PE NUMBER: 0604857F

PE TITLE: Operationally Responsive Space

	Exhib	it R-2, RDT	&E Budge	t Item Just	Exhibit R-2, RDT&E Budget Item Justification										
	PE NUMBER AND TITLE  14 Advanced Component Development and Prototypes (ACD&P)  15 October 10 October 11 October 12 Octobe									2006					
	Cost (\$ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	Cost to	Total					
Т.	otal Program Element (PE) Cost	Actual 0.000	Estimate 0.000	Estimate 35.625	Estimate 41.663	Estimate 75.720	Estimate 77.064	Estimate 78.122	Complete Continuing	TBD					
	actical Satellites	0.000	0.000	0.101	0.102	0.000	0.000	0.000	Continuing	TBD					
A016 Or	perationally Responsive Lift	0.000	0.000	35.524	41.561	75,720	77.064	78.122	Continuing	TBD					

In FY 2007, this is a new PE. The funding is being transferred from PE 0604855F, Operationally Responsive Launch. This new PE recognizes the broader scope of not just responsive launchers, but also satellites and ranges, necessary for a responsive space system.

In FY 2007, the Affordable Responsive Spacelift (ARES) effort in Project 64A016 and the Tactical Satellite (TacSat) effort in Project 64A015 are new starts to meet some of the requirements of the Operationally Responsive Space Analysis of Alternatives.

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

Responsive Space is the rapid reaction combination of payloads, launch systems, and ranges; optimized to provide surge operations, reconstitution capability, and prompt global strike. This encompasses the spacelift missions of delivering payloads to, or from, mission orbit and changing the orbit of existing systems to better satisfy new mission requirements. It includes small satellite demonstrations aimed at proving out the technologies needed to create a low-cost, operational capability for the rapid launch, checkout, and theater integration of space systems to support the tactical needs of the combatant commanders. It also requires on-demand, flexible, and cost effective range operations.

In December 2002 the DepSecDef directed the Air Force and the Defense Advanced Research Projects Agency (DARPA) to establish a joint program office to accelerate the Operationally Responsive Space (ORS) effort to meet portions of this requirement. This joint technology development program is focused on the development and transition of more mature technologies into a future weapon system capable of delivering and deploying payloads worldwide from and through space such as tactical satellites (TacSats). Concept development, risk reduction and technology maturation are key elements of the ORS program; and demonstrations, modeling and simulations are the critical tools.

In July 2004 the Air Force Requirements for Operational Capabilities Council (AFROCC) reviewed the Operationally Responsive Spacelift Analysis of Alternatives (AoA), and approved the following recommendations: (1.) Leverage lessons learned from AF-DARPA Falcon demo (2.) Conduct Architecture Studies -- Responsive spacecraft: size and functions study, -- Integration and technology needs (3.) Pursue a hybrid (part reusable, part expendable) launch vehicle: spiral development approach, Step one: Small scale hybrid integration demonstrator, Step two: Full scale operational hybrid demonstrator, Step three: Vehicle production /operations. AFSPC plans to operationalize the small scale hybrid vehicle to provide a 2,000 to 5,000 pound capability to low earth orbit.

In FY07 the Affordable Responsive Spacelift (ARES) hybrid launch vehicle demonstrator will be initiated. Early activities will include requirements development, preliminary design and test planning.

In parallel, operationally responsive satellite concepts and requirements will be studied, and in the future Operationally Responsive Range mission planning will be

R-1 Shopping List - Item No. 61-1 of 61-12

Exhibit R-2 (PE 0604857F

# **UNCLASSIFIED** DATE Exhibit R-2, RDT&E Budget Item Justification February 2006 BUDGET ACTIVITY PE NUMBER AND TITLE 04 Advanced Component Development and Prototypes (ACD&P) 0604857F Operationally Responsive Space conducted. This program is Budget Activity 4, Advanced Component Development and Prototypes (ACDP), because it involves evaluating integrated technologies in as realistic an operating environment as possible to assess the performance or cost reduction potential of advanced technology. B. Program Change Summary (\$ in Millions) FY 2006 FY 2005 FY 2007 Previous President's Budget 0.000 0.000 0.000 Current PBR/President's Budget 0.000 0.000 35.625 **Total Adjustments** 0.000 0.000 Congressional Program Reductions **Congressional Rescissions** Congressional Increases Reprogrammings SBIR/STTR Transfer Significant Program Changes: FY07: Initial funding for new PE, transferred from PE 0604855F, Operationally Responsive Launch

