

UNCLASSIFIED

PE NUMBER: 0305164F

PE TITLE: NAVSTAR Global Positioning System User Equipment Space

Exhibit R-2, RDT&E Budget Item Justification

DATE

February 2005

BUDGET ACTIVITY

07 Operational System Development

PE NUMBER AND TITLE

0305164F NAVSTAR Global Positioning System User Equipment Space

Cost (\$ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	92.748	102.432	125.778	107.617	97.296	73.369	76.191	77.309	Continuing	TBD
3028 Navstar GPS	92.748	102.432	125.778	107.617	97.296	73.369	76.191	77.309	Continuing	TBD

(U) **A. Mission Description and Budget Item Justification**

The Global Positioning System (GPS) is a space-based radio positioning, navigation, and time distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, etc., grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by 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, the 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).

This program element is in Budget Activity 7 - Operational System Development, because UE supports operational systems.

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

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) Previous President's Budget	99.449	104.114	92.697	89.204
(U) Current PBR/President's Budget	92.748	102.432	125.778	107.617
(U) Total Adjustments	-6.701	-1.682		
(U) Congressional Program Reductions				
Congressional Rescissions		-1.682		
Congressional Increases				
Reprogrammings	-4.700			
SBIR/STTR Transfer	-2.001			

(U) **Significant Program Changes:**

Increased funding in FY06-FY07 for Y-Code, M-Code, Coarse Acquisition (CA) Code (YMCA) receiver development.

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Exhibit R-2a, RDT&E Project Justification

DATE

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BUDGET ACTIVITY 07 Operational System Development					PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System User Equipment Space			PROJECT NUMBER AND TITLE 3028 Navstar GPS		
Cost (\$ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
3028 Navstar GPS	92.748	102.432	125.778	107.617	97.296	73.369	76.191	77.309	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) **A. Mission Description and Budget Item Justification**

The Global Positioning System (GPS) is a space-based radio positioning, navigation, and time distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, etc., grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by 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, the 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).

This program element is in Budget Activity 7 - Operational System Development, because UE supports operational systems.

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

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) Continue Advanced UE Technology efforts	17.960	19.257	15.791	13.489
(U) Continue SAASM/GRAM-SAASM development	9.235	7.952	3.405	1.449
(U) Continue Integration, Test and Evaluation	6.044	4.839	5.408	6.266
(U) Continue System Engineering and program support	24.770	33.501	31.674	31.494
(U) Continue Modernization efforts (M-Code Development)	34.739	36.883	69.500	54.919
(U) Total Cost	92.748	102.432	125.778	107.617

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

	<u>FY 2004</u> <u>Actual</u>	<u>FY 2005</u> <u>Estimate</u>	<u>FY 2006</u> <u>Estimate</u>	<u>FY 2007</u> <u>Estimate</u>	<u>FY 2008</u> <u>Estimate</u>	<u>FY 2009</u> <u>Estimate</u>	<u>FY 2010</u> <u>Estimate</u>	<u>FY 2011</u> <u>Estimate</u>	<u>Cost to</u> <u>Complete</u>	<u>Total Cost</u>
(U) AF RDT&E										
(U) Other APPN Operations and Maintenance										
(U) (PE 0305164F, BA 1 - Operating Forces, SAG 13D) Aircraft Procurement (PE	2.113	2.129	2.900	4.003	7.351	8.356	7.930	4.900	Continuing	TBD
(U) 0305164F, BA 7, Aircraft Support Equipment, BP19)	29.326	28.033	11.800	12.406	14.148	23.375	30.427	33.794	Continuing	TBD
(U) Other Procurement (PE	10.255	10.232	9.096	5.963	5.461	4.481	4.736	5.082	Continuing	TBD

Project 3028

R-1 Shopping List - Item No. 190-2 of 190-7

Exhibit R-2a (PE 0305164F)

