

UNCLASSIFIED

PE NUMBER: 0302015F

PE TITLE: E-4B NATIONAL AIRBORNE OPERATIONS CENTER

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2007
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BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0302015F E-4B NATIONAL AIRBORNE OPERATIONS CENTER
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Cost (\$ in Millions)	FY 2006 Actual	FY 2007 Estimate	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	14.281	0.282	19.529	4.105	11.665	4.667	1.864	6.041	0.000	210.293
4777 E-4B Aircraft Modernization	14.281	0.282	19.529	4.105	11.665	4.667	1.864	6.041	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 highly modified Boeing 747-200 aircraft to add new capabilities 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 highly survivable alternate operations center 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 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 program include:

- Modification Block 1 (Mod Blk 1): IOC was declared September 2006. FY07 RDT&E funding will be used to final incorporation of technical data in support of the fielded prototype aircraft.

- The E-4B's nuclear command and control mission is supported by a group of twenty-three, fixed ground entry points/stations (GEPs) (NAOC Ground Communications Network, PE: 0302052F) that provide networked connectivity between the E-4B and various high value ground sites. An ultra high frequency (UHF) radio link is used to connect airborne elements of the network with the ground-based portions of the circuit. The UHF radio link between airborne elements and the 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.

Currently, the E-4B crew must temporarily install one of three sets of pre-production equipment to access this digital broadband capability. Following the modification, each of the E-4B aircraft will have a system that is both fully integrated into the E-4B's external communication and data distribution systems and is lighter than the carry-on equipment. An airborne modem will need to be developed since a device suitable for the E-4B mission requirements is not commercially available. The C3 UHF Digitization modernization will provide Internet protocol (IP) based connectivity to the Internet at both the UNCLAS and the SECRET levels. It will also provide Video Conferencing (VTC) capabilities, Voice over IP (VoIP), and access to Secure Internet Protocol Router Network (SIPRNET) with data rate processing up to 1.544Mbps. Digital Northstar provides more flexibility and utility than the current analog UHF/FDM system, including on-the-fly circuit changes, digital bulk encryption to protect the network from monitoring and intrusion, forward error correction, dynamic bandwidth management, and high-speed data transfer.

The goal of the Northstar system is to eventually phase out the analog capability at the GEPs in favor of the digital UHF wave form. This transition to a digital

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only system will not occur before all airborne users have a digital UHF capability similar to that provided by this E-4B modification. The E-4B will retain an analog Northstar UHF capability following the installation of this modification.

- The SHF Multiplexor (MUX) 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 current SHF MUX is an FCC-100 derivative and is prone to intermittent disconnects and poor performance. Defense Information System Agency (DISA) recommended replacing the MUX with a higher reliability device. The anticipated multiplexor replacement is a dual V-100 MUX. A temporary MUX replacement kit was developed and testing confirmed the dual V-100 as the viable replacement for the old SHF MUX. The technical risk for this modification is not hardware but integration. The technical risk of integrating the new multiplexer into the E-4B communication management system is sufficiently high to warrant using RDT&E dollars for the first modification.
- Family of Advanced Beyond-Line-Of-Sight Terminals (FAB-T) will be installed to incorporate Command Post Terminal Replacement (CPTR) capabilities. FAB-T will replace the E-4B Milstar terminal and will provide access to protected wideband Advanced Extremely High Frequency (AEHF) satellite networks. An UHF SATCOM radio Remote Control Head will be acquired and installed to support the UHF radio (AFSATCOM) currently associated with MILSTAR because FAB-T does not support that radio. FAB-T Increment 1 increases data rate capability from Low Data Rate (LDR) to Expanded Data Rate (XDR) and replaces all of the E-4B current MILSTAR equipment except the antenna and antenna control unit. The FAB-T installation will meet or exceed all E-4B airborne environmental and S/V requirements.
- The Presidential National Voice Conferencing (PNVC) system provides survivable, near commercial quality voice conferencing capability for the President and other national/military leaders. The PNVC system replaces Survivable Emergency Conferencing Network (SECN). This modification replaces the following SECN equipment: ANDVT, MILSTAR Summing Device (MSD) KY-99s, and the MSD Remote Control Head.
- The STU-IIIR is a National Security Agency (NSA)-approved Type I cryptographic device used to secure voice and data and is the only STU-III device that is certified for airborne operation. STU-IIIR replacement is driven by the expiration of the current maintenance contract as well as by the established cessation date for keying support of existing STU-IIIs. This modification supports the E-4B Airborne Operations Center Communications Upgrade ORD that validates the need for secure voice and data to subscribers both within and outside the aircraft. NAOC will lose this secure communication capability without this modification. The anticipated STU-IIIR replacement is the STE-RI.