	Exh	DATE	February	2006						
					PE NUMBER AND TITLE PROJECT NUMBER AND TITLE  0604857F Operationally Responsive A015 Tactical Satellites					
017141	and dempending bevelopment an	na i rototypo	o (/102a. /		Space	rationally re	оролого	71010 1401100		
	Cost (\$ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	Cost to	Total
Actual Estimate Estimate					Estimate	Estimate	Estimate	Estimate	Complete	1
A015 Tactical Satellites 0.000 0.000 0.10				0.101	0.102	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles 0 0 (					0	0	0	0		

In FY 2007, Project 64A015, Tactical Satellites, is a new start to meet some of the requirements defined in the ORS Analysis of Alternatives

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

Responsive Space is the rapid reaction combination of payloads, launch systems, and ranges; optimized to provide surge operations, reconstitution capability, and prompt global strike. It includes small satellite demonstrations aimed at proving out the technologies needed to create a low-cost, operational capability for the rapid launch, checkout, and theater integration of space systems to support the tactical needs of the combatant commanders.

Operationally Responsive Space will provide a broad range of capabilities directly supporting warfighter needs. Potential missions include communications, data exfiltration, blue-force situational awareness, positioning, navigation and timing, weather, and battlefield intelligence, surveillance and reconnaissance.

Tactical satellites will be optimized for dedicated theater use and/or surge, augmentation and replenishment of more traditional space capabilities. Current Concepts of Operation (CONOPS) call for the production of satellites as war reserve material, featuring high degrees of modularity and the use of plug and play payloads and buses, in support of the above missions. Further, responsive satellites must be capable of rapid satellite initialization and be networked with other national security space, air and surface systems.

The TACSAT Demonstration Program with participation from a wide consortium of operators, developers and technologists, including the Office of Force Transformation, Air Force Research Labs and Air Force Space Command is the principal testbed for proving out the technologies required to develop and field future Operationally Responsive Space/Spacecraft capabilities. This FY07 effort will perform analysis, costing, and utility assessment of TACSAT concepts and requirements.

The TACSAT Demonstration Program will consist of a series of small satellite demonstrations, whose goal is to demonstrate affordable and responsive launch, checkout, and theater integration of systems to support the tactical needs of the Combatant Commanders. TACSAT demonstrations will validate common interfaces, subsystems, new payloads, and new CONOPS. The TACSAT demonstrations also will facilitate the development of Joint Warfighting Space requirements and future mission(s) planning. Follow-on development of operational satellites will leverage lessons learned, processes and mature technology demonstrated in the TACSAT program.

<b>(U)</b>	B. Accomplishments/Planned Program (\$ in Millions)	FY 2005	FY 2006	FY 2007
(U)	Perform analysis, costing and assess utility for operationally responsive satellite concepts/requirements.			0.101
(U)				
(U)				
(U)	Total Cost	0.000	0.000	0.101
Pro	ect A015 R-1 Shopping List - Item No. 61-3 of 61-12		Exhibit R-2a	(PF 0604857F)

