

UNCLASSIFIED

CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification							DATE:	
							February 2005	
APPROPRIATION/BUDGET ACTIVITY RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-5					R-1 ITEM NOMENCLATURE 0604512N Shipboard Aviation Systems			
COST (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	23.479	29.312	33.029	31.490	22.018	21.199	21.589	21.935
2232 - CV Launch & Recovery Systems	18.125	28.340	33.029	31.490	22.018	21.199	21.589	21.935
9071 - Shipboard Aviation Information Technology	3.912							
9385 - Machine Vision Confirmation of Launch Bar Eng	1.442							
9565 - Synthetic Material Arresting Cable		0.972						
A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Navy unique project addresses the System Development and Demonstration (SDD) of all systems required to recover and launch Navy/Marine Corps aircraft (fixed/rotary wing and Vertical/Short Take-Off and Landing (VSTOL) operating aboard aircraft carriers (CV/CVN), amphibious assault ships (LHA/LHD) and aviation facility ships. This program element covers projects 2232, 9071, 9385 and 9565, and includes the funding of Production Representative Models (PRM): - (U) Virtual Imaging System for Approach and Landing (VISUAL): VISUAL provides the Landing Signal Officer (LSO) with enhanced information during recovery operations in low visibility, day and night conditions. - (U) Moriah Wind System (MWS): Integrated digital wind measurement designed to replace the Type F wind system on all U.S. Navy air capable ships. - (U) Advanced Arresting Gear (AAG): The AAG replaces the MK7 arresting gear, which has reached the limits of its operating capability. Upon completion of the AAG SDD phase, we will initiate three technology insertion efforts for the Electromagnetic Aircraft Launch System (EMALS) and the steam catapult: 1) EMALS Advanced Control Technology Insertion: Introduction of sensorless control technologies, resulting in removal of a significant number of feedback sensors in the system; improving reliability, maintainability and availability. 2) EMALS High Density Energy Storage: Introduction of solid state energy storage technology to replace the first generation rotary inertial systems. This will result in a 300 Long Ton reduction in ship system installed weight with a corresponding reduction in Height of Center of Gravity Above the Baseline, and enhanced reliability, availability and maintainability. 3) Advanced Catapult Control System for Steam Catapults: Introduce EMALS control, prognostics and health monitoring technology into the steam catapult, providing a common operator interface, reduced maintenance and enhanced availability. This effort compliments the improvements introduced into the arresting gear through AAG. - (U) Shipboard Aviation Data Management System Initiative: This initiative will use state-of-the-art information technology and decision support systems to automate the current manual intensive process in collecting and distributing information to enable aviation operations on board aircraft carriers to be accomplished in a more efficient and effective manner. - (U) Machine Vision Confirmation of Launch Bar Engagement: This program will develop a system based on machine vision technology to verify the proper hook up of aircraft to the catapult under all operating conditions. - (U) Synthetic Material Arresting Cable: This program will develop and test a new Synthetic Fiber Arresting Gear cable to replace the current steel cable material with a lighter weight material having a higher strength-to-weight ratio.								

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Exhibit R-2, RDTEN Budget Item Justification
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EXHIBIT R-2a, RDT&E Project Justification						DATE: February 2005		
APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-5		PROGRAM ELEMENT NUMBER AND NAME 0604512N Shipboard Aviation Systems			PROJECT NUMBER AND NAME 2232 - CV Launch & Recovery Systems			
COST (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Project Cost	18.125	28.340	33.029	31.490	22.018	21.199	21.589	21.935
RDT&E Articles Qty	4	1						

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

This Navy unique project addresses the System Development and Demonstration (SDD) of all systems required to recover and launch Navy/Marine Corps aircraft [fixed/rotary wing and Vertical/Short Take-Off and Landing (VSTOL)] operating aboard aircraft carriers (CV/CVN), amphibious assault ships (LHA/LHD) and aviation facility ships. This program includes the following systems under Project 2232, including the funding of production representative models (PRM):

