

UNCLASSIFIED

PE NUMBER: 0305164F

PE TITLE: NAVSTAR Global Positioning System User Equipment Space

Exhibit R-2, RDT&E Budget Item Justification

DATE

February 2006

BUDGET ACTIVITY

07 Operational System Development

PE NUMBER AND TITLE

0305164F NAVSTAR Global Positioning System User Equipment Space

Cost (\$ in Millions)	FY 2005 Actual	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	93.408	123.794	131.083	92.394	66.187	67.729	67.617	Continuing	TBD
3028 Navstar GPS	93.408	123.794	131.083	92.394	66.187	67.729	67.617	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 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) Previous President's Budget	102.432	125.778	107.617
(U) Current PBR/President's Budget	93.408	123.794	131.083
(U) Total Adjustments	-9.024	-1.984	
(U) Congressional Program Reductions	-0.079	-0.192	
Congressional Rescissions		-1.792	
Congressional Increases			
Reprogrammings	-6.500		
SBIR/STTR Transfer	-2.445		

(U) **Significant Program Changes:**

FY05: -\$6.5M in FY05 for higher Air Force priorities; +\$23.466M adjustment for Modernized User Equipment 2nd vendor.

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification

DATE

February 2006

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 2005 Actual	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	93.408	123.794	131.083	92.394	66.187	67.729	67.617	Continuing	TBD
Quantity of RDT&E Articles	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 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) Continue Advanced UE Technology efforts	19.274	16.522	13.489
(U) Continue SAASM/GRAM-SAASM development	9.898	3.405	1.449
(U) Continue Integration, Test and Evaluation	2.526	5.816	6.266
(U) Continue System Engineering	22.739	26.532	24.746
(U) Continue Program Support	5.237	7.419	7.514
(U) Continue Modernization efforts (Modernized UE Development)	33.734	64.100	77.619
(U) Total Cost	93.408	123.794	131.083

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

	<u>FY 2005</u> <u>Actual</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									
(U) Operations and Maintenance (PE									
0305164F, BA 1 - Operating	2.612	2.842	3.545	7.095	8.062	8.578	5.548	Continuing	TBD
Forces, SAG 13D)									
(U) Aircraft Procurement (PE									
0305164F, BA 7, Aircraft	28.033	11.521	10.888	12.421	21.147	27.984	31.102	Continuing	TBD

Project 3028

R-1 Shopping List - Item No. 192-2 of 192-7

Exhibit R-2a (PE 0305164F)

Exhibit R-2a, RDT&E Project Justification

DATE

February 2006

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

Support Equipment, BP19)

(U) Other Procurement (PE

0305164F, BP 83 - Electronics

& Telecommunications

Equipment, WSC 836730, P-62);

9.863

8.974

6.004

5.483

4.514

4.779

5.136

Continuing

TBD

BP 86 - Spares & Repair Parts,

WSC 190A, P-62)

(U) **D. Acquisition Strategy**

Several ongoing and planned concept definition and technology risk reduction programs will define and mature GPS technologies needed for GPS Modernization.

Military signal (M-Code) capability is the latest layer to GPS military user equipment foundation that will establish protection of navigation security architecture. 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.

The Modernized User Equipment (MUE) program will develop controlled, non-proprietary specifications and interface control documents (ICDs), to enable the Services to acquire affordable Modernized UE through their program offices and/or the GPS JPO. An assurance plan will verify compliance. The program will use a phased approach:

- 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/Modernized UE/Coarse Acquisition (YMCA). A second MUE vendor will be funded to expand the industrial base for critical modernized capabilities.
- Cost Plus Award Fee (CPAF) Development contract (award March 2006)

