

Exhibit R-2, RDT&E Budget Item Justification								DATE February 2004	
BUDGET ACTIVITY 07 Operational System Development				PE NUMBER AND TITLE 0401119F C-5 Airlift Squadrons					
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	273.750	346.541	332.982	317.664	208.106	66.652	16.585	0.000	1,909.734
4495 Avionics Modernization Program	80.700	65.502	10.927	0.000	0.000	0.000	0.000	0.000	360.763
4835 Reliability Enhancement & Reengining Program	193.050	281.039	322.055	317.664	208.106	66.652	16.585	0.000	1,548.971
<p>The OSD payback to the AF FY05 PBD resulted in 3600 funds being added to C-5 RERP through FY09. This action causes a conflict with the RERP schedule provided as an Exhibit to the FY05 PBR. Funding should have been on the 3010 line in APAF. Overall schedule for RERP has to be restructured, which will occur in the FY06 POM cycle.</p> <p>(U) A. Mission Description and Budget Item Justification</p> <p>674495: Avionics Modernization Program (AMP): Phase I of an Air Force planned two-phase modernization effort for the C-5. It implements Global Air Traffic Management (GATM) and navigation/safety capability and the All Weather Flight Control System (AWFCS). It installs Deputy Secretary of Defense (DepSecDef) directed navigation/safety equipment: Terrain Awareness and Warning System (TAWS) and Traffic Alert and Collision Avoidance System (TCAS), reducing the threat of controlled flight into terrain and mid-air collisions. GATM capability, which encompasses communications, navigation, and surveillance requirements will be incorporated into the aircraft to meet current and future International Civil Aviation Organization (ICAO)/Federal Aviation Administration (FAA) requirements and to progress towards free flight capability. The AWFCS portion of AMP replaces low reliability Line Replaceable Units (LRUs) in the automatic flight control system and replaces aging, non-supportable mechanical instruments in the engine and flight systems. Connectivity to mobility command and control capabilities will also be incorporated in the AMP design. The TCAS portion was accelerated ahead of the rest of the AMP mod and was completed 31 Oct 02. Two AMP RDT&E test articles were funded in FY99 for installation and flight test in FY02/03/04/05. AMP's first flight occurred in Dec 02. Currently, two of four software blocks have been developed and are undergoing flight test. This project is comprised of low technical risk efforts supporting fielded weapons systems and, therefore, was assigned to Budget Activity 7, Operational Systems Development.</p> <p>674835: Reliability Enhancement and Re-engining Program (RERP): Phase II of an Air Force planned two-phase modernization effort for the C-5. It improves aircraft reliability, maintainability and availability. RERP will enable the C-5 to achieve wartime mission requirements by increasing fleet availability (mission capable rate, departure reliability) while reducing total ownership costs (TOC). This effort centers around replacing TF-39 engines with a more reliable, commercially Off-the-Shelf (COTS) turbofan engine with increased takeoff thrust and stage three noise compliance. These new engines (along with new pylons, wing attach fittings and upgrades, and thrust reversers) increase payload capability and access to Global Air Traffic Management (GATM) airspace. The modification also decreases aircraft time to climb, increases engine-out climb gradient for takeoff, improves transportation system throughput, and decreases engine removals. Additionally, numerous other system modifications will be performed (e.g., auxiliary power units, electrics, hydraulics, fuel system, fire suppression system, pressurization/air conditioning system, landing gear, and airframe) to increase fleet availability and reduce total ownership costs. Three RDT&E test articles were funded in FY04 for installation and flight test in FY05/06/07. RERP's Preliminary Design Review (PDR) completed in Jan 03 and the Air-vehicle Critical Design Review (CDR) is scheduled to complete in Feb 04. This project is comprised of low technical risk efforts supporting fielded weapons systems and, therefore, was assigned to Budget Activity 7, Operational Systems Development.</p>									

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Previous President's Budget	284.730	356.570	455.232
(U) Current PBR/President's Budget	273.750	346.541	332.982
(U) Total Adjustments	-10.980	-10.029	
(U) Congressional Program Reductions		0.000	
Congressional Rescissions		-3.029	
Congressional Increases			
Reprogrammings	-2.855	-7.000	
SBIR/STTR Transfer	-8.125		

(U) **Significant Program Changes:**

FY04 PB:

The C-5 RDT&E funding requirement was reduced by \$10.0M. This was a result of Congressional rescissions (-\$3.0M) and reprogramming action (-\$7.0M) to satisfy National Defense Authorization Act requirements.

