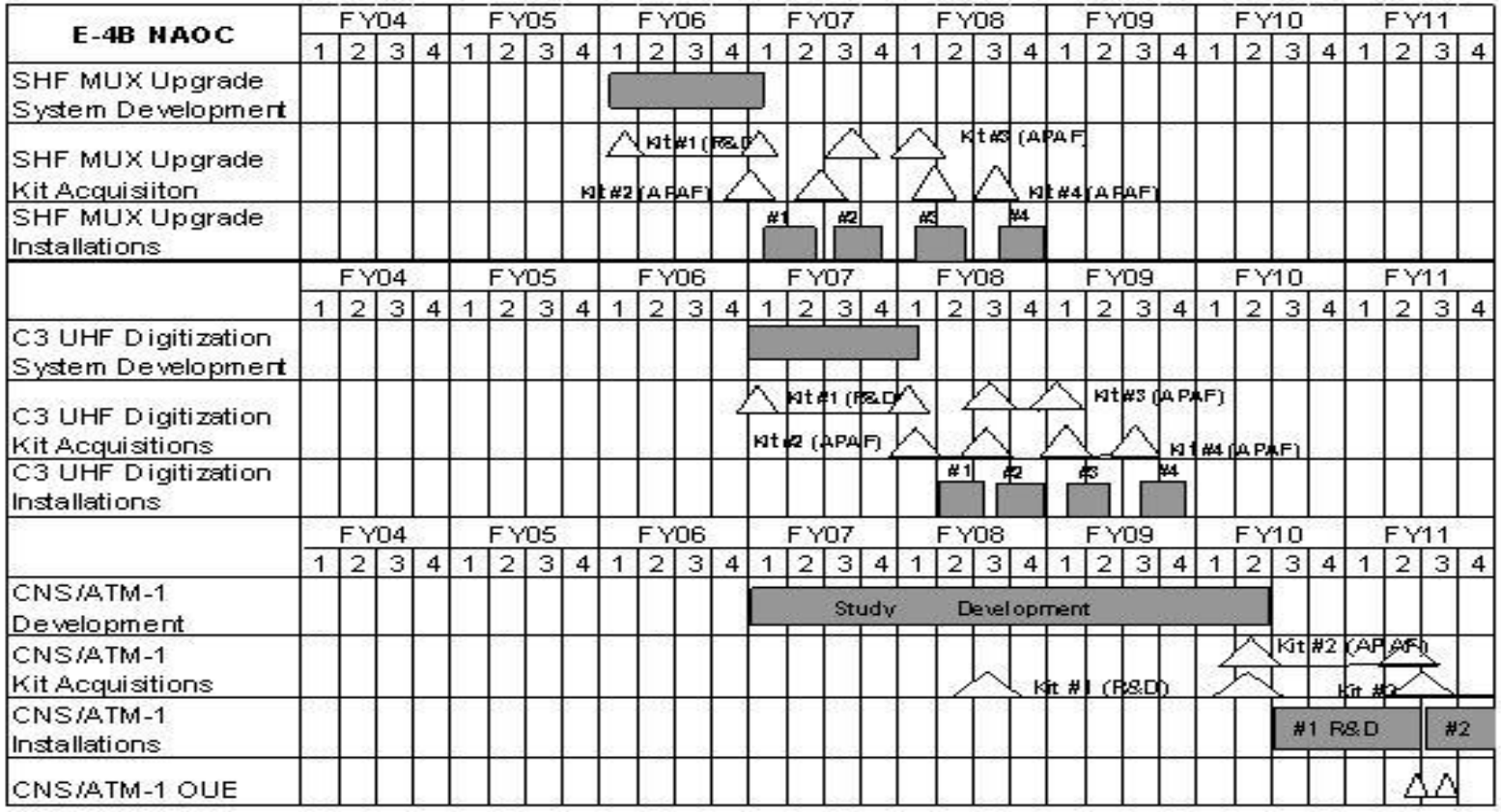
ACRONYMS & ABBREVIATIONS

MB1:	Modification Block 1
DLI:	Data LAN Infrastructure
SHF:	Super High Frequency
UHF:	Ultra High Frequency
MUX:	Multiplexer
CNS/ATM:	Communications, Navigation, Surveillance/Air Traffic Management