- (U) Moriah Wind System (MWS): MWS replaces current analog wind system with an integrated digital wind measurement system which will be an affordable, LAN compatible, wind suite for all classes of air capable Navy ships.
 - (U) Virtual Imaging System for Approach and Landing (VISUAL): VISUAL provides the Landing Signal Officer (LSO) with enhanced information during recovery operations in low visibility, day and night conditions.
 - (U) Advanced Arresting Gear (AAG): The AAG replaces the MK7 arresting gear, which has reached the limits of its operating capability. Upon completion of the AAG SDD phase, we will initiate three technology insertion efforts for the Electromagnetic Aircraft Launch System (EMALS) and the steam catapult:
 - 1) EMALS Advanced Control Technology Insertion: Introduction of sensorless control technologies, resulting in removal of a significant number of feedback sensors in the system; improving reliability, maintainability and availability.
 - 2) EMALS High Density Energy Storage: Introduction of solid state energy storage technology to replace the first generation rotary inertial systems. This will result in a 300 Long Ton reduction in ship system installed weight with a corresponding reduction in Height of Center of Gravity Above the Baseline, and enhanced reliability, availability and maintainability.
 - 3) Advanced Catapult Control System for Steam Catapults: Introduce EMALS control, prognostics and health monitoring technology into the steam catapult, providing a common operator interface, reduced maintenance and enhanced availability. This effort compliments the improvements introduced into the arresting gear through AAG.
- These initiatives are part of a pre-planned technology insertion roadmap and have been coordinated with PEO Carriers, who agrees that EMALS technology insertion should be pursued by NAVAIR in this program element.
- (U) Shipboard Aviation Data Management System Initiative: This initiative will use state-of-the-art information technology and decision support systems to automate the current manual intensive process in collecting and distributing information to enable aviation operations on board aircraft carriers to be accomplished in a more efficient and effective manner.
 - (U) Machine Vision Confirmation of Launch Bar Engagement: This program will develop a system based on machine vision technology to verify the proper hook up of aircraft to the catapult under all operating conditions.

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(U) B. Accomplishments/Planned Program				
VISUAL	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	1.758	0.000	0.000	0.000
RDT&E Articles Quantity	2			
<div style="border: 1px solid black; padding: 5px;">VISUAL Completed fabrication of two (2) CV/CVN PRM units and conducted integration/ acceptance test efforts. Delivered two (2) CV/CVN PRM units. Completed environmental/EMI/R&M lab and conducted landbased/shipboard developmental testing. Completed CV/CVN system operational testing. Recieved production approval. Provided engineering and management support to the program.</div>				
MWS	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.859	0.000	0.000	0.000
RDT&E Articles Quantity	2			
<div style="border: 1px solid black; padding: 5px;">MWS Completed CDR and delivered two (2) MWS PRM. Completed developmental testing. Completed CV/CVN operational testing. Received MS C approval. Provided engineering and management support for the program.</div>				

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(U) B. Accomplishments/Planned Program				
AAG	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	15.508	28.340	33.029	31.490
RDT&E Articles Quantity		1		
AAG FY-04: Completed AoA and Technology Maturity Assessment. Prepared and received approval for Acquisition Strategy. Prepared and released RFP to Industry. Conducted source selection efforts. Prepared for and received milestone A approval and awarded two Technology Development (TD) contracts. Initiated system design efforts for AAG to include modeling, simulation and trade studies. Completed System Requirements Review. FY-05: Completed Preliminary Design and Integrated Baseline Reviews. Selected SDD phase contractor. Received MS B approval and awarded SDD contract. Completed initial Critical Design Reviews. Provided engineering and management support to the program. Purchased one AAG production representative test system to support developmental testing. FY-06: Complete remaining Critical Design Reviews. Fabricate test system hardware. Initiate test site upgrades. Provide engineering and management support to the program. FY-07: Deliver test systems to the NAVAIR Lakehurst Jet Car Test Site. Install test systems. Conduct Test Readiness Review. Initiate DT-B2. Provide engineering and management support to the program.				