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

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

	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Previous President's Budget	18.639	0.283		
(U) Current PBR/President's Budget	14.281	0.282	19.529	4.105
(U) Total Adjustments	-4.358			
(U) Congressional Program Reductions				
Congressional Rescissions		-0.001		
Congressional Increases				
Reprogrammings	-2.630			
SBIR/STTR Transfer	-1.728			

(U) **Significant Program Changes:**

During the FY07 budget process the Department made the decision to transition the E-4B missions to other existing and planned DoD assets and retire the E-4B fleet beginning FY09 at the rate of one per year. Upon further analysis, the Department decided to delay retirement of the last three aircraft and directed the Air Force to install Modification Block 1 (Mod Block 1) on a third aircraft. This will leave an all-modified fleet of three aircraft beginning in the FY08/09 timeframe. The Air Force is currently analyzing this path forward in order to develop a cost-effective plan while minimizing mission and acquisition risk. Accordingly, additional modifications will be required through FY13 to ensure the aircraft remains mission capable.

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Cost (\$ in Millions)	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total	
4777 E-4B Aircraft Modernization	14.281	0.282	19.529	4.105	11.665	4.667	1.864	6.041	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 highly modified Boeing 747-200 aircraft to add new capabilities 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 highly survivable alternate operations center 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 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 program include:

- Modification Block 1 (Mod Blk 1): IOC was declared September 2006. FY07 RDT&E funding will be used to final incorporation of technical data in support of the fielded prototype aircraft.
- The E-4B's nuclear command and control mission is supported by a group of twenty-three, fixed ground entry points/stations (GEPs) (NAOC Ground Communications Network, PE: 0302052F) that provide networked connectivity between the E-4B and various high value ground sites. An ultra high frequency (UHF) radio link is used to connect airborne elements of the network with the ground-based portions of the circuit. The UHF radio link between airborne elements and the 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.

Currently, the E-4B crew must temporarily install one of three sets of pre-production equipment to access this digital broadband capability. Following the modification, each of the E-4B aircraft will have a system that is both fully integrated into the E-4B's external communication and data distribution systems and is lighter than the carry-on equipment. An airborne modem will need to be developed since a device suitable for the E-4B mission requirements is not commercially available. The C3 UHF Digitization modernization will provide Internet protocol (IP) based connectivity to the Internet at both the UNCLAS and the SECRET levels. It will also provide Video Conferencing (VTC) capabilities, Voice over IP (VoIP), and access to Secure Internet Protocol Router Network (SIPRNET) with data rate processing up to 1.544Mbps. Digital Northstar provides more flexibility and utility than the current analog UHF/FDM system, including on-the-fly circuit changes, digital bulk encryption to protect the network from monitoring and intrusion, forward error correction, dynamic bandwidth management, and high-speed data transfer.

The goal of the Northstar system is to eventually phase out the analog capability at the GEPs in favor of the digital UHF wave form. This transition to a digital only system will not occur before all airborne users have a digital UHF capability similar to that provided by this E-4B modification. The E-4B will retain an analog

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Northstar UHF capability following the installation of this modification.

