

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>	DATE <b>February 1999</b>
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<b>BUDGET ACTIVITY</b> <b>7 - Operational System Development</b>	<b>PE NUMBER AND TITLE</b> <b>0305165F NAVSTAR GPS (Space)</b>
	<b>PROJECT</b>

COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
NAVSTAR GPS (Space & Control)	27,248	21,065	98,890	108,851	76,581	39,450	34,107	34,556	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0

**(U) A. Mission Description**

This program element funds Research and Development for the NAVSTAR Global Positioning System (GPS) Space and Control segments of the overall GPS program. This includes: satellite development, procurement, and deployment; training simulators; Mission Operation Support Center (MOSC); and ground control segment operation, including sustaining engineering, space and ground segments upgrades, and R&D efforts to support entire GPS system deployment. PE also funds Block IIF modernization efforts to include additional civil signals and improvements to the military signal beginning with satellite number 7. Funding of the additional civil signal effort is shared between the DOD and the DOT. The DOD portion of this effort is funded across the FYDP, while the DOT portion is funded in FY00 (\$17.2). DOT funding is required each year for the program to be fully executable.

Additional required DOT funding:

FY01	FY02	FY03	FY04	FY05
40.5	25.0	17.4	15.0	15.0

**(U) FY 1998 (\$ in Thousands):**

- (U) \$ 1,732 Continued system engineering including configuration management
- (U) \$ 3,111 Continued training simulator development
- (U) \$ 13,350 Continued Operational Control Segment (OCS) Consolidated Contract for Common Operator Support Environment (COSE), OCS Architectural Implementation, and Block IIR Full Functionality
- (U) \$ 6,045 Completed Sensor to Shooter accuracy improvement effort
- (U) \$ 51 Continued space long-range planning and analysis
- (U) \$ 71 Completed R&D funding of GPS Joint Program Office support (continues in procurement appropriation)
- (U) \$ 2,386 Continued GPS Modernization Studies (continues in FY 1999 in PE 0604480F)

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PROJECT

- (U) \$	502	Continued IIA/IIF/IIR IMOSC development	
- (U) \$	27,248	Total	

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>7 - Operational System Development</b>	<b>0305165F NAVSTAR GPS (Space)</b>	
<u>(U) FY 1999 (\$ in Thousands):</u>		
– (U) \$ 1,330	Continue system engineering, including configuration management	
– (U) \$ 2,107	Continue training simulator development	
– (U) \$ 11,364	Continue OCS Consolidated Contract for COSE, OCS Architectural Implementation, and Block IIR Full Functionality	
– (U) \$ 2,004	Begin OCS Transition to Operations	
– (U) \$ 77	Complete space long-range planning and analysis	
– (U) \$ 2,180	Continue IIA/IIF/IIR IMOSC development	
– (U) \$ 1,320	Begin MCS interface to IIR OSS	
– (U) \$ 683	Identified as a source for SBIR	
– (U) \$ 21,065	Total	
<u>(U) FY 2000 (\$ in Thousands):</u>		
– (U) \$ 2,358	Continue system engineering, including configuration management	
– (U) \$ 1,231	Complete training simulator development	
– (U) \$ 8,796	Continue OCS Consolidated contract for COSE, OCS Architectural Implementation, and Block IIR Full Functionality	
– (U) \$ 7,495	Complete OCS Transition to Operations	
– (U) \$ 2,753	Continue IIA/IIF/IIR IMOSC development	
Project	Page 3 of 10 Pages	Exhibit R-2 (PE 0305165F)

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BUDGET ACTIVITY	PE NUMBER AND TITLE PROJECT	
<b>7 - Operational System Development</b>	<b>0305165F NAVSTAR GPS (Space)</b>	
– (U) \$ 1,380	Complete MCS interface to IIR OSS	
– (U) \$ 3,444	Complete IIF satellite development	
– (U) \$ 5,390	Continue IIF clock technical support	
– (U) \$ 2,700	Continue IIF SV compatibility analysis	
– (U) \$ 5,967	Continue IIF satellite associated development including launch vehicle integration, award fees, interface document engineering, and crosslink frequency migration	
– (U) \$ 21,435	Continue IIF OCS development	
– (U) \$ 3,900	Continue GPS LEO Consolidation	
– (U) \$ 2,407	Continue IIF OCS associated development including SCN mission unique development, integration studies, and completion of system simulator	
– (U) \$ 29,634	Begin GPS Modernization Space/Control development	
– (U) \$ 98,890	Total	
Project	Page 4 of 10 Pages	Exhibit R-2 (PE 0305165F)