FY05 PBR:

The C-5 RDT&E funding requirement has been reduced by \$122.2M since the FY04 PBR submittal. Funding for the reliability enhancement and re-engining program (RERP) was reduced by \$132.2M and funding for the avionics modernization program (AMP) was increased by \$10.0M. Reprogramming actions from C-5 RERP RDT&E (-\$30.6M) were made to AMP RDT&E (\$10.0M) and AMP APAF (\$20.6M) to keep the program on schedule. An additional reduction in RERP RDT&E (-\$93.3M) was made to fund higher priority Air Force efforts. Additional reductions were taken for other reprogramming actions (-\$7.2M) and inflation savings (-\$1.1M).

Exhibit R-2a, RDT&E Project Justification

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BUDGET ACTIVITY 07 Operational System Development				PE NUMBER AND TITLE 0401119F C-5 Airlift Squadrons			PROJECT NUMBER AND TITLE 4495 Avionics Modernization Program		
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
4495 Avionics Modernization Program	80.700	65.502	10.927	0.000	0.000	0.000	0.000	0.000	360.763
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

674495: Avionics Modernization Program (AMP): Phase I of an Air Force planned two-phase modernization effort for the C-5. It implements Global Air Traffic Management (GATM) and navigation/safety capability and the All Weather Flight Control System (AWFCS). It installs Deputy Secretary of Defense (DepSecDef) directed navigation/safety equipment: Terrain Awareness and Warning System (TAWS) and Traffic Alert and Collision Avoidance System (TCAS), reducing the threat of controlled flight into terrain and mid-air collisions. GATM capability, which encompasses communications, navigation, and surveillance requirements will be incorporated into the aircraft to meet current and future International Civil Aviation Organization (ICAO)/Federal Aviation Administration (FAA) requirements and to progress towards free flight capability. The AWFCS portion of AMP replaces low reliability Line Replaceable Units (LRUs) in the automatic flight control system and replaces aging, non-supportable mechanical instruments in the engine and flight systems. Connectivity to mobility command and control capabilities will also be incorporated in the AMP design. The TCAS portion was accelerated ahead of the rest of the AMP mod and was completed 31 Oct 02. Two AMP RDT&E test articles were funded in FY99 for installation and flight test in FY02/03/04/05. AMP's first flight occurred in Dec 02. Currently, two of four software blocks have been developed and are undergoing flight test. This project is comprised of low technical risk efforts supporting fielded weapons systems and, therefore, was assigned to Budget Activity 7, Operational Systems Development.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) System Engineering/Program Management	9.743	13.177	1.602
(U) AMP Kit Design/Development/Contractor Test	60.530	40.305	6.673
(U) Prototype Fabrication/Install	3.012	2.825	1.337
(U) Mission Support	3.603	3.650	1.000
(U) Government Flight Test Cost	3.812	5.545	0.315
(U) Total Cost	80.700	65.502	10.927

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) AF RDT&E									
(U) Other APPN									
(U) Aircraft Procurement, AF,									
(U) BA-5, C-5 Mods, Avionics	58.347	76.894	89.721	93.845				186.900	508.986
Modernization Program, BP-11									

Exhibit R-2a, RDT&E Project Justification

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BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0401119F C-5 Airlift Squadrons	PROJECT NUMBER AND TITLE 4495 Avionics Modernization Program
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(U) C. Other Program Funding Summary (\$ in Millions)

Aircraft Procurement, AF,							
(U) BA-5, C-5 Mods, Avionics Modernization Program, BP-16	11.522	14.369			24.300	50.191	
(U) BA-5, C-5 Mods, Reliability Enhancement and Re-engining Program, BP-11			235.406	596.149	817.142	7,216.303	8,865.001

(U) D. Acquisition Strategy

Avionics Modernization Program: Program acquisition strategy establishes a single integrating contractor (Lockheed Martin Aero) to modify and qualify integrated Commercial Off-the-Shelf (COTS) line replaceable units (LRUs) and software to meet C-5 performance and Global Air Traffic Management (GATM) requirements, update existing C-5 engineering and technical data, develop interface control specifications based on performance requirements, prototype the new system, and support ground and flight testing. AMP contract awarded to the Lockheed Martin Aero/Honeywell team on 22 January 1999. \$9.7M in FY99 procurement was added in the FY00 PB to accelerate Traffic Alert and Collision Avoidance System (TCAS) installations ahead of the rest of AMP. The AMP modification is planned for the entire C-5 fleet.