- The SHF Multiplexor (MUX) 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 current SHF MUX is an FCC-100 derivative and is prone to intermittent disconnects and poor performance. Defense Information System Agency (DISA) recommended replacing the MUX with a higher reliability device. The anticipated multiplexor replacement is a dual V-100 MUX. A temporary MUX replacement kit was developed and testing confirmed the dual V-100 as the viable replacement for the old SHF MUX. The technical risk for this modification is not hardware but integration. The technical risk of integrating the new multiplexor into the E-4B communication management system is sufficiently high to warrant using RDT&E dollars for the first modification.
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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)	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Mod Blk 1 - AIU prototype installation (formerly called Block 5A)	14.281			
(U) Mod Blk 1 - resolve Category II deficiencies on prototype		0.282		
(U) C-3 UHF - Prototype design, kit manufacturing, and install			3.109	4.105
(U) STU III - Prototype design, kit manufacturing and install			16.420	
(U) Total Cost	14.281	0.282	19.529	4.105

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

	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Complete</u>							
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4381 (AIU--formerly Blk 5A)	11.366								0.000	11.366
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 9709 (GATM Phase II)	0.745									
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4389 C-3 UHF Digitization			2.470	2.354						
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4391 SHF MUX Upgrade						0.287	0.396			
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4393 STU III Replacement				12.663						
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4400 FAB-T								1.860		

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Exhibit R-2a (PE 0302015F)

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

(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 4401 PNVC		0.781
(U) Aircraft Procurement AF, Budget Activity 5, Weapon System Code E00400, PE 0302015F; Mod 9709D CNS/ATM	3.500	8.000 5.000

(U) **D. Acquisition Strategy**

Implementation of modifications will be contracted under the sole source Product Support Integration (PSI) with Boeing - Wichita.

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Exhibit R-3, RDT&E Project Cost Analysis

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<u>(U) Cost Categories</u> (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	<u>Contract Method & Type</u>	<u>Performing Activity & Location</u>	<u>Total Prior to FY 2006 Cost</u>	<u>FY 2006 Cost</u>	<u>FY 2006 Award Date</u>	<u>FY 2007 Cost</u>	<u>FY 2007 Award Date</u>	<u>FY 2008 Cost</u>	<u>FY 2008 Award Date</u>	<u>FY 2009 Cost</u>	<u>FY 2009 Award Date</u>	<u>Cost to Complete</u>	<u>Total Cost</u>	<u>Target Value of Contract</u>
<u>(U) Product Development</u> Boeing - Wichita	Sole Source CPIF	Wichita Development & Modification Center, Wichita, KS		12.859	Mar-06	0.282	Mar-07	18.667	Jan-08	3.674	Jan-09	0.000	35.482	13.263
Subtotal Product Development			0.000	12.859		0.282		18.667		3.674		0.000	35.482	13.263
Remarks:														
<u>(U) Support</u> Communications interoperability engineering, requirements development and initial operator training	Various MIPRs	DISA and other DoD Activities at Arlington, VA		0.811	Apr-06							0.000	0.811	0.811
Subtotal Support			0.000	0.811		0.000		0.000		0.000		0.000	0.811	0.811
Remarks:														
<u>(U) Test & Evaluation</u> Mod Blk 1 test plan development and test execution	Project Order	605th Flight Test Squadron at Eglin AFB, FL		0.180	Feb-06							0.000	0.180	0.180
Subtotal Test & Evaluation			0.000	0.180		0.000		0.000		0.000		0.000	0.180	0.180
Remarks:														
<u>(U) Management</u> E-4B Program Office contractor support	Small Business T&M	Efficiency Management and Engineering Company at Oklahoma City, OK		0.431	Jan-06			0.862	Jan-08	0.431	Jan-09	0.000	1.724	0.431
Subtotal Management			0.000	0.431		0.000		0.862		0.431		0.000	1.724	0.431
Remarks:														
<u>(U) Total Cost</u>			0.000	14.281		0.282		19.529		4.105		0.000	38.197	14.685

Exhibit R-4, RDT&E Schedule Profile

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Modification Block 1 Schedule																																
E-4B NAOC	FY06				FY07				FY08				FY09				FY10				FY11				FY12				FY13			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Prototype Mod Blk 1 Design Rework	MB1 #1																															
#2 Mod Blk 1 Installation & Check-Out	MB1 #2																															
MB1 OT&E Preps & Testing	MB1 Test & Evaluation																															
MB1 Mission Capable Prototype Mod Blk 1 Doc Close-Out	#1 MB1 IOC				#2 MB1																											
#3 Mod Blk 1 Installation & Check-Out									MB1 #3																							

MB1: Modification Block 1
MC: Mission Capable
OT&E: Operational Test & Evaluation
PDM: Programmed Depot Maintenance

