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**Department of Defense
Fiscal Year (FY) 2021 Budget Estimates**

February 2020



Air Force

Justification Book Volume 3a of 3

Research, Development, Test & Evaluation, Air Force

Vol-III Part 1

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Air Force • Budget Estimates FY 2021 • RDT&E Program

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Fiscal Year (FY) 2021 Budget Estimates RDT&E Descriptive Summaries Budget Activities February 2020

INTRODUCTION AND EXPLANATION OF CONTENTS

GENERAL

- This document has been prepared to provide information on the United States Air Force (USAF) Research, Development, Test and Evaluation (RDT&E) program elements and projects in the FY 2021 President's Budget (PB).
 - All exhibits in this document have been assembled in accordance with DoD 7000.14R, Financial Management Regulation, Volume 2B, Chapter 5.
 - Other comments on exhibit contents in this document:
 - Exhibits R-2/2a and R-3 provide narrative information for all RDT&E program elements and projects within the USAF FY 2021 RDT&E program with the exception of classified program elements. The format and contents of this document are in accordance to the guidelines and requirements of the Congressional committees in so far as possible.
 - The "Other Program Funding Summary portion of the R-2 includes, in addition to RDTE& funds, Procurement funds and quantities, Military Construction appropriation funds on specific development programs, Operations and Maintenance appropriation funds where they are essential to the development effort described, and where appropriate, Department of Energy (DOE) costs.

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- All exhibits contained in Volumes I, II, and III are unclassified. Classified exhibits are not included in the submission due to the level of security classification and necessity of special security clearances.

RDT&E, Air Force Overseas Contingency Operations (OCO)

- FY2021 OCO can be separated into the following categories:
 - OCO for Direct War Costs: Direct War costs are those combat or direct combat support costs that will not continue to be expended once combat operations end at major contingency locations.
 - OCO for Enduring Requirements: OCO for Enduring Requirements are enduring in-theater and in-CONUS costs that will likely remain after combat operations cease, and have previously been funded in OCO.
 - OCO for Base Requirements: OCO for Base Requirements is OCO funding for base budget requirements in support of the National Defense Strategy. The Budget requests these funds in OCO to comply with the base budget defense caps included in the Budget Control Act of 2011.

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Summary Recap of Budget Activities	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Basic Research	545,223	549,761			549,761
Applied Research	1,482,434	1,656,126			1,656,126
Advanced Technology Development	876,008	1,066,453			1,066,453
Advanced Component Development & Prototypes	6,386,187	8,244,911		44,335	8,289,246
System Development & Demonstration	5,377,043	6,690,641			6,690,641
Management Support	3,769,578	2,878,071			2,878,071
Operational Systems Development	22,982,541	24,480,992		83,913	24,564,905
Software & Digital Technology Pilot Programs					
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203

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Summary Recap of Budget Activities	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Basic Research	492,294				492,294
Applied Research	1,540,623				1,540,623
Advanced Technology Development	778,548				778,548
Advanced Component Development & Prototypes	9,049,227				9,049,227
System Development & Demonstration	6,359,375				6,359,375
Management Support	3,149,790				3,149,790
Operational Systems Development	26,199,822		5,304	5,304	26,205,126
Software & Digital Technology Pilot Programs	149,742				149,742
Total Research, Development, Test & Evaluation	47,719,421		5,304	5,304	47,724,725

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	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Summary Recap of FYDP Programs					
Strategic Forces	933,653	846,784			846,784
General Purpose Forces	3,020,691	3,748,342		5,200	3,753,542
Intelligence and Communications	1,530,574	1,340,238			1,340,238
Mobility Forces	894,433	936,221			936,221
Research and Development	13,189,310	14,528,474		26,450	14,554,924
Central Supply and Maintenance	93,964	37,505			37,505
Training Medical and Other	2,488	8,542			8,542
Administration and Associated Activities	117,431	90,730			90,730
Support of Other Nations	3,866	4,071			4,071
Space	4,800,166	6,240,052		17,885	6,257,937
Classified Programs	16,832,438	17,785,996		78,713	17,864,709
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203

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	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Summary Recap of FYDP Programs					
Strategic Forces	1,065,581				1,065,581
General Purpose Forces	4,019,405		5,304	5,304	4,024,709
Intelligence and Communications	1,090,263				1,090,263
Mobility Forces	1,048,447				1,048,447
Research and Development	14,101,988				14,101,988
Central Supply and Maintenance	95,633				95,633
Training Medical and Other	7,073				7,073
Administration and Associated Activities	78,515				78,515
Support of Other Nations	3,599				3,599
Space	6,798,195				6,798,195
Classified Programs	19,410,722				19,410,722
Total Research, Development, Test & Evaluation	47,719,421		5,304	5,304	47,724,725

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-----	-----	-----	-----	-----	-----
Basic Research	545,223	549,761			549,761
Applied Research	1,482,434	1,656,126			1,656,126
Advanced Technology Development	876,008	1,066,453			1,066,453
Advanced Component Development & Prototypes	6,386,187	8,244,911		44,335	8,289,246
System Development & Demonstration	5,377,043	6,690,641			6,690,641
Management Support	3,769,578	2,878,071			2,878,071
Operational Systems Development	22,982,541	24,480,992		83,913	24,564,905
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203
Summary Recap of FYDP Programs					