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Exhibit R-3, RDT&E Project Cost Analysis

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BUDGET ACTIVITY		PE NUMBER AND TITLE						PROJECT NUMBER AND TITLE				
07 Operational System Development		0401119F C-5 Airlift Squadrons						4495 Avionics Modernization Program				
(U) <u>Cost Categories</u>	<u>Contract Method & Type</u>	<u>Performing Activity & Location</u>	<u>Total</u> <u>Prior to FY</u> <u>2003</u> <u>Cost</u>	<u>FY</u> <u>2003</u> <u>Cost</u>	<u>FY</u> <u>2003</u> <u>Award</u> <u>Date</u>	<u>FY</u> <u>2004</u> <u>Cost</u>	<u>FY</u> <u>2004</u> <u>Award</u> <u>Date</u>	<u>FY</u> <u>2005</u> <u>Cost</u>	<u>FY</u> <u>2005</u> <u>Award</u> <u>Date</u>	<u>Cost to</u> <u>Complete</u>	<u>Total</u> <u>Cost</u>	<u>Target</u> <u>Value of</u> <u>Contract</u>
(U) <u>Product Development</u>												
Lockheed Martin Aero	CPAF		183.652	73.285	Oct-02	56.307	Oct-03	9.612	Oct-04	0.000	322.856	323.856
N/A											0.000	
Subtotal Product Development			183.652	73.285		56.307		9.612		0.000	322.856	323.856
Remarks:												
(U) <u>Support</u>												
WR-ALC/LT			4.900	0.925		1.517					7.342	7.342
ASC/GRA			8.555	2.678		2.133		1.000			14.366	13.366
N/A											0.000	
Subtotal Support			13.455	3.603		3.650		1.000		0.000	21.708	20.708
Remarks:												
(U) <u>Test & Evaluation</u>												
418 Test Squadron (Edwards AFB)			6.527	3.812		5.545		0.315			16.199	16.199
N/A											0.000	
Subtotal Test & Evaluation			6.527	3.812		5.545		0.315		0.000	16.199	16.199
Remarks:												
(U) <u>Management</u>											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	0.000
Remarks:												
(U) Total Cost			203.634	80.700		65.502		10.927		0.000	360.763	360.763

Exhibit R-4, RDT&E Schedule Profile

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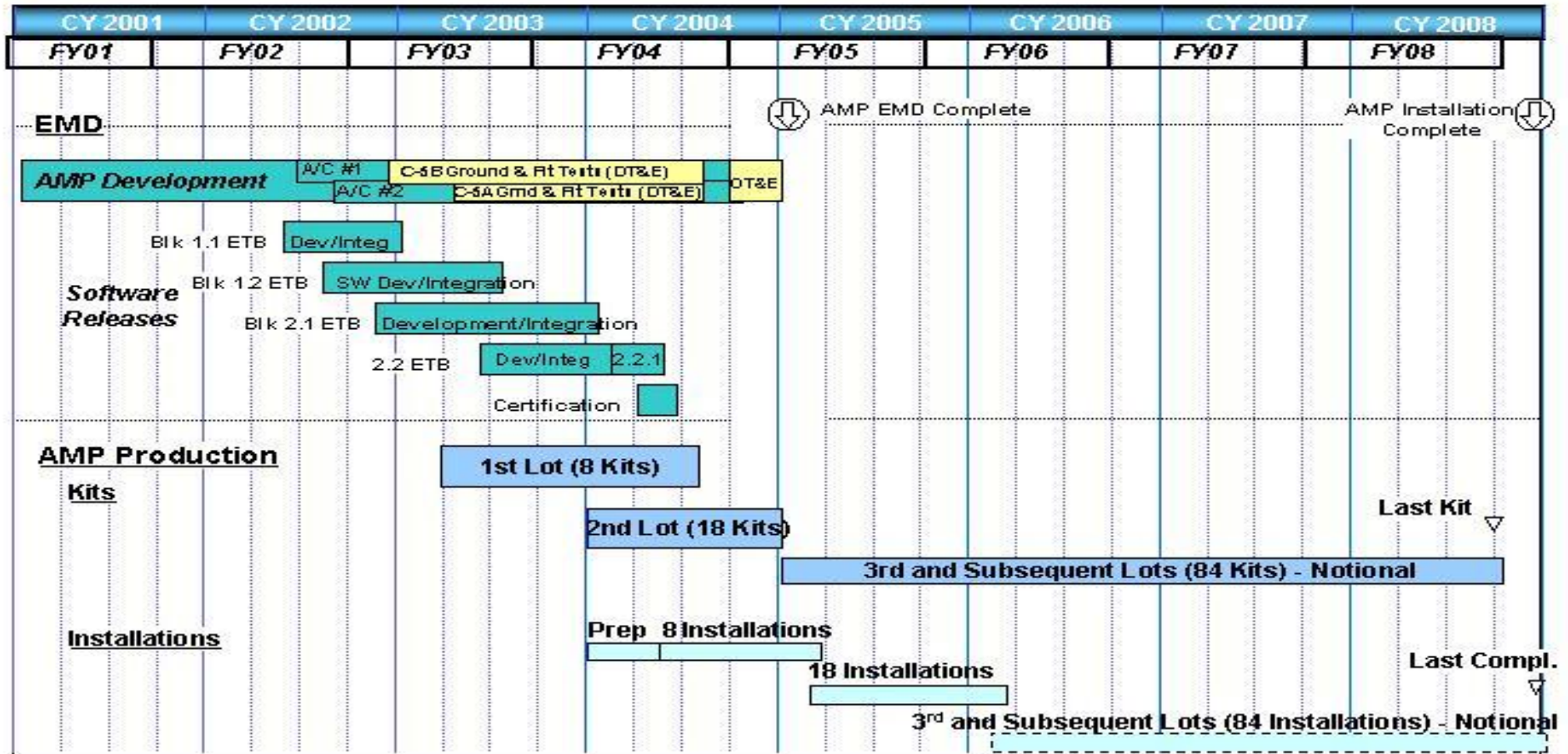
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BUDGET ACTIVITY
07 Operational System Development

