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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000																															
BUDGET ACTIVITY 07 - Operational System Development				PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)				PROJECT																														
COST (\$ in Thousands)		FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost																												
673028	Navstar GPS	36,944	49,244	66,975	50,425	50,469	50,535	50,653	Continuing	TBD																												
Quantity of RDT&E Articles		0	0	0	0	0	0	0	0	0																												
<p>(U) <u>A. Mission Description</u> The Global Positioning System (GPS) is a space-based radio positioning, navigation, and time distribution system. GPS User Equipment (UE) consists of standardized receivers, antennae, antenna electronics, etc., grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by all Services and DoD. RDT&E funds UE development and testing, studies and engineering to assist UE aircraft integration, software upgrades, product improvement studies, commercial GPS UE test and evaluation, and mission support. Due to increasing military GPS dependence and emerging Electronic Warfare (EW) threat, Navigation Warfare (Navwar) program was established to address EW solutions for GPS. Key elements of GPS Modernization include protecting U.S. military and allies' use of GPS, preventing hostile exploitation of GPS, and preserving civil use of GPS outside the area of operations (AOO).</p> <p>(U) <u>FY 1999 (\$ in Thousands)</u></p> <table border="0"> <tr> <td>(U) \$731</td> <td>Continued aircraft integration development testing</td> </tr> <tr> <td>(U) \$3,324</td> <td>Continued development and product improvement testing and evaluation</td> </tr> <tr> <td>(U) \$2,890</td> <td>Continue ACTD - Protection</td> </tr> <tr> <td>(U) \$1,163</td> <td>Complete ACTD - Prevention</td> </tr> <tr> <td>(U) \$365</td> <td>Continued Navwar modeling & simulation efforts</td> </tr> <tr> <td>(U) \$106</td> <td>Complete Navwar Evaluation Team (NET) support</td> </tr> <tr> <td>(U) \$1,762</td> <td>Continued support contract</td> </tr> <tr> <td>(U) \$15,158</td> <td>Continued GPS Receiver Application Module - Selective Availability Anti-Spoofing Module (GRAM-SAASM) development</td> </tr> <tr> <td>(U) \$4,294</td> <td>Continued SAASM development</td> </tr> <tr> <td>(U) \$239</td> <td>Completed Defense Advanced GPS Receiver (DAGR) study effort</td> </tr> <tr> <td>(U) \$4,701</td> <td>Began Advanced User Equipment Technology efforts</td> </tr> <tr> <td>(U) \$707</td> <td>Continued Modernization efforts</td> </tr> <tr> <td>(U) \$1,504</td> <td>Continued in-house support</td> </tr> <tr> <td>(U) \$36,944</td> <td>Total</td> </tr> </table>											(U) \$731	Continued aircraft integration development testing	(U) \$3,324	Continued development and product improvement testing and evaluation	(U) \$2,890	Continue ACTD - Protection	(U) \$1,163	Complete ACTD - Prevention	(U) \$365	Continued Navwar modeling & simulation efforts	(U) \$106	Complete Navwar Evaluation Team (NET) support	(U) \$1,762	Continued support contract	(U) \$15,158	Continued GPS Receiver Application Module - Selective Availability Anti-Spoofing Module (GRAM-SAASM) development	(U) \$4,294	Continued SAASM development	(U) \$239	Completed Defense Advanced GPS Receiver (DAGR) study effort	(U) \$4,701	Began Advanced User Equipment Technology efforts	(U) \$707	Continued Modernization efforts	(U) \$1,504	Continued in-house support	(U) \$36,944	Total
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE
BUDGET ACTIVITY		PROJECT
07 - Operational System Development		February 2000
PE NUMBER AND TITLE		PROJECT
0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)		
(U) A. Mission Description Continued		
(U) FY 2000 (\$ in Thousands)		
(U) \$736	Continue aircraft integration development testing	
(U) \$5,070	Continue development and product improvement testing and evaluation	
(U) \$3,500	Complete ACTD (Protection) objectives under Joint GPS Combat Evaluation (JGPSCE) Demo	
(U) \$11,000	Continue classified requirement	
(U) \$4,500	Continue SAASM development	
(U) \$6,100	Continue GRAM-SAASM development and begin platform demonstrations	
(U) \$3,685	Continue in-house support	
(U) \$1,934	Continue support contract	
(U) \$6,500	Continue advanced UE technology effort (Receivers)	
(U) \$2,950	Continue advanced UE technology effort (Anti-Jam Filters)	
(U) \$3,269	Continue advanced UE technology effort (Advanced Antenna)	
(U) \$49,244	Total	
(U) FY 2001 (\$ in Thousands)		
(U) \$659	Continue aircraft integration development testing	
(U) \$16,000	Begin advance UE Protection development (Receiver, Antenna)	
(U) \$2,300	Continue development and product improvement testing and evaluation	
(U) \$13,100	Continue SAASM development	
(U) \$10,000	Continue Modernization efforts (SAASM M-Code development)	
(U) \$3,696	Continue in-house support	
(U) \$2,116	Continue support contract	
(U) \$8,000	Continue classified requirement	
(U) \$7,054	Continue advanced UE technology effort (Receivers)	
(U) \$2,050	Continue advanced UE technology effort (Advanced Antenna)	
(U) \$2,000	Continue advanced UE technology effort (Anti-Jam Filters)	
(U) \$66,975	Total	
Project 673028		Exhibit R-2 (PE 0305164F)