			UNCLA	ASSIFIED					
	Exhibit R-	2a, RDT&E	Project Jus	stification			DATE	February	2006
ET ACTIVITY Ivanced Component Developm	ent and Prote	otypes (ACD&	P)			esponsive			
C. Other Program Funding Summ	ary (\$ in Millio	ons)							
	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 Cost
AF RDT&E, PE 0604855F, ORL R-xx)		13.500	0.000	0.000	0.000	0.000	0.000	0.000	13.500
Defensewide RDT&E, PE 0605799D8Z, Force Fransformation (R-xx)	20.000	39.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
D. Acquisition Strategy Use existing government contracts.									
	C. Other Program Funding Summ  AF RDT&E, PE 0604855F, ORL R-xx) Defensewide RDT&E, PE 0605799D8Z, Force Fransformation (R-xx) D. Acquisition Strategy	C. Other Program Funding Summary (\$ in Million FY 2005 Actual AF RDT&E, PE 0604855F, ORL R-xx) Defensewide RDT&E, PE 0605799D8Z, Force 20.000 Transformation (R-xx) D. Acquisition Strategy	C. Other Program Funding Summary (\$ in Millions)  FY 2005 Actual Estimate AF RDT&E, PE 0604855F, ORL R-xx) Defensewide RDT&E, PE 0605799D8Z, Force 10605799D8Z, Force	Exhibit R-2a, RDT&E Project Justin ACTIVITY Ivanced Component Development and Prototypes (ACD&P)  C. Other Program Funding Summary (\$ in Millions)  FY 2005 FY 2006 FY 2007 Actual Estimate Estimate AF RDT&E, PE 0604855F, ORL R-xx) Defensewide RDT&E, PE 0605799D8Z, Force 20.000 39.000 0.000 Fransformation (R-xx) D. Acquisition Strategy	C. Other Program Funding Summary (\$ in Millions)   FY 2005   FY 2006   FY 2007   FY 2008	Exhibit R-2a, RDT&E Project Justification  PER NUMBER AND TITLE 0604857F Operationally R Space  C. Other Program Funding Summary (\$ in Millions)  FY 2005 FY 2006 FY 2007 FY 2008 FY 2009 Actual Estimate Estimate Estimate Estimate Estimate  AF RDT&E, PE 0604855F, ORL R-xx)  Defensewide RDT&E, PE 0605799D8Z, Force 20.000 39.000 0.000 0.000 0.000  Transformation (R-xx)  D. Acquisition Strategy	Exhibit R-2a, RDT&E Project Justification   PE NUMBER AND TITLE   0604857F Operationally Responsive   Space	PE NUMBER AND TITLE   O604857F Operationally Responsive   Space   PT 2010   PT 2011   PT 2011	Exhibit R-2a, RDT&E Project Justification   PE NUMBER AND TITLE   0604857F Operationally Responsive   A015 Tactical Satellites

Project A015

	E	Exhibit R-	3, RDT&E	Project Co	st Anal	ysis				C	ATE <b>Feb</b>	ruary 20	006
	DGET ACTIVITY  Advanced Component Developmen	otypes (ACI	D&P)  PE NUMBER AND TITLE  0604857F Operationally Responsive  Space					PROJECT NUMBER AND TITLE A015 Tactical Satellites					
(U)	Cost Categories (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	Contract Method & Type	Performing Activity & Location	Total Prior to FY 2005 Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost to Complete	Total Cost	Target Value of Contract
(U)	Product Development Subtotal Product Development			0.000	0.000		0.000		0.000		0.000	0.000 0.000	0.000
(U)	Remarks: Support Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000 0.000	0.000
(U)	Remarks: Test & Evaluation											0.000	
(U)	Subtotal Test & Evaluation Remarks: Management Perform analysis and assess alternative	various	various	0.000	0.000		0.000		0.000	0.106	0.000	0.000	0.000
	concepts/requirements & program support Subtotal Management Remarks:			0.000	0.000		0.000		0.101 0.101	Oct-06	Continuing Continuing	TBD TBD	TBD TBD
(U)	Subtotal Remarks:			0.000	0.000		0.000		0.000		0.000	0.000 0.000	0.000
(U)	Total Cost			0.000	0.000		0.000		0.101		Continuing	TBD	TBD
Pı	roject A015			R-1 Shopping Li	st - Item No.	61-5 of 61-	12				Exh	ibit R-3 (PE (	0604857F)

#### UNCLASSIFIED DATE Exhibit R-4, RDT&E Schedule Profile February 2006 BUDGET ACTIVITY PE NUMBER AND TITLE PROJECT NUMBER AND TITLE 04 Advanced Component Development and Prototypes (ACD&P) 0604857F Operationally Responsive A015 Tactical Satellites Space ORS Schedule U.S. AIR FORCE FY05 FY06 FY08 **FY09 FY10 FY11** FY07 Phase 3 Phase 2 Go/No-Go Contract Small Launch Vehicle (SLV) Award Demonstration Design & Development Flight Demos On Ramp to RSS (funded by ORL PE 64855F, PDR CDR through FY06, ORS PE Plt Demos 64857F FY07 and beyond ) Flt Demo FIt Demo Hybrid Launch Vehicle Program Research & **Development Announcement** Concept (Studies & Analysis) PDR CDR Small Scale Hybrid Launch Vehicle Flt Demos Design & Development