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0401119F C-5 Airlift Squadrons

PROJECT NUMBER AND TITLE
4495 Avionics Modernization Program

C-5 AMP SCHEDULE



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Exhibit R-4a, RDT&E Schedule Detail	DATE February 2004
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	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) <u>Schedule Profile</u>			
(U) Acquisition Strategy Panel (FY97/4)			
(U) Contract Award (FY99/1)			
(U) Preliminary Design Review (PDR) (FY00/3)			
(U) Critical Design Review (CDR) (FY01/3)			
(U) TCAS Kit Installations Start (FY00/2)			
(U) TCAS Kit Installations End (FY03/1)	1Q		
(U) AMP Prototype Installation Start (FY02/3)			
(U) First Flight/Developmental Test Start (FY03/1)	1Q		
(U) Production Installation Start (FY04/3)		3Q	
(U) AMP EMD Complete (FY05/2)			
Prod Installation Complete (FY07/2)			2Q

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BUDGET ACTIVITY 07 Operational System Development				PE NUMBER AND TITLE 0401119F C-5 Airlift Squadrons			PROJECT NUMBER AND TITLE 4835 Reliability Enhancement & Reengining Program			
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total	
4835 Reliability Enhancement & Reengining Program	193.050	281.039	322.055	317.664	208.106	66.652	16.585	0.000	1,548.971	
Quantity of RDT&E Articles	0	3	0	0	0	0	0			

(U) A. Mission Description and Budget Item Justification

674835: Reliability Enhancement and Re-engining Program (RERP): Phase II of an Air Force planned two-phase modernization effort for the C-5. It improves aircraft reliability, maintainability and availability. RERP will enable the C-5 to achieve wartime mission requirements by increasing fleet availability (mission capable rate, departure reliability) while reducing total ownership costs (TOC). This effort centers around replacing TF-39 engines with a more reliable, commercially Off-the-Shelf (COTS) turbofan engine with increased takeoff thrust and stage three noise compliance. These new engines (along with new pylons, wing attach fittings and upgrades, and thrust reversers) increase payload capability and access to Global Air Traffic Management (GATM) airspace. This modification also decreases aircraft time to climb, increases engine-out climb gradient for takeoff, improves transportation system throughput, and decreases engine removals. Additionally, numerous other system modifications will be performed (e.g., auxiliary power units, electrics, hydraulics, fuel system, fire suppression system, pressurization/air conditioning system, landing gear, and airframe) to increase fleet availability and reduce total ownership costs. Three RDT&E test articles were funded in FY04 for installation and flight test in FY05/06/07. RERP's Preliminary Design Review (PDR) completed in Jan 03 and the Air-vehicle Critical Design Review (CDR) is scheduled to complete in Feb 04. This project is comprised of low technical risk efforts supporting fielded weapons systems and, therefore, was assigned to Budget Activity 7, Operational Systems Development.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Systems Engineering/Program Management	12.872	24.279	21.551
(U) RERP Design/Development	126.877	140.279	169.331
(U) Prototype Fabrication/Install	44.130	105.210	116.993
(U) Mission Support	5.596	5.171	5.680
(U) Government Test Support	3.575	6.100	8.500
(U)			
(U) Total Cost	193.050	281.039	322.055