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
BUDGET ACTIVITY 07 Operational System Development	PE NUMBER AND TITLE 0305164F NAVSTAR Global Positioning System User Equipment Space	PROJECT NUMBER AND TITLE 3028 Navstar GPS
<p>(U) <u>C. Other Program Funding Summary (\$ in Millions)</u></p> <p>0305164F, BP 83 - Electronics & Telecommunications Equipment, WSC 836730, P-62); BP 86 - Spares & Repair Parts, WSC 190A, P-62)</p> <p>(U) <u>D. Acquisition Strategy</u></p> <p>Several ongoing and planned concept definition and technology risk reduction programs will define and mature GPS technologies needed for GPS Modernization. Air Force strategy is to develop an open system architecture for a GPS receiver based on the GPS Receiver Applications Module (GRAM) concept. The GRAM-Selective Availability Anti-Spoofing Module (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. GPS UE continues to work with platforms/users to identify requirements and upgrade paths for GPS enhancements. In addition, to combat the potential threat that U.S. forces may be denied the use of GPS signals, the Advanced Digital Antenna Production (ADAP) program (a follow-on to the GPS Antenna System (GAS-1)), is being developed.</p> <p>The Modernized User Equipment (MUE) program will develop controlled, non-proprietary specifications and interface control documents (ICDs), to enable the Services to acquire affordable M-Code UE through their program offices and/or the GPS JPO. An assurance plan will verify compliance. The program will use a phased approach:</p> <ul style="list-style-type: none"> - Cost Plus Fixed Fee (CPFF) Program and Research Development Announcement (PRDA) contracts for program concept development are intended to reduce risk and advance the technology required for future development (awarded 3QFY03). - A contract will be awarded FY06 to develop an aviation and ground receiver card capable of position, velocity, and time (PVT) utilizing Y-Code/M-Code/Coarse Acquisition (YMCA). 		
Project 3028	R-1 Shopping List - Item No. 190-3 of 190-7	Exhibit R-2a (PE 0305164F)

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Exhibit R-3, RDT&E Project Cost Analysis

DATE

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BUDGET ACTIVITY

07 Operational System Development

PE NUMBER AND TITLE

0305164F NAVSTAR Global
Positioning System User Equipment
Space

PROJECT NUMBER AND TITLE

3028 Navstar GPS