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis

DATE

February 2006

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) <u>Cost Categories</u> (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>2005</u> <u>Cost</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 Value</u> <u>of Contract</u>
(U) <u>Product Development</u>												
Rockwell (MAGR)	C/FPIF/FFP / CPAF		19.293	0.000		0.000		0.000		0.000	19.293	
DOE Sandia (SAASM)	MIPR	Kirtland AFB, NM	34.478	8.810	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	0.599	
Various (SAASM/GB-GRAM)	Various	Various	29.113	0.819		0.612		0.612		Continuing	TBD	
Various (Modernized UE)	Various	Various	60.056	33.734	Jan-05	64.100	Mar-06	77.619	Jan-07	Continuing	TBD	
Alliant Techsys Inc (SAASM) & Multiple NAVWAR PRDAs	C/CPFF & C/CPAF		18.222	0.000		0.000		0.000		0.000	18.222	
Holloman AFB (Various Integration)	Project Order	46th TG, Holloman AFB, NM	6.022	0.282	Jan-05	0.400	Jan-06	0.684	Jan-07	Continuing	TBD	
SPAWAR (Various Integration)			0.000	0.122	Jan-05	0.164	Jan-06	0.000		0.000	0.286	
General Dynamics (Various)	Time and Materials		1.810	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	85.634	
Allan Osborne, Alliant Tech, Rockwell Collins, and Raytheon (DAGR)	PRDA	Various	25.953	2.155	Jun-05	0.000		0.000		0.000	28.108	
Raytheon (MAGR2K) (GRAM-SAASM)	PRDA		31.126	0.269		0.000		0.000		0.000	31.395	
Advanced UE Tech Invest	Various		4.646	0.000		0.000		0.000		0.000	4.646	
Receiver Technology	MIPR	AFRL - WPAFB, OH & KAFB, NM	13.880	2.168	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		0.000	7.847	
Advanced Antenna Technology	Various	Various	33.889	14.951		12.647		10.169		Continuing	TBD	
Subtotal Product Development			372.568	63.310		84.591		93.241		Continuing	TBD	0.000
Remarks:												
(U) <u>Support</u>												
Overlook Sys (OASD/C3I)	C/CPFF	OASD, Arlington, VA	27.573	0.324	Jan-05	1.000	Jan-06	1.000	Jan-07	Continuing	TBD	
Aerospace Corp (Technical Supt)	CPFF	Aerospace, Los Angeles, CA	14.968	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	0.714	
Miscellaneous (Program Spt)	Various	Various	53.360	22.739		26.532		24.746		Continuing	TBD	

Project 3028

R-1 Shopping List - Item No. 192-4 of 192-7

Exhibit R-3 (PE 0305164F)

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis

DATE

February 2006

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

Various (Other Navwar Studies)	Various		7.883	0.000	0.000	0.000	0.000	7.883	
Subtotal Support			104.498	27.976	33.951	32.260	Continuing	TBD	0.000
Remarks:									
(U) <u>Test & Evaluation</u>									
46th TG (SAASM/Test)	Project		31.987	0.000	0.000	0.000	0.000	31.987	
46th TG/UE development & production Testing	Order								
	Project	Holloman							
	Order /	AFB, NM /	18.112	2.122	5.252	5.582	Continuing	TBD	
	Various	Various							
Subtotal Test & Evaluation			50.099	2.122	5.252	5.582	Continuing	TBD	0.000
Remarks:									
(U) <u>Management</u>									
Subtotal Management			0.000	0.000	0.000	0.000	0.000	0.000	0.000
Remarks:									
(U)									
Subtotal			0.000	0.000	0.000	0.000	0.000	0.000	0.000
Remarks:									
(U) Total Cost			527.165	93.408	123.794	131.083	Continuing	TBD	0.000