*PDM availabilities scheduled on a 4-year cycle with a normal 01Apr input date and a 12 month length.
** Aircraft 787 PDM input has been slipped to 10 Oct 06

-  Planned Activity(s)
-  Completed Activity
-  Completed Event
-  Planned Event

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Exhibit R-4, RDT&E Schedule Profile

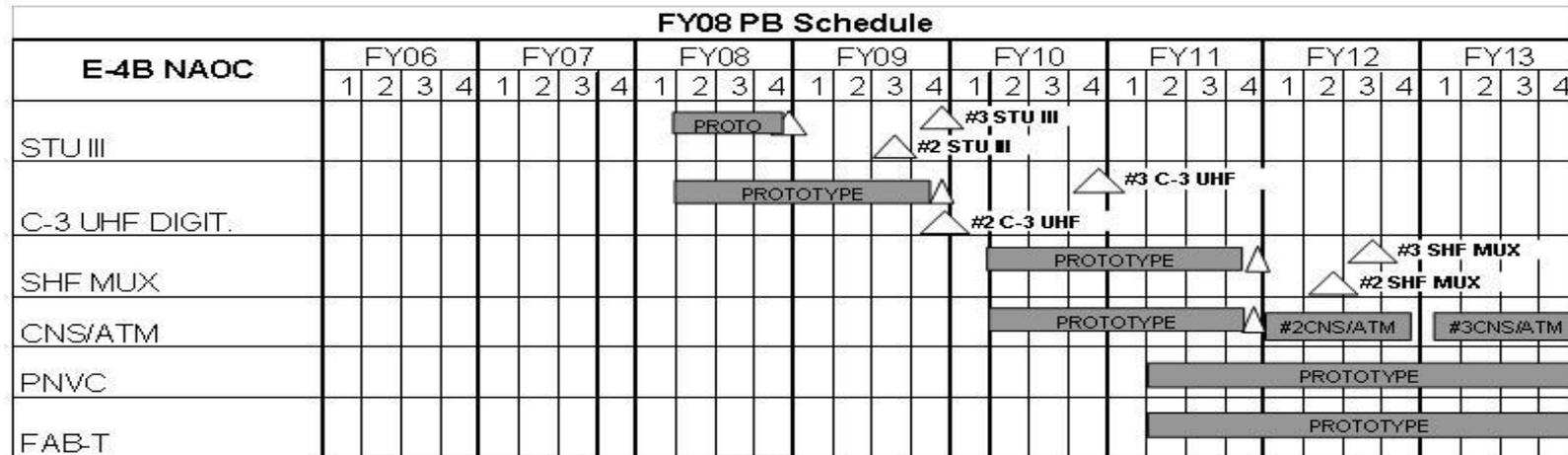
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STU: Secure Telephone Units
 UHF: Ultra High Frequency
 SHF: Super High Frequency
 MUX: Multiplexer
 CNS: Communication Navigation Surveillance
 ATM: Air Traffic Management
 FAB-T: Family of Advanced Beyond-Line-of-Sight Terminals
 PNVC: Presidential National Voice Conferencing

 Planned Activity(s)
 Completed Activity
 Completed Event
 Planned Event

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Exhibit R-4a, RDT&E Schedule Detail	DATE February 2007
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(U) <u>Schedule Profile</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
(U) Modification Block I (Mod Blk 1)	1-4Q			
(U) -- Prototype Mod Blk1 Design Rework	1-4Q			
(U) -- #2 Mod Blk 1 Installation & Check-Out	1-4Q			
(U) -- Prototype Mod Blk 1 OT&E Preparations & Testing	3-4Q			
(U) -- Initial Operational Capability (IOC) of #1 Mod Blk 1 aircraft	4Q			
(U) -- #2 Mod Blk 1 aircraft mission capable	4Q			
(U) Mod Blk 1 Prototype design documentation close-out		1Q		
(U) C-3 UHF Digitalization Prototype dev begins (design & kit)			2-4Q	
(U) -- C-3 UHF Digitalization Prototype dev continues & install				1-4Q
(U) SHF MUX Prototype design dev, kit manufacturing & install			2-4Q	