Demonstrator (ARES
Program)

TacSat performance, utility, and
costing analyses

TacSat Demonstration
Launches (Note: only
partially funded in this PE)

CDR: Critical Design Review PDR: Preliminary Design Review

Design / development

Operations / sustainment

TacSat-2 TacSat-3

Integration / test

∧⇔ Key events

RSS: Responsive Small Spacelift

TacSat4

FY07 Staffer Brief

Project A015

AoA: Analysis of Alternatives

Concept activities

Production / fielding

R-1 Shopping List - Item No. 61-6 of 61-12

TacSat-1

Exhibit R-4 (PE 0604857F)

	Exhibit R-4a, RD	T&E Schedule Det	tail	DATE <b>February</b>	2006
	GET ACTIVITY Advanced Component Development and Prototypes (AC	D&P) 060	NUMBER AND TITLE 04857F Operationally Responsive ace	PROJECT NUMBER AND TITLE A015 Tactical Satellites	
	Schedule Profile TACSAT performance, utility and costing analyses		FY 2005	FY 2006	<u>FY 2007</u> 2-4Q
Pro	oject A015	R-1 Shopping List - Item N	lo. 61-7 of 61-12	Exhibit R-4a	(PE 0604857F)

	Exh	DATE	February	2006							
	FACTIVITY		PE NUMBER AND			NUMBER AND TITLE					
					0604857F Operationally Responsive A016 C Space				Operationally Responsive Lift		
	Cost (\$ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	Cost to	Total	
Actual Estimate Estimate					Estimate	Estimate	Estimate	Estimate	Complete		
A016 Operationally Responsive Lift 0.000 0.000 35.5				35.524	41.561	75.720	77.064	78.122	Continuing	TBD	
	Quantity of RDT&E Articles 0 0					0	0	0			

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

Responsive Space is the rapid reaction combination of payloads, launch systems, and ranges; optimized to provide surge operations, reconstitution capability, and prompt global strike. This encompasses the spacelift missions of delivering payloads to, or from, mission orbit and changing the orbit of existing systems to better satisfy new mission requirements.

In December 2002 the DepSecDef directed the Air Force and the Defense Advanced Research Projects Agency (DARPA) to establish a joint program office to accelerate the Operationally Responsive Space (ORS) effort to meet portions of this requirement. This joint technology development program is focused on the development and transition of more mature technologies into a future weapon system capable of delivering and deploying payloads worldwide from and through space such as tactical satellites (TacSats). Concept development, risk reduction and technology maturation are key elements of the Small Launch Vehicle (SLV) portion of this effort. The ongoing SLV phase II will include the initial launches of one or more technology demonstrations.

In FY07 the Affordable Responsive Spacelift (ARES) hybrid launch vehicle demonstrator will be initiated. Early activities will include requirements development, preliminary design and test planning. Early ARES demonstration and development effort will consist of a series of phases designed to: 1) Reduce technology risk/mature integration technology, 2) Validate a Concept of Operations (CONOPS) for use of the system, 3) Execute smaller scale subsystem and system demonstrations which validate requirements and test methods for system evaluation, and 4) Enhance the ability of the developer to design reliability, responsiveness, and affordability into a future operational system.

Phase I will consist of the design and development of the ARES Subscale Demonstrator. This effort will include concept definition, demonstration planning, preliminary and detailed design, Demonstrator production, and ground and flight tests.

( <b>U</b> )	B. Accomplishments/Planned Program (\$ in Millions)	FY 2005	FY 2006	FY 2007
(U)	Continue SLV system design and development, systems engineering and flight test planning for Phase II			11.000
(U)	Perform Range readiness and mission assurance for launch			3.240
(U)	Perform analysis, costing and assess utility for operationally responsive space concepts/requirements and Program			1.760
	Management support			
(U)	Begin ARES development			19.524
(U)	Total Cost	0.000	0.000	35.524

Project A016 R-1 Shopping List - Item No. 61-8 of 61-12

		DATE	February	2006						
BUDGET ACTIVITY  04 Advanced Component Development and Prototypes (ACD&P)  0604857  Space						ND TITLE perationally R	Responsive	PROJECT NUM A016 Operate	BER AND TITLE tionally Respo	onsive Lift
( <b>U</b> )	C. Other Program Funding Summ	ary (\$ in Millio	ons)							
		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 Cost
(U)	AF RDT&E, PE 0604855F, ORL (R-XX)	32.142	23.019	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
(U)	NASA funding provided to support multiple contractors	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.350

## (U) D. Acquisition Strategy

Efforts will be executed by the joint AF/DARPA Falcon Program Office. An open competition was held for Phase II contracts in August 2004, resulting in four awards in September 2004 using an Other Transactions contract vehicle. One or more contractors will be carried to a launch. At the completion of Phase II, a third phase will be considered to conduct additional developmental flight testing.