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Exhibit R-2a, RDTEN Project Justification
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<p>(U) C. PROGRAM CHANGE SUMMARY:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 45%;"></th> <th style="width: 10%; text-align: right;">FY 2004</th> <th style="width: 10%; text-align: right;">FY 2005</th> <th style="width: 10%; text-align: right;">FY 2006</th> <th style="width: 10%; text-align: right;">FY 2007</th> </tr> </thead> <tbody> <tr> <td>(U) Funding:</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Previous President's Budget:</td> <td style="text-align: right;">18.148</td> <td style="text-align: right;">28.631</td> <td style="text-align: right;">33.097</td> <td style="text-align: right;">31.486</td> </tr> <tr> <td>Current BES/President's Budget</td> <td style="text-align: right;">18.125</td> <td style="text-align: right;">28.340</td> <td style="text-align: right;">33.029</td> <td style="text-align: right;">31.490</td> </tr> <tr> <td>Total Adjustments</td> <td style="text-align: right; border-top: 1px solid black;">-0.023</td> <td style="text-align: right; border-top: 1px solid black;">-0.291</td> <td style="text-align: right; border-top: 1px solid black;">-0.068</td> <td style="text-align: right; border-top: 1px solid black;">0.004</td> </tr> <tr> <td colspan="5" style="padding-top: 10px;">Summary of Adjustments</td> </tr> <tr> <td> Congressional program reductions</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Congressional undistributed reductions</td> <td></td> <td style="text-align: right;">-0.252</td> <td></td> <td></td> </tr> <tr> <td> Congressional rescissions</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> SBIR/STTR Transfer</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> OSD</td> <td></td> <td style="text-align: right;">-0.039</td> <td style="text-align: right;">-0.194</td> <td style="text-align: right;">-0.182</td> </tr> <tr> <td> Economic Assumptions</td> <td style="text-align: right;">-0.017</td> <td></td> <td style="text-align: right;">0.336</td> <td style="text-align: right;">0.402</td> </tr> <tr> <td> Reprogrammings</td> <td style="text-align: right;">-0.006</td> <td></td> <td></td> <td></td> </tr> <tr> <td> Navy (FMB/Sponsor/NAVAIR)</td> <td></td> <td></td> <td style="text-align: right;">-0.210</td> <td style="text-align: right;">-0.216</td> </tr> <tr> <td> Congressional increases</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Subtotal</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">-0.023</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">-0.291</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">-0.068</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">0.004</td> </tr> </tbody> </table> <p style="margin-top: 20px;">(U) Schedule:</p> <p>VISUAL program slipped due to technical challenges on CV unit. TECHEVAL scheduled for 2Q-4Q/03 was changed to 4Q/03-1Q/04; Operation Testing scheduled for 2Q/03 was changed to 1Q/04 and OPEVAL scheduled for 1Q/04 was changed to 1Q-2Q/04 . Delivery of CV EDM Shipboard Unit was delayed from 1Q/03-3Q/03. VISUAL L-Class development was cancelled due to cost overruns in the CV program.</p> <p>AAG program slipped due to minor delay in Source Selection process. This resulted in the following changes: Milestone A scheduled for 3Q/03 was changed to 4Q/03 and Contract Award scheduled for 3Q/03 was changed to 4Q/03. The following changes were made to test and evaluation milestones to more accurately reflect the program of record: Developmental testing scheduled for 3Q/07-4Q/07 has been changed to 3Q/07-1Q/08 and Development Test/Operational Assist scheduled for 1Q/09-4Q/09 to 2Q/09-3Q09</p> <p style="margin-top: 20px;">(U) Technical:</p>						FY 2004	FY 2005	FY 2006	FY 2007	(U) Funding:					Previous President's Budget:	18.148	28.631	33.097	31.486	Current BES/President's Budget	18.125	28.340	33.029	31.490	Total Adjustments	-0.023	-0.291	-0.068	0.004	Summary of Adjustments					Congressional program reductions					Congressional undistributed reductions		-0.252			Congressional rescissions					SBIR/STTR Transfer					OSD		-0.039	-0.194	-0.182	Economic Assumptions	-0.017		0.336	0.402	Reprogrammings	-0.006				Navy (FMB/Sponsor/NAVAIR)			-0.210	-0.216	Congressional increases					Subtotal	-0.023	-0.291	-0.068	0.004
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APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-5			PROGRAM ELEMENT NUMBER AND NAME 0604512N Shipboard Aviation Systems			PROJECT NUMBER AND NAME 2232 - CV Launch & Recovery Systems			