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BUDGET ACTIVITY 07 - Operational System Development			PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)				PROJECT		
(U) <u>B. Budget Activity Justification</u>									
This program element is in Budget Activity 7 - Operational System Development, because UE passed Milestone IIB in January 1992.									
(U) <u>C. Program Change Summary (\$ in Thousands)</u>									
			<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>			<u>Total Cost</u>	
(U)	Previous President's Budget (FY 2000 PBR)		36,234	53,963	41,471			TBD	
(U)	Appropriated Value		36,638	49,913					
(U)	Adjustments to Appropriated Value								
	a. Congressional/General Reductions		-404	-10					
	b. Small Business Innovative Research		-685						
	c. Omnibus or Other Above Threshold Reprogram		825	-270					
	d. Below Threshold Reprogram		777						
	e. Rescissions		-207	-389					
	f. Other							TBD	
(U)	Adjustments to Budget Years Since FY 2000 PBR				25,504				
(U)	Current Budget Submit/FY 2001 PBR		36,944	49,244	66,975			TBD	
(U) <u>Significant Program Changes:</u>									
FY 2001 increase funds GPS UE Navwar Anti-Jam Technology/Modernization Security Architecture (SAASM), development efforts. Changed timing of DAGR procurement to FY02.									
(U) <u>D. Other Program Funding Summary (\$ in Thousands)</u>									
		<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</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)	AF RDT&E								
(U)	Other APPN								
(U)	Operations and Maintenance (PE 0305164F, BA 1 - Operating Forces, SAG 13D)	2,122	966	2,211	2,149	2,266	6,833	6,715	Continuing
(U)	Aircraft Procurement (PE 0305164F, BA 7, Aircraft	35,295	35,449	39,290	57,452	76,549	89,559	117,105	Continuing

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BUDGET ACTIVITY 07 - Operational System Development	PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)
	PROJECT 0305164F

(U) **D. Other Program Funding Summary (\$ in Thousands)**

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</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>	
Support Equipment, BP19, P-74)									
(U) Other Procurement (PE 0305164F, BP 63 - Electronics & Telecommunications Equipment, WSC 6730, P-62)	3,321	2,325	1,658	4,402	4,409	4,773	4,394	Continuing	Continuing
(U) OSD RDT&E (ACTD Funding: PE 0603750D) Related RDT&E: PE 0305165F, NAVSTAR GPS (Space/Grd Segments) PE 0604480F, GPS Block IIF PE 0305176F, Combat Survivor/Evader Locator	300								