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<p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$ 1,648 Continue system engineering, including configuration management</li> <li>- (U) \$ 9,383 Continue OCS Consolidated contract for COSE, OCS Architectural Implementation, and Block IIR Full Functionality</li> <li>- (U) \$ 3,537 Continue IIA/IIF/IIR IMOSC development</li> <li>- (U) \$ 4,650 Continue IIF clock technical support</li> <li>- (U) \$ 4,100 Continue IIF SV compatibility analysis</li> <li>- (U) \$ 7,323 Continue IIF satellite associated development including launch vehicle integration, award fees, interface document engineering, and crosslink frequency migration</li> <li>- (U) \$ 23,987 Continue IIF OCS development</li> <li>- (U) \$ 6,000 Continue GPS LEO Consolidation</li> <li>- (U) \$ 1,269 Continue IIF OCS associated development including SCN mission unique development and integration studies</li> <li>- (U) \$ 4,000 Begin IIF SAASM Control System changes</li> <li>- (U) \$ 42,954 Continue GPS Modernization Space/Control development</li> <li>- (U) \$ 108,851 Total</li> </ul> <p>(U) <b>B. <u>Budget Activity Justification:</u></b></p> <p style="padding-left: 40px;">This program is in Budget Activity 7 - Operational Systems Development because it is a post-Milestone III program.</p> <p>(U) <b>C. <u>Program Change Summary (\$ in Thousands)</u></b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="text-align: right; width: 10%;"><u>FY 1998</u></th> <th style="text-align: right; width: 10%;"><u>FY 1999</u></th> <th style="text-align: right; width: 10%;"><u>FY 2000</u></th> <th style="text-align: right; width: 10%;"><u>FY 2001</u></th> <th style="text-align: right; width: 10%;"><u>Total Cost</u></th> </tr> </thead> <tbody> <tr> <td>(U) Previous President's Budget (FY 1999 PB)</td> <td style="text-align: right;">25,146</td> <td style="text-align: right;">21,155</td> <td style="text-align: right;">11,013</td> <td style="text-align: right;">8,925</td> <td style="text-align: right;">Continuing</td> </tr> <tr> <td>(U) Appropriated Value</td> <td style="text-align: right;">26,685</td> <td style="text-align: right;">21,155</td> <td></td> <td></td> <td></td> </tr> <tr> <td>(U) Adjustments to Appropriated Value</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">a. Cong Gen Reductions</td> <td style="text-align: right;">-882</td> <td style="text-align: right;">-90</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">b. SBIR</td> <td style="text-align: right;">-661</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">c. Omnibus or Other Above Threshold Reprogram</td> <td style="text-align: right;">-171</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">d. Below Threshold Reprogramming</td> <td style="text-align: right;">2,277</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>(U) Adjustments to Budget Years Since FY 1999 PB</td> <td></td> <td></td> <td style="text-align: right;">87,877</td> <td style="text-align: right;">99,926</td> <td></td> </tr> <tr> <td>(U) Current Budget Submit/FY 2000 PB</td> <td style="text-align: right;">27,248</td> <td style="text-align: right;">21,065</td> <td style="text-align: right;">98,890</td> <td style="text-align: right;">108,851</td> <td style="text-align: right;">Continuing</td> </tr> </tbody> </table>				<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>	(U) Previous President's Budget (FY 1999 PB)	25,146	21,155	11,013	8,925	Continuing	(U) Appropriated Value	26,685	21,155				(U) Adjustments to Appropriated Value						a. Cong Gen Reductions	-882	-90				b. SBIR	-661					c. Omnibus or Other Above Threshold Reprogram	-171					d. Below Threshold Reprogramming	2,277					(U) Adjustments to Budget Years Since FY 1999 PB			87,877	99,926		(U) Current Budget Submit/FY 2000 PB	27,248	21,065	98,890	108,851	Continuing