D. OTHER PROGRAM FUNDING SUMMARY:

<u>Line Item No. & Name</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>FY 2010</u>	<u>FY 2011</u>	<u>To</u>	<u>Total</u>
									<u>Complete</u>	<u>Cost</u>
Line Item: 4216	20.098	21.146	27.042	29.604	30.941	31.221	117.037	103.595		Continuing
Aircraft Launch & Recovery Equip										

E. ACQUISITION STRATEGY:

MWS: The Navy prepared a performance specification and competitively awarded an IDIQ contract to cover SDD (CPIF) and production requirements (FFP).

VISUAL: The Navy prepared a performance specification and competitively awarded a cost plus incentive fee contract to develop/deliver PRMs, with fixed-price successive target production options.

AAG: The Navy competitively awarded two Cost Plus Fixed Fee (CPFF) TD phase contracts to develop the AAG. Upon completion of the Preliminary Design and Integrated Baseline Reviews, the Navy will award a single Cost Plus Award Fee (CPAF) option to one of the TD phase contracts for the SDD phase to develop and demonstrate a production representative AAG at the NAVAIR Lakehurst Jet Car and Runway Aircraft Landing test sites. After successful demonstration of the production representative AAG, the Navy will award Fixed Price Incentive (FPI) contracts for LRIP and full rate production quantities.

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Exhibit R-3 Cost Analysis (page 1)								DATE: February 2005				
APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-5			PROGRAM ELEMENT 0604512N Shipboard Aviation Systems			PROJECT NUMBER AND NAME 2232 - CV Launch & Recovery Systems						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary H/W Development (AAG)	C/CPFF	Gen Atomics/SanDeigo,CA	10.844								10.844	10.844
Primary H/W Development (AAG)	C/CPFF	Northrop Grum/Sunnyvale,CA	10.846								10.846	10.846
Primary H/W Development (AAG)	C/CPAF	TBD		22.476	11/04	26.141	11/05	19.509	11/06	21.040	89.166	89.166
Primary H/W Development (AAG)	WX	NAWCAD, Lakehurst, NJ	1.305	1.137	11/04	2.955	11/05	3.512	11/06	Continuing	Continuing	
Primary H/W Development (VISUAL)	C/CPIF	DRS / Anaheim, CA	27.467								27.467	27.467
Primary H/W Development (MWS)	CPIF/FP	QPI / Fredricksburg, VA	3.874								3.874	3.874
Award Fees	C/CPAF	TBD		1.530	11/04	1.530	11/05	0.680	11/06	6.890	10.630	
Systems Engineering	WX	NAWCAD, Lakehurst, NJ	49.463	2.887	11/04	2.140	11/05			Continuing	Continuing	
(MWS/CREI/VISUAL/AAG/ALRCS)												
Systems Engineering (VISUAL/MWS)	WX	NAWCAD, Patuxent River, MD	0.307								0.307	
Systems Engineering (VISUAL)	WX	NSWC, Crane IN	1.800								1.800	
Subtotal Product Development			105.906	28.030		32.766		23.701		Continuing	Continuing	
Remarks: Award fee is 0% fixed and 12% of total contract.												
Development Support												
Software Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
Studies & Analyses												
GFE												
Subtotal Support												