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) AF RDT&E									
(U) Other APPN									
(U) Aircraft Procurement,AF, BA-5,C-5 Mods, Reliability					235.406	596.149	817.142	7,216.303	8,865.001

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BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0401119F C-5 Airlift Squadrons	PROJECT NUMBER AND TITLE 4835 Reliability Enhancement & Reengining Program
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(U) **C. Other Program Funding Summary (\$ in Millions)**

Enhancement and Re-engining Program, BP-11

Aircraft Procurement, AF,

(U) BA-5, C-5 Mods, Avionics Modernization Program, BP-11	58.347	76.894	89.721	93.845	186.900	508.986
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Aircraft Procurement, AF,

(U) BA-5, C-5 Mods, Avionics Modernization Program, BP-16			11.522	14.369	24.300	50.191
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(U) **D. Acquisition Strategy**

Reliability Enhancement and Re-engining Program (RERP): The approved FY02 acquisition strategy called for the modification of the entire C-5 aircraft fleet starting with the 50 B-models first. System Development & Demonstration (SDD) includes 1 C-5A and 2 C-5Bs. The program acquisition strategy is to consider every opportunity to use commercially available components and processes to modernize C-5 products and processes to meet or exceed required system performance and support, so as to renew the weapon system until 2040. The program acquisition strategy also seeks to construct a government/industry partnership to identify solutions, assign responsibility, and execute to achieve AMC requirements. Fleet availability, ownership cost, and system performance will be used to balance solutions against program cost. Lockheed Martin Aero has been selected as the prime contractor through a sole source arrangement. Lockheed has selected General Electric (Powerplant) and Goodrich (Pylon) as the major subcontractors.

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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</u> Prior to FY 2003 Cost	<u>FY</u> 2003 Cost	<u>FY</u> 2003 Award Date	<u>FY</u> 2004 Cost	<u>FY</u> 2004 Award Date	<u>FY</u> 2005 Cost	<u>FY</u> 2005 Award Date	<u>Cost to Complete</u>	<u>Total</u> Cost	<u>Target</u> Value of Contract
(U) <u>Product Development</u>												
Lockheed Martin Aero (Pre-EMD)	FFP		46.738							0.000	46.738	46.738
Lockheed Martin Aero (SDD)	CPAF		79.802	183.879	Oct-02	269.768	Oct-03	307.875	Oct-04	577.817	1,419.141	1,419.142
											0.000	
Subtotal Product Development			126.540	183.879		269.768		307.875		577.817	1,465.879	1,465.880
Remarks:												
(U) <u>Support</u>												
WR-ALC/LT			5.121	2.238		2.068		2.272		6.916	18.615	18.615
ASC/GRA			7.682	3.358		3.103		3.408		10.374	27.925	27.925
N/A											0.000	
Subtotal Support			12.803	5.596		5.171		5.680		17.290	46.540	46.540
Remarks:												
(U) <u>Test & Evaluation</u>												
418 Test Squadron (Edwards AFB)			4.477	3.575		6.100		8.500		13.900	36.552	36.552
N/A											0.000	
Subtotal Test & Evaluation			4.477	3.575		6.100		8.500		13.900	36.552	36.552
Remarks:												
(U) <u>Management</u>												
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	0.000
Remarks:												
(U) Total Cost			143.820	193.050		281.039		322.055		609.007	1,548.971	1,548.972

Exhibit R-4, RDT&E Schedule Profile

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PE NUMBER AND TITLE
0401119F C-5 Airlift Squadrons