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<p>(U) Significant Program Changes: \$683 identified as a source for SBIR in FY 1999. \$2,277 FY 1998 Below Threshold Reprogramming is for GPS Modernization. \$26,677 FY 2000/\$23,099 FY 2001 funding transferred from PE 64480F. \$34,100 FY 2000/\$45,000 FY 2001 added for GPS Modernization, and \$27,100 FY 2000/\$31,827 FY 2001 primarily for Control Sement systems development.</p> <p>(U) <b>D. <u>Other Program Funding Summary (\$ in Thousands)</u></b></p> <table border="0" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="text-align: center;"><u>FY 1998</u></th> <th style="text-align: center;"><u>FY 1999</u></th> <th style="text-align: center;"><u>FY 2000</u></th> <th style="text-align: center;"><u>FY 2001</u></th> <th style="text-align: center;"><u>FY 2002</u></th> <th style="text-align: center;"><u>FY</u> <u>2003</u></th> <th style="text-align: center;"><u>FY 2004</u></th> <th style="text-align: center;"><u>FY 2005</u></th> <th style="text-align: center;"><u>To</u> <u>Compl</u></th> <th style="text-align: center;"><u>Total</u> <u>Cost</u></th> </tr> </thead> <tbody> <tr> <td>(U) Operations and Maintenance (PE 0305165F, BA 1 - Operating Forces, SAG 13D)</td> <td style="text-align: right;">24,992</td> <td style="text-align: right;">26,094</td> <td style="text-align: right;">41,417</td> <td style="text-align: right;">43,272</td> <td style="text-align: right;">39,918</td> <td style="text-align: right;">43,197</td> <td style="text-align: right;">49,707</td> <td style="text-align: right;">50,566</td> <td style="text-align: center;">Cont</td> <td style="text-align: center;">Cont</td> </tr> <tr> <td>(U) Missile Procurement (PE 0305165F, BA 5 - Space and Other Support, P-20, 21)</td> <td style="text-align: right;">162,626</td> <td style="text-align: right;">93,599</td> <td style="text-align: right;">170,847</td> <td style="text-align: right;">257,435</td> <td style="text-align: right;">224,096</td> <td style="text-align: right;">228,902</td> <td style="text-align: right;">293,886</td> <td style="text-align: right;">217,987</td> <td style="text-align: center;">Cont</td> <td style="text-align: center;">Cont</td> </tr> <tr> <td>(U) Other Procurement (PE 0305165F, BP 83 - Electronics and Telecommunications Equipment, WSC 6790, P-68)</td> <td style="text-align: right;">10,665</td> <td style="text-align: right;">8,113</td> <td style="text-align: right;">14,648</td> <td style="text-align: right;">8,833</td> <td style="text-align: right;">9,939</td> <td style="text-align: right;">6,159</td> <td style="text-align: right;">6,978</td> <td style="text-align: right;">6,982</td> <td style="text-align: center;">Cont</td> <td style="text-align: center;">Cont</td> </tr> </tbody> </table> <p><b><u>Related RDT&amp;E:</u></b></p> <p>(U) PE 0305164F, GPS User Equipment          (U) PE 0101221N, Fleet Ballistic Missile System          (U) PE 0301357F and 0305913F, Nuclear Detonation Detection System (NDS)          (U) PE 0305119F Space Boosters (Delta II)          (U) PE 0604480F, GPS Block IIF</p> <p>(U) <b>E. <u>Acquisition Strategy:</u></b> GPS Operational Control System (OCS) upgrade was competitively awarded to a single contractor in July 1995. Block IIF satellite development contract was competitively awarded to a single contractor in April 1996.</p>										<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY</u> <u>2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To</u> <u>Compl</u>	<u>Total</u> <u>Cost</u>	(U) Operations and Maintenance (PE 0305165F, BA 1 - Operating Forces, SAG 13D)	24,992	26,094	41,417	43,272	39,918	43,197	49,707	50,566	Cont	Cont	(U) Missile Procurement (PE 0305165F, BA 5 - Space and Other Support, P-20, 21)	162,626	93,599	170,847	257,435	224,096	228,902	293,886	217,987	Cont	Cont	(U) Other Procurement (PE 0305165F, BP 83 - Electronics and Telecommunications Equipment, WSC 6790, P-68)	10,665	8,113	14,648	8,833	9,939	6,159	6,978	6,982	Cont	Cont
	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY</u> <u>2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To</u> <u>Compl</u>	<u>Total</u> <u>Cost</u>																																										
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Project			Page 6 of 10 Pages			Exhibit R-2 (PE 0305165F)																																														