(U) Cost Categories (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	<u>Contract</u> <u>Method &</u> <u>Type</u>	<u>Performing</u> <u>Activity &</u> <u>Location</u>	<u>Total</u> <u>Prior to FY</u> <u>2004</u> <u>Cost</u>	<u>FY 2004</u> <u>Cost</u>	<u>FY 2004</u> <u>Award</u> <u>Date</u>	<u>FY 2005</u> <u>Cost</u>	<u>FY 2005</u> <u>Award</u> <u>Date</u>	<u>FY 2006</u> <u>Cost</u>	<u>FY 2006</u> <u>Award</u> <u>Date</u>	<u>FY 2007</u> <u>Cost</u>	<u>FY 2007</u> <u>Award</u> <u>Date</u>	<u>Cost to</u> <u>Complete</u>	<u>Total Cost</u>	<u>Target</u> <u>Value of</u> <u>Contract</u>
(U) <u>Product Development</u>														
Rockwell (MAGR)	C/FPIF/FF P/ CPAF		19.293	0.000		0.000		0.000		0.000		0.000	19.293	
DOE Sandia (SAASM)	MIPR	Kirtland AFB, NM	26.873	7.605	Jan-04	7.310	Jan-05	2.793	Jan-06	0.837	Jan-07	Continuing	TBD	
NAWC (SAASM)	MIPR		0.599	0.000		0.000		0.000		0.000		0.000	0.599	
Various (SAASM)	Various	Various	28.115	0.998		0.455		0.612		0.612		Continuing	TBD	
Various (M-Code)	Various	Various	25.317	34.739		36.883		69.500		54.919		Continuing	TBD	
Alliant Techsys Inc (SAASM) & Multiple NAVWAR PRDAs	C/CPFF & C/CPAF		18.222	0.000		0.000		0.000		0.000		0.000	18.222	
Holloman AFB (Integration)	Project Order	46th TG, Holloman AFB, NM	5.400	0.622	Jan-04	0.304	Jan-05	0.656	Jan-06	0.684	Jan-07	Continuing	TBD	
General Dynamics (Various)	Time and Materials		1.810	0.000		0.000		0.000		0.000		0.000	1.810	
Completed technology development efforts	Various		85.634	0.000		0.000		0.000		0.000		0.000	85.634	
Allan Osborne, Alliant Tech, Rockwell Collins, and Raytheon (DAGR)	PRDA	Various	25.953	0.000		2.500		0.000		0.000		Continuing	TBD	
Various (GRAM-SAASM)	PRDA		30.494	0.632		0.187		0.000		0.000		0.000	31.313	
Advanced UE Tech Invest	Various		4.646	0.000		0.000		0.000		0.000		0.000	4.646	
Receiver Technology	MIPR	AFRL - WPAFB, OH & KAFB, NM	10.213	3.667	Nov-03	2.300	Dec-04	3.875	Dec-05	3.320	Dec-06	Continuing	TBD	
Anti-jam Filter Technology	Various	Various	7.847	0.000		0.000				0.000		Continuing	TBD	
Advanced Antenna Technology	Various	Various	19.596	14.293		14.457		11.916		10.169		Continuing	TBD	
Subtotal Product Development			310.012	62.556		64.396		89.352		70.541		Continuing	TBD	0.000
Remarks:														
(U) <u>Support</u>														
Overlook Sys (OASD/C3I)	C/CPFF	OASD, Arlington, VA	27.073	1.000	Jan-04	1.000	Jan-05	1.000	Jan-06	1.000	Jan-07	Continuing	TBD	
Aerospace Corp (Technical Supt)	CPFF	Aerospace, Los Angeles, CA	9.486	4.982	Oct-03	4.913	Oct-04	6.419	Oct-05	6.514	Oct-06	Continuing	TBD	
PRC (Technical Supt)	Time and Materials		0.714	0.000		0.000		0.000		0.000		0.000	0.714	
Miscellaneous	Various	Various	34.572	18.788		27.588		24.255		23.980		Continuing	TBD	