(U) **E. Acquisition Strategy**
 Several ongoing and planned concept definition and technology risk reduction programs will define and mature required GPS technologies needed for GPS Modernization. Our strategy will develop open system like architecture for a GPS receiver based on the GPS Receiver Application Module (GRAM) concept. The GRAM-SAASM program is a further risk reduction effort to integrate the GPS receiver operations internally between GRAM and SAASM. Also, several anti-jam technology risk reduction efforts will be pursued to mature technologies and prepare for technology insertion. Continue to work with platforms/users to identify requirements and upgrade paths to insert GPS enhancements.

(U) **F. Schedule Profile**

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
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BUDGET ACTIVITY 07 - Operational System Development	PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)	PROJECT 673028
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(U) **F. Schedule Profile Continued**

	<u>FY 1999</u>				<u>FY 2000</u>				<u>FY 2001</u>			
	1	2	3	4	1	2	3	4	1	2	3	4
(U) GPS ORD validation			*									
(U) GPS OIPT	*					X	X					
(U) Advance UE Technology (ie Receiver, Antenna, Filter efforts)	*	*	*	*	*	X	X	X	X	X	X	X
(U) Navwar AOA brief to JROC			*									
(U) Defense Science Board						*						
(U) GRAM-SAASM ICD Complete							X					
(U) GRAM-SAASM preproduction prototypes deliveries							X					

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)								DATE February 2000		
BUDGET ACTIVITY 07 - Operational System Development					PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)			PROJECT		
(U) Performing Organizations Continued:										
<u>Contractor or Government Performing Activity</u>	<u>Contract Method/Type or Funding Vehicle</u>	<u>Award or Obligation Date</u>	<u>Performing Activity EAC</u>	<u>Project Office EAC</u>	<u>Total Prior to FY 1999</u>	<u>Budget FY 1999</u>	<u>Budget FY 2000</u>	<u>Budget FY 2001</u>	<u>Budget to Complete</u>	<u>Total Program</u>
OSD Withhold for Inflation Savings						46			0	46
<u>Product Development Organizations</u>										
Rockwell (MAGR)	C/FPIF/FFP/CPAF	Various	19,293	19,293	19,293	0	0	0	0	19,293
DOE Sandia (SAASM)	MIPR	Feb 94	Continuing	Continuing	7,982	2,605	3,400	4,500	Continuing	TBD
NAWC (SAASM)	MIPR	Oct 95	760	760	599	0	0	0	0	599
Various (SAASM)	Various	Various	Continuing	Continuing	4,041	1,539	1,100	8,600	Continuing	TBD
TBD (SAASM M-Code)	TBD	Dec 00	Continuing	Continuing	0	0	0	8,000		8,000
Alliant Techsys Inc (SAASM)	C/CPFF	Oct 95	4,782	4,782	4,632	150	0	0	0	4,782
Multiple (NAVWAR PRDAs)	C/CPAF	Aug 96	13,440	13,440	13,440	0	0	0	0	13,440
Holloman AFB (Integration)	Project Order	N/A	Continuing	Continuing	2,549	731	736	659	Continuing	TBD
General Dynamics (Various)	Time and Materials	Jan 96	1,810	1,810	1,810	0	0	0	0	1,810
Various (ACTD Prevention)	Various	Various	8,545	8,545	6,265	1,163	0	0	0	7,428
Various (ACTD Protection)	Various	Various	14,071	14,071	7,443	2,890	3,500	0	0	13,833
Adv UE Protection Dev	Various	Various	TBD	TBD	0	0	0	18,000		18,000
Various (NET)	Various	Various	10,413	10,413	10,228	106	0	0	0	10,334
Various (Classified Requirement)	Various	Various	Continuing	Continuing	7,752	0	11,000	8,000	Continuing	TBD
Various (GPS Modernization)	Various	Various	TBD	TBD	5,078	707	0	0	0	5,785
Various (Navwar M&S)	Various	Various	4,775	4,775	3,210	365	0	0	0	3,575
CeCom (DAGR study)	MIPR	Dec 97	385	385	146	239	0	0	0	385