Project A016 R-1 Shopping List - Item No. 61-9 of 61-12 Exhibit R-2a (PE 0604857F)

	E	xhibit R-	3, RDT&E		st Anal					D	ATE <b>Fob</b>	ruary 20	006
										February 2006  NUMBER AND TITLE perationally Responsive Lift			
( <b>U</b> )	Cost Categories (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	Contract Method & Type	Performing Activity & Location	Total Prior to FY 2005 Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost to Complete	Total Cost	Target Value of Contrac
(U)	Product Development Phase II contractors:	OTA	Air Launch, Kirkland, WA						11.000	Oct-06	Continuing	TBD	TBI
	TBD Phase III contractors ARES Design and Development Subtotal Product Development Remarks:	TBD	TBD	0.000	0.000		0.000		19.524 30.524		Continuing Continuing Continuing	TBD TBD TBD	TBD TBD TBD
(U)	Support Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000 0.000	0.000
(U)	Remarks: Test & Evaluation Perform Range readiness and mission assurance	TBD	various						3.240	Oct-06	Continuina	TBD	TBI
	for launch Subtotal Test & Evaluation Remarks:			0.000	0.000		0.000		3.240		Continuing Continuing	TBD	TBL
(U)	Management Perform analysis and assess alternative concepts/requirements & program support			0.000	0.000		0.000		1.760		Continuing	TBD	TBI
(U)	Subtotal Management Remarks: Total Cost			0.000	0.000		0.000		1.760 35.524		Continuing Continuing	TBD TBD	ТВЕ

Project A016

Exhibit R-3 (PE 0604857F)

#### UNCLASSIFIED DATE Exhibit R-4, RDT&E Schedule Profile February 2006 BUDGET ACTIVITY PE NUMBER AND TITLE PROJECT NUMBER AND TITLE 04 Advanced Component Development and Prototypes (ACD&P) 0604857F Operationally Responsive A016 Operationally Responsive Lift Space ORS Schedule U.S. AIR FORCE FY05 FY06 FY08 **FY09 FY10 FY11** FY07 Phase 3 Phase 2 Go/No-Go Contract Small Launch Vehicle (SLV) Award Demonstration Design & Development Flight Demos On Ramp to RSS (funded by ORL PE 64855F, PDR CDR through FY06, ORS PE Plt Demos 64857F FY07 and beyond ) Flt Demo FIt Demo Hybrid Launch Vehicle Program Research & **Development Announcement** Concept

(Studies & Analysis) PDR CDR Small Scale Hybrid Launch Vehicle Flt Demos Design & Development Demonstrator (ARES Program) TacSat performance, utility, and costing analyses **TacSat Demonstration** Launches (Note: only TacSat-1 TacSat4 TacSat-2 TacSat-3 partially funded in this PE) AoA: Analysis of Alternatives PDR: Preliminary Design Review RSS: Responsive Small Spacelift CDR: Critical Design Review Concept activities Design / development Integration / test

FY07 Staffer Brief

Project A016

Production / fielding

R-1 Shopping List - Item No. 61-11 of 61-12

Operations / sustainment

Exhibit R-4 (PE 0604857F)

∧ Key events

Exhibit R-4a, RDT&E S	DATE February 2006	
BUDGET ACTIVITY  04 Advanced Component Development and Prototypes (ACD&P)	PE NUMBER AND TITLE  0604857F Operationally Responsive  Space	PROJECT NUMBER AND TITLE A016 Operationally Responsive Lift
(U) Schedule Profile (U) ARES Design and Development Contract Award (U) ARES PDR	FY 2005	FY 2006 FY 2007 2Q 4Q
Project A016 R-1 Sh	nopping List - Item No. 61-12 of 61-12	Exhibit R-4a (PE 0604857F)