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BUDGET ACTIVITY <b>7 - Operational System Development</b>					PE NUMBER AND TITLE <b>0305165F NAVSTAR GPS (Space)</b>						PROJECT					
<b>(U) F. <u>Schedule Profile</u></b>																
		<u>FY 1998</u>				<u>FY 1999</u>				<u>FY 2000</u>				<u>FY 2001</u>		
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(U) Training simulator development complete										x						
(U) Continue OCS Consolidated Contract																
(U) Phase 2 delivery				*												
(U) Phase 3/4 delivery									x							
(U) IIA IMOSC development begins			*													
(U) IIA IMOSC system available									x							
(U) IIA IMOSC development complete												x				
(U) IIF IMOSC development begins									x							
(U) MCS interface to IIR OSS devel begins					*											
(U) MCS interface to IIR OSS dev complete											x					
(U) IIF satellite final design verification										x						
(U) IIF SAASM Control Seg devel begins													x			
(U) IIF OCS software delivery																x
(U) GPS Modernization studies began	*															
(U) GPS Modernization studies complete																x
(U) GPS ORD Coordination begins				*												
(U) GPS OIPT			*			x										
(U) GPS ORD Validation							x									
(U) GPS Program Review																x
(U) GPS Modernization Space/Control development begins													x			

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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>	DATE <b>February 1999</b>
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BUDGET ACTIVITY <b>7 - Operational System Development</b>	PE NUMBER AND TITLE <b>0305165F NAVSTAR GPS (Space)</b>
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**(U) A. Project Cost Breakdown (\$ in Thousands)**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
(U) System Engineering including Configuration Management	1,732	1,330	2,358	1,648
(U) Training Simulator Development	3,111	2,107	1,231	0
(U) Operational Control Segment (OCS) Development/Sustainment	13,350	11,364	8,796	9,383
(U) Sensor to Shooter	6,045	0	0	0
(U) OCS Transition to Operations		2,004	7,495	0
(U) Space long-range planning	51	77	0	0
(U) Program Office Support	71	0	0	0
(U) GPS Modernization	2,386	0	0	0
(U) IIA/IIF/IIR IMOSC development	502	2,180	2,753	3,537
(U) MCS interface to IIR OSS	0	1,320	1,380	0
(U) IIF satellite development*	0	0	3,444	0
(U) IIF clock technical support*	0	0	5,390	4,650
(U) IIF SV compatibility analysis*	0	0	2,700	4,100
(U) IIF satellite associated development*	0	0	5,967	7,323
(U) IIF Operational Control System development*	0	0	21,435	23,987
(U) GPS LEO consolidation*	0	0	3,900	6,000
(U) IIF OCS associated development*	0	0	2,407	1,269
(U) IIF SAASM Control System changes	0	0	0	4,000
(U) GPS Modernization Space/Control development	0	0	29,634	42,954
(U) Identified as a source for SBIR		683		
(U) Total	27,248	21,065	98,890	108,851

\*Funded in PE 0604480F in FY 1999 and prior.

**(U) B. Budget Acquisition History and Planning Information (\$ in Thousands)**

**Performing Organizations:**

Project

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)										DATE February 1999	
BUDGET ACTIVITY <b>7 - Operational System Development</b>					PE NUMBER AND TITLE <b>0305165F NAVSTAR GPS (Space)</b>					PROJECT	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1998	Budget FY 1998	Budget FY 1999	Budget FY 2000	Budget FY 2001	Budget to Complete	Total Program
Identified as a source for SBIR							683				683
<u>Product Development Organizations</u>											
Lockheed-Martin Applied Research Labs	CPAF/FFP	Jul 95	164,816	179,726	47,567	21,626	16,389	17,782	9,351	8,089	120,804
	MIPR	Mar 97	2,766	2,766	1,561	805	0	400	0	0	2,766
Boeing North American	FPAF/CPAF	Apr 96	Cont	Cont	3,000*	1,832*	2,180*	70,240	91,170	Cont	Cont
NRL	MIPR	Dec 99	Cont	Cont	0*	0*	0*	5,390	4,650	15,625**	Cont
GPS Modernization	TBD	TBD	Cont	Cont	0	0	0	2,000	2,000	Cont	Cont
Miscellaneous	Various	Various	N/A	N/A	N/A	1,131	406	720	32	Cont	Cont
*primary funding in PE 0604480F											
**through FY05 only											
<u>Support and Management Organizations</u>											
System Engineer	Various	Various	N/A	N/A	17,678	1,732	1,330	2,358	1,648	Cont	Cont
Program Support	Various	Various	N/A	N/A	6,605	71	0	0	0	0	6,676
Miscellaneous	Various	Various	N/A	N/A	N/A	51	77	0	0	0	128
<u>Test and Evaluation Organizations</u>											
N/A											
Identified as a source for SBIR							683				683
Subtotal Product Development					52,128	25,394	18,975	96,532	107,203	Cont	Cont
Subtotal Support and Management					24,283	1,854	1,407	2,358	1,648	Cont	Cont
Project											



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