Project 3028

R-1 Shopping List - Item No. 190-4 of 190-7

Exhibit R-3 (PE 0305164F)

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Exhibit R-3, RDT&E Project Cost Analysis							DATE February 2005		
BUDGET ACTIVITY				PE NUMBER AND TITLE			PROJECT NUMBER AND TITLE		
07 Operational System Development				0305164F NAVSTAR Global Positioning System User Equipment Space			3028 Navstar GPS		
(Program Spt)									
Various	Various		7.883	0.000	0.000	0.000	0.000	0.000	7.883
(Other Navwar Studies)									
Subtotal Support			79.728	24.770	33.501	31.674	31.494	Continuing	TBD
Remarks:									
(U) <u>Test & Evaluation</u>									
46th TG (SAASM/Test)	Project		31.987	0.000	0.000	0.000	0.000	0.000	31.987
	Order								
46th TG/UE development & production	Project	Holloman							
Testing	Order /	AFB, NM /	12.690	5.422	4.535	4.752	5.582	Continuing	TBD
	Various	Various							
Subtotal Test & Evaluation			44.677	5.422	4.535	4.752	5.582	Continuing	TBD
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			434.417	92.748	102.432	125.778	107.617	Continuing	TBD

Exhibit R-4, RDT&E Schedule Profile

DATE

February 2005

BUDGET ACTIVITY

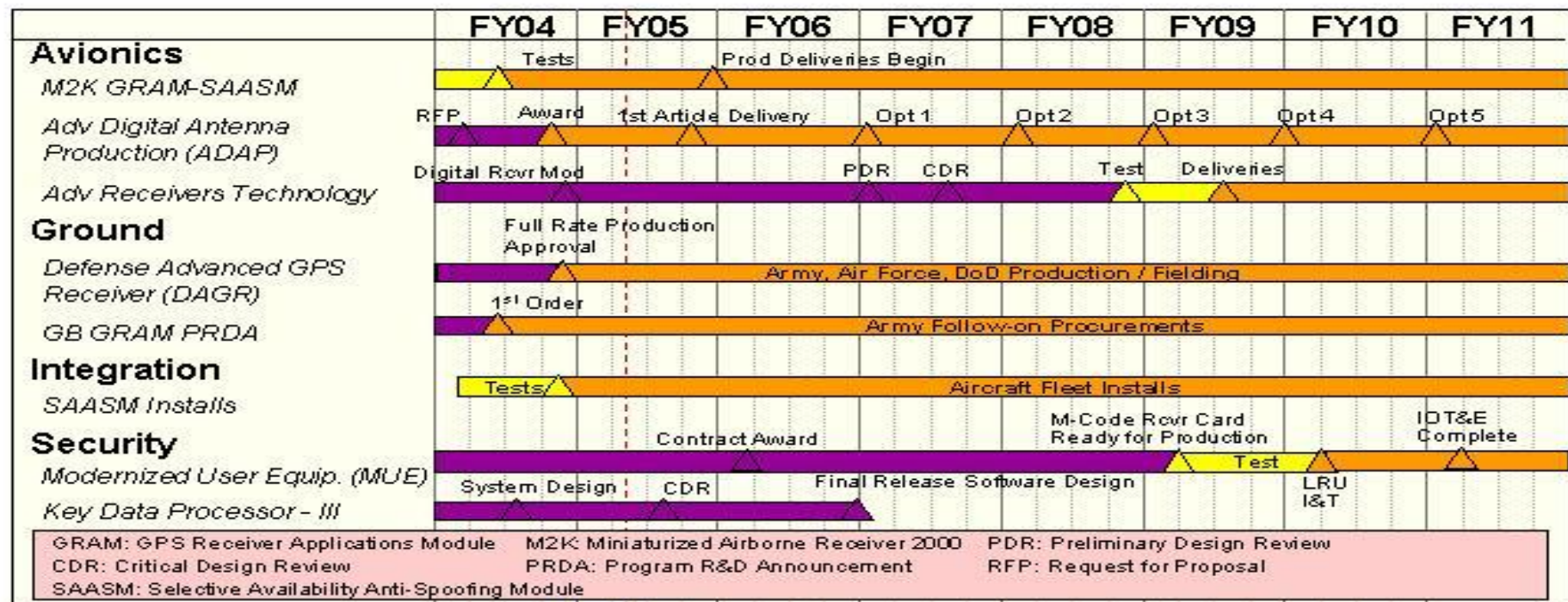
07 Operational System Development

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Time now

Concept activities
Production / fielding

Design / development
Operations / sustainment

Integration / test
Key events

Launch

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Exhibit R-4a, RDT&E Schedule Detail

DATE

February 2005

BUDGET ACTIVITY

07 Operational System Development

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(U) **Schedule Profile**FY 2004FY 2005FY 2006FY 2007

(U) GB GRAM-SAASM preproduction prototypes deliveries

1Q

(U) Begin Micro-Electro Mechanical Sensor (MEMS) NRE effort

3Q

(U) Adv Digital Antenna Production (ADAP) Contract Award

3Q

(U) GRAM-SAASM Avionics Development Complete

3Q

(U) Key Data Processor (KDP) III System Requirements Baselined

2Q

(U) M-Code Receiver Requirements Definition

3Q

(U) Multi Beam Steering Antenna Electronics Requirement Dev

3Q

(U) KDP III Operational Software Design Complete

3Q

(U) MUE Final Interface Control Document (ICD)

3Q

(U) Advanced Digital Antenna Production (ADAP) First Article Delivery

4Q

(U) KDP III Application Specific Integrated Circuit (ASIC) Preliminary Design Review

1Q

(U) KDP III System Level Critical Design Review

1Q

(U) ADAP Government Testing

1Q

(U) MUE Single Contractor Award (YMCA)

2Q

(U) KDP ASIC Critical Design Review

3Q

(U) KDP III ASIC Ready for Production

1Q

(U) Multibeam Steering AE Preliminary Design Review

1Q

(U) Multibeam Steering Adv Electronics Critical Design Review

3Q

(U) KDP III Preliminary Review by NSA Technical Review Board

4Q