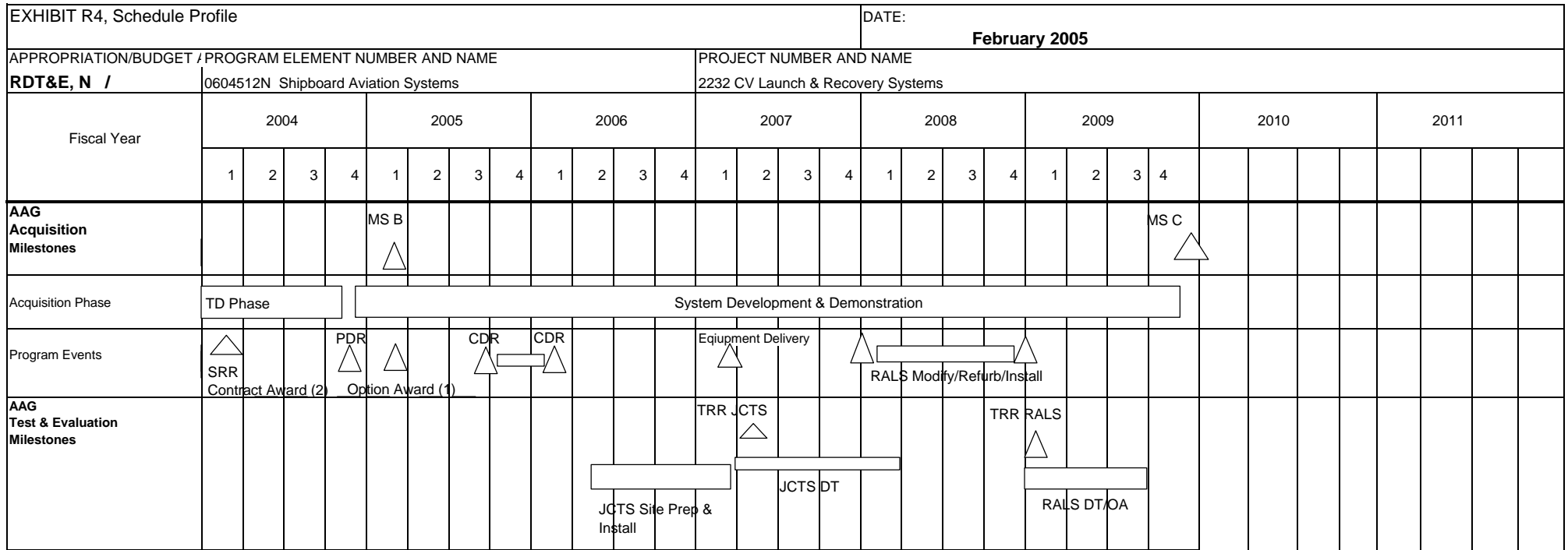
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Exhibit R-3 Cost Analysis (page 2)										DATE: February 2005		
APPROPRIATION/BUDGET ACTIVITY RDTE, N / BA-5			PROGRAM ELEMENT 0604512N Shipboard Aviation Systems				PROJECT NUMBER AND NAME 2232 - CV Launch & Recovery Systems					
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WX	NAWCAD Lakehurst, NJ	0.920					6.000	11/06	32.000	38.920	
Operational Test & Evaluation	WX	NAWCAD Lakehurst, NJ	0.045								0.045	
Facility Testing (JCTS)	WX	NAWCAD Lakehurst, NJ						1.500	04/07	1.000	2.500	
AAG Award Fees	C/CPFF	Gen Atomics/SanDeigo,CA	0.562								0.562	0.562
AAG Award Fees	C/CPFF	Northrop Grum/Sunnyvale,CA	1.124								1.124	1.124
AAG Award Fees	C/CPAF	TBD								8.335	8.335	8.335
Subtotal T&E			2.651					7.500		41.335	51.486	
Program Management Support	RX	NAWCAD Patuxent Rv, MD		0.220	05/05	0.165	11/05	0.190	11/06	Continuing	Continuing	
Travel	WX	NAWCAD Patuxent Rv, MD		0.045	11/04	0.045	11/05	0.045	11/06	Continuing	Continuing	
Travel	WX	NAWCAD Lakehurst, NJ		0.045	11/04	0.053	11/05	0.054	11/06	Continuing	Continuing	
Subtotal Management				0.310		0.263		0.289		Continuing	Continuing	
Remarks:												
Total Cost			108.557	28.340		33.029		31.490		Continuing	Continuing	
Remarks:												