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BUDGET ACTIVITY				PE NUMBER AND TITLE				PROJECT		
07 - Operational System Development				0305164F NAVSTAR Global Positioning System (User 673028 EQ) Space)						
(U) <u>Performing Organizations Continued:</u>										
<u>Product Development Organizations</u>										
TBD (Handheld PRDA)	TBD	Apr 00	TBD	TBD	0	0	4,900	Continuing	TBD	
Various (GRAASM)	PRDA	Jul 98	23,659	23,659	6,001	15,158	6,100	0	0	27,259
<u>Support and Management Organizations</u>										
Overlook Sys (OASD/C3I)	C/CPFF	Dec 95	Continuing	Continuing	15,266	1,762	1,934	2,116	Continuing	TBD
Aerospace Corp (Technical Supt)	CPFF	Various	Continuing	Continuing	928	0	2,112	2,112	Continuing	TBD
SMC/FMB (Shared Prg Cost)	Various	Various	Continuing	Continuing	4,584	576	668	612	Continuing	TBD
PRC (Technical Supt)	Time and Materials	Dec 95	714	714	714	0	0	0	0	714
Miscellaneous (In-house support)	Various	Various	Continuing	Continuing	3,025	928	905	972	Continuing	TBD
Advanced UE Tech Invest (Tech Supt)	Various	Various	4,655	4,655	0	4,655	0	0	0	4,655
Receiver Tech (Tech Spt)	Various	Various	Continuing	Continuing	0	0	6,500	2,154	Continuing	TBD
Anti-jam Filter Tech (Tech Spt)	Various	Various	Continuing	Continuing	0	0	2,950	2,000	Continuing	TBD
Advanced Antenna (Tech Spt)	Various	Various	Continuing	Continuing	0	0	3,269	2,050	Continuing	TBD
Various (Other Navwar Studies)	Various	Various	2,375	2,375	2,375	0	0	0	0	2,375
<u>Test and Evaluation Organizations</u>										
46th TG (SAASM/Test)	Project Order	Various	31,987	31,987	31,987	0	0	0	0	31,987
46th TG (UE develop & product testing)	Project Order	Various	Continuing	Continuing	1,469	3,324	5,070	2,300	Continuing	TBD
Project 673028			Page 8 of 9 Pages				Exhibit R-3 (PE 0305164F)			

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(U) Government Furnished Property:									
<u>Item</u>	<u>Contract</u>	<u>Award or</u>	<u>Delivery</u>	<u>Total Prior</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget to</u>	<u>Total</u>
<u>Description</u>	<u>Method/Type</u>	<u>or Funding</u>	<u>Date</u>	<u>to FY 1999</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Complete</u>	<u>Program</u>
<u>Product Development Property</u>	<u>Vehicle</u>	<u>Obligation</u>	<u>Date</u>						
N/A									
<u>Support and Management Property</u>									
N/A									
<u>Test and Evaluation Property</u>									
N/A									
Subtotals				<u>Total Prior</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget to</u>	<u>Total</u>
				<u>to FY 1999</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Complete</u>	<u>Program</u>
					46			0	46
Subtotal Product Development				100,469	25,653	25,836	52,659	TBD	TBD
Subtotal Support and Management				26,892	7,921	18,338	12,016	TBD	TBD
Subtotal Test and Evaluation				33,456	3,324	5,070	2,300	TBD	TBD
Total Project				160,817	36,944	49,244	66,975	TBD	TBD