Exhibit R-4, RDT&E Schedule Profile

DATE

February 2006

BUDGET ACTIVITY

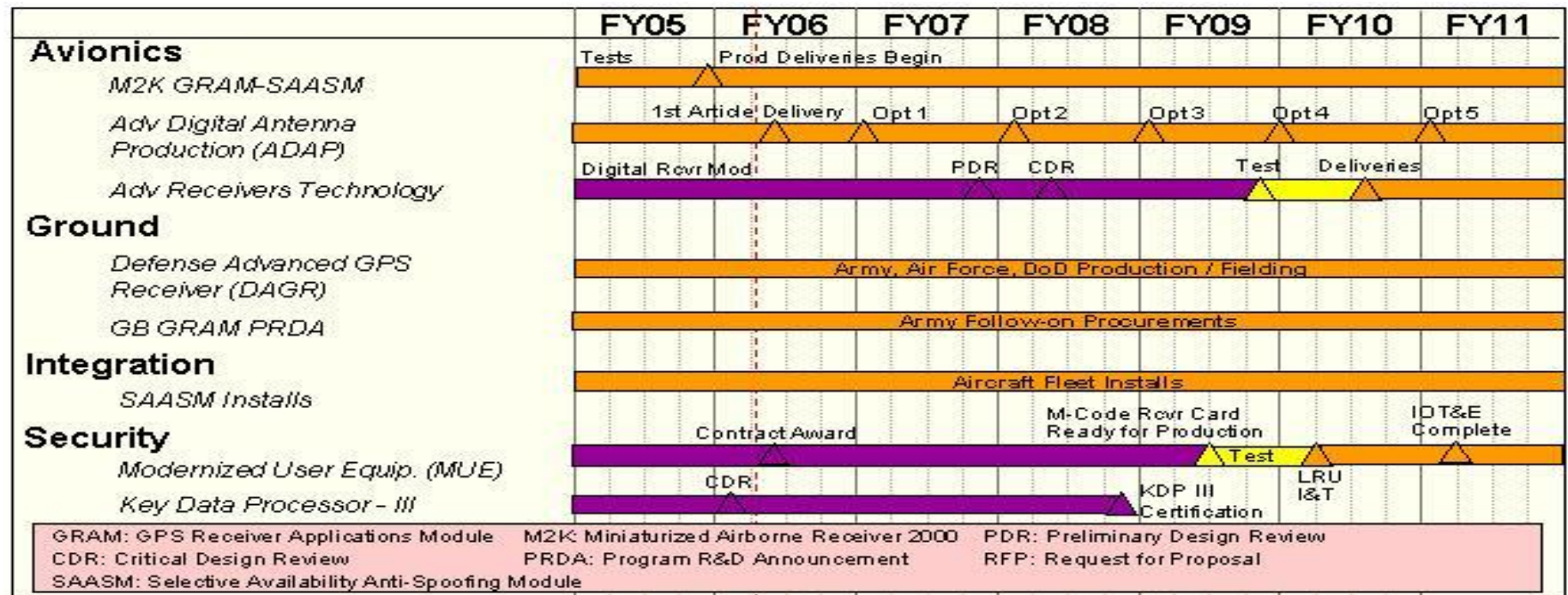
07 Operational System Development

PE NUMBER AND TITLE

0305164F NAVSTAR Global
Positioning System User Equipment
Space

PROJECT NUMBER AND TITLE

3028 Navstar GPS



UNCLASSIFIED

Exhibit R-4a, RDT&E Schedule Detail

DATE

February 2006

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) <u>Schedule Profile</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) Adv Digital Antenna Production (ADAP) Prog Mgt Review	2Q		
(U) Modernized UE (MUE) Reqmts/Specs Definition	3Q		
(U) KDP III Operational Software Design Complete	3Q		
(U) KDP III System Level Critical Design Review		1Q	
(U) Miniaturized Adv GPS Rcvr (MAGR2K) Negotiation/Testing		1Q	
(U) MUE Development Contract Award		2Q	
(U) Begin Digital Receiver Module Delivery		2Q	
(U) ADAP First Article Delivery		2Q	
(U) KDP III Application Specific Integrated Circuit (ASIC) Preliminary Design Review with Foundry		2Q	
(U) MUE Contractors' Awards (YMCA)		2Q	
(U) Digital Antenna Control Unit (DACU) Integration/Test		2Q	
(U) ADAP First Production Order			1Q
(U) KDP III ASIC Ready for Production			1Q
(U) Multibeam Steering Adv Electronics PDR			1Q
(U) MUE Key Data Point-B (KDP) Decision			2Q
(U) Adv Tech - MultiBeam Steering (MBS) CDR			3Q
(U) KDP III Preliminary Review by NSA Technical Review Board			4Q
(U) MUE ASIC Complete			4Q