PROJECT NUMBER AND TITLE
4835 Reliability Enhancement & Reengining Program

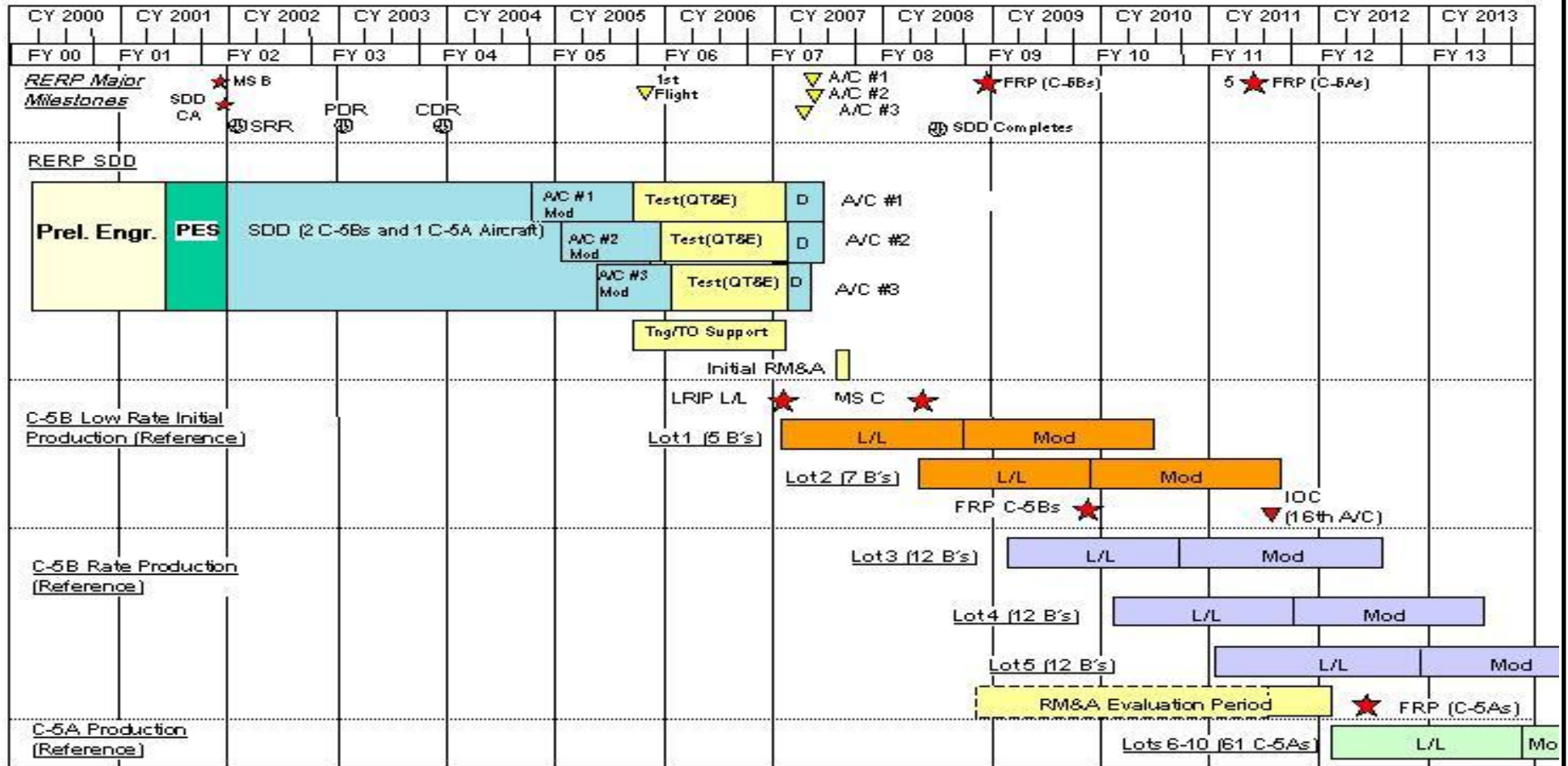


Exhibit R-4a, RDT&E Schedule Detail	DATE February 2004
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BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0401119F C-5 Airlift Squadrons	PROJECT NUMBER AND TITLE 4835 Reliability Enhancement & Reengining Program
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	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) <u>Schedule Profile</u>			
(U) Acquisition Strategy Panel (ASP) (FY00/1)			
(U) Pre-EMD Contract Award (FY00/2)			
(U) Milestone B/DAB (FY02/1)			
(U) SDD Contract Award (FY02/1)			
(U) SDD Start (FY02/1)			
(U) Preliminary Design Review (PDR)(FY03/2)	2Q		
(U) Critical Design Review (CDR)(FY04/1)		1Q	
(U) First Prototype Flight (FY06/1)			
(U) MS C (FY07/2)			
(U) LRIP Installations Begin (FY08/1)			
(U) SDD Complete (FY08/4)			