19 Jan 05

Exhibit R-4, RDT&E Schedule Profile		DATE: February 2005
BUDGET ACTIVITY: 07 Operational System Development	PE NUMBER AND TITLE: 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER	PROJECT NUMBER AND TITLE: 4777 E-4B Aircraft Modernization

E-4B, National Airborne Operations Center (NAOC) Con't



Planned Activity(s)

Completed Activity

▲ Completed Event

△ Planned Task(s)

ACRONYMS & ABBREVIATIONS

MB1:	Modification Block 1
DLI:	Data LAN Infrastructure
SHF:	Super High Frequency
UHF:	Ultra High Frequency
MUX:	Multiplexer
CNS/ATM:	Communications, Navigation, Surveillance/Air Traffic Management

19 Jan 05

Exhibit R-4a, RDT&E Schedule Detail			DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER		PROJECT NUMBER AND TITLE 4777 E-4B Aircraft Modernization

(U) Schedule Profile	FY 2004	FY 2005	FY 2006	FY 2007
(U) Modification Block I (Mod Blk 1)	1Q			
(U) -- Mod Blk 1 - System engineering Complete		2Q		
(U) -- Prototype Install Input	1Q			
(U) -- Prototype Delivers		2Q		
(U) -- Prototype OT&E		3Q		
(U) -- Production Kit #1 Ordered	2Q			
(U) -- Production Kit #1 Delivers		2Q		
(U) -- Production #1 Input		3Q		
(U) -- Production #1 Delivers			3Q	
(U) -- Production Kit #2 Ordered		2Q		
(U) -- Production Kit #2 Delivers			2Q	
(U) -- Production #2 Input			3Q	
(U) -- Production #2 Delivers				3Q
(U) -- Production Kit #3 Ordered			2Q	
(U) -- Production Kit #3 Delivers				2Q
(U) -- Production #3 Input				3Q
(U) Data LAN Infrastructure (DLI)	2Q			
(U) -- Multi-Level Security Testbed Study	2Q	2Q		1Q
(U) -- Dev Begins			1Q	
(U) -- System Engineering Complete				3Q
(U) -- Prototype Hardware Buy			2Q	
(U) -- Prototype Hardware Delivers				3Q
(U) -- Prototype Install Begins				4Q
(U) -- Production Kit #1 Buy				1Q
(U) -- Production Kit #1 Delivers				3Q
(U) -- Production #1 Install Begins				4Q
(U) Super High Frequency (SHF) Multiplexer Upgrade			1Q	
(U) -- Development Begins			1Q	
(U) -- System Engineering Complete				1Q
(U) -- Prototype Kit Ordered			3Q	
(U) -- Prototype Kit Delivers				1Q
(U) -- Prototype Install Begins				1Q

Exhibit R-4a, RDT&E Schedule Detail		DATE February 2005
BUDGET ACTIVITY **07 Operational System Development**	PE NUMBER AND TITLE **0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER**	PROJECT NUMBER AND TITLE **4777 E-4B Aircraft Modernization**

(U) -- Prototype Install Delivers	2Q
(U) -- Production Kit #1 Ordered	1Q
(U) -- Production Kit #1 Delivers	3Q
(U) -- Production #1 Install Begins	3Q
(U) -- Production #1 Delivers	4Q
(U) -- Production Kit #2 Ordered	3Q
(U) C3 UHF Digitization	1Q
(U) -- Development Begins	1Q
(U) CNS/ATM I	1Q
(U) -- Requirements Update Study Begins	1Q