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Exhibit R-4a, Schedule Detail
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COST (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Project Cost		0.972						
RDT&E Articles Qty		1						

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

- (U) Synthetic Material Arresting Cable: This program will develop and test a new Synthetic Fiber Arresting Gear cable to replace the current steel cable material with a lighter weight material having a higher strength-to-weight ratio. A cable with higher strength-to-weight characteristics will improve peak to mean, which will help the arresting engine realize performance improvements in both the high and low energy levels.

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(U) B. Accomplishments/Planned Program				
Synthetic Material Arresting Cable	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost		0.972		
RDT&E Articles Quantity		1		
<p>Conducted systems engineering tasks of requirements analysis and tracking, and specification development. Conducted design engineering and laboratory developmental testing on various novel materials and constructions. Conducted modeling and simulation, failure mode analysis, performance data analysis, and fatigue life testing. Awarded contract to cable manufacturer for various synthetic cables. Conducted advanced material sheave study to optimize cable to sheave performance.</p>				

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(U) C. PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
(U) Funding:				
Previous President's Budget:		0.972		
Current BES/President's Budget				
Total Adjustments	0.000	0.972	0.000	0.000
Summary of Adjustments				
Congressional undistributed reductions		-0.028		
Congressional increases		1.000		
Subtotal	0.000	0.972	0.000	0.000

(U) Schedule:
Not applicable.

(U) Technical:
Not applicable.

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<p>D. OTHER PROGRAM FUNDING SUMMARY:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Line Item No. & Name</u></th> <th style="text-align: right;"><u>FY 2004</u></th> <th style="text-align: right;"><u>FY 2005</u></th> <th style="text-align: right;"><u>FY 2006</u></th> <th style="text-align: right;"><u>FY 2007</u></th> <th style="text-align: right;"><u>FY 2008</u></th> <th style="text-align: right;"><u>FY 2009</u></th> <th style="text-align: right;"><u>FY 2010</u></th> <th style="text-align: right;"><u>FY 2011</u></th> <th style="text-align: right;"><u>To Complete</u></th> <th style="text-align: right;"><u>Total Cost</u></th> </tr> </thead> <tbody> <tr> <td>Line Item: 4216</td> <td style="text-align: right;">20.098</td> <td style="text-align: right;">21.146</td> <td style="text-align: right;">27.042</td> <td style="text-align: right;">29.604</td> <td style="text-align: right;">30.941</td> <td style="text-align: right;">31.221</td> <td style="text-align: right;">117.037</td> <td style="text-align: right;">103.595</td> <td></td> <td style="text-align: right;">Continuing</td> </tr> <tr> <td colspan="11">Aircraft Launch & Recovery Equip</td> </tr> </tbody> </table> <p>E. ACQUISITION STRATEGY:</p> <p>NAWCAD Lakehurst awarded a contract to a cable manufacturer for various synthetic cables, which it will analyze and test for potential replacement of existing Arresting Gear steel cables. Additional strategy to fully qualify a replacement arresting cable will be determined upon identification of follow-on funding.</p>											<u>Line Item No. & Name</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>FY 2010</u>	<u>FY 2011</u>	<u>To Complete</u>	<u>Total Cost</u>	Line Item: 4216	20.098	21.146	27.042	29.604	30.941	31.221	117.037	103.595		Continuing	Aircraft Launch & Recovery Equip										
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R-1 SHOPPING LIST - Item No. 111

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