Strategic Forces	933,653	846,784			846,784
General Purpose Forces	3,020,691	3,748,342		5,200	3,753,542
Intelligence and Communications	1,530,574	1,340,238			1,340,238
Mobility Forces	894,433	936,221			936,221
Research and Development	13,189,310	14,528,474		26,450	14,554,924
Central Supply and Maintenance	93,964	37,505			37,505
Training Medical and Other	2,488	8,542			8,542
Administration and Associated Activities	117,431	90,730			90,730
Support of Other Nations	3,866	4,071			4,071

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Summary Recap of Budget Activities -----	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Basic Research	492,294				492,294
Applied Research	1,409,749				1,409,749
Advanced Technology Development	778,548				778,548
Advanced Component Development & Prototypes	7,737,916				7,737,916
System Development & Demonstration	2,615,359				2,615,359
Management Support	2,891,280				2,891,280
Operational Systems Development	21,466,680		5,304	5,304	21,471,984
Total Research, Development, Test & Evaluation	37,391,826		5,304	5,304	37,397,130
Summary Recap of FYDP Programs -----					
Strategic Forces	1,065,581				1,065,581
General Purpose Forces	4,019,405		5,304	5,304	4,024,709
Intelligence and Communications	1,090,263				1,090,263
Mobility Forces	1,048,447				1,048,447
Research and Development	14,101,988				14,101,988
Central Supply and Maintenance	95,633				95,633
Training Medical and Other	7,073				7,073
Administration and Associated Activities	78,515				78,515
Support of Other Nations	3,599				3,599

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Summary Recap of Budget Activities	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Space	4,800,166	6,240,052		17,885	6,257,937
Classified Programs	16,832,438	17,785,996		78,713	17,864,709
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203

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Summary Recap of Budget Activities	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Space	103,466				103,466
Classified Programs	15,777,856				15,777,856
Total Research, Development, Test & Evaluation	37,391,826		5,304	5,304	37,397,130

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Appropriation: 3600F Research, Development, Test & Eval, AF

Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ e OCO)	c
1	0601102F	Defense Research Sciences	01	374,047	356,107			356,107	U
2	0601103F	University Research Initiatives	01	159,073	178,859			178,859	U
3	0601108F	High Energy Laser Research Initiatives	01	12,103	14,795			14,795	U
		Basic Research		545,223	549,761			549,761	
4	0602020F	Future AF Capabilities Applied Research	02						U
5	0602102F	Materials	02	172,109	215,851			215,851	U
6	0602201F	Aerospace Vehicle Technologies	02	150,625	157,724			157,724	U
7	0602202F	Human Effectiveness Applied Research	02	109,598	134,795			134,795	U
8	0602203F	Aerospace Propulsion	02	202,638	226,775			226,775	U
9	0602204F	Aerospace Sensors	02	168,897	219,912			219,912	U
10	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02	86,165					U
11	0602298F	Science and Technology Management - Major Headquarters Activities	02	8,288	7,968			7,968	U
12	0602602F	Conventional Munitions	02	100,573	142,772			142,772	U
13	0602605F	Directed Energy Technology	02	129,579	124,379			124,379	U
14	0602788F	Dominant Information Sciences and Methods	02	182,221	216,062			216,062	U
15	0602890F	High Energy Laser Research	02	40,400	48,221			48,221	U

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Appropriation: 3600F Research, Development, Test & Eval, AF

Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	Se
1	0601102F	Defense Research Sciences	01	315,348				315,348	U
2	0601103F	University Research Initiatives	01	161,861				161,861	U
3	0601108F	High Energy Laser Research Initiatives	01	15,085				15,085	U
		Basic Research		492,294				492,294	
4	0602020F	Future AF Capabilities Applied Research	02	100,000				100,000	U
5	0602102F	Materials	02	140,781				140,781	U
6	0602201F	Aerospace Vehicle Technologies	02	349,225				349,225	U
7	0602202F	Human Effectiveness Applied Research	02	115,222				115,222	U
8	0602203F	Aerospace Propulsion	02						U
9	0602204F	Aerospace Sensors	02	211,301				211,301	U
10	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02						U
11	0602298F	Science and Technology Management - Major Headquarters Activities	02	8,926				8,926	U
12	0602602F	Conventional Munitions	02	132,425				132,425	U
13	0602605F	Directed Energy Technology	02	128,113				128,113	U
14	0602788F	Dominant Information Sciences and Methods	02	178,668				178,668	U
15	0602890F	High Energy Laser Research	02	45,088				45,088	U

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16	1206601F	Space Technology	02	131,341	161,667			161,667	U
		Applied Research		1,482,434	1,656,126			1,656,126	
17	0603030F	AF Foundational Development/Demos	03						U
18	0603032F	Future AF Integrated Technology Demos	03						U
19	0603033F	Next Gen Platform Dev/Demo	03						U
20	0603034F	Persistent Knowledge, Awareness, & C2 Tech	03						U
21	0603035F	Next Gen Effects Dev/Demos	03						U
22	0603112F	Advanced Materials for Weapon Systems	03	44,099	60,086			60,086	U
23	0603199F	Sustainment Science and Technology (S&T)	03	13,353	16,249			16,249	U
24	0603203F	Advanced Aerospace Sensors	03	41,462	42,292			42,292	U
25	0603211F	Aerospace Technology Dev/Demo	03	115,406	127,949			127,949	U
26	0603216F	Aerospace Propulsion and Power Technology	03	140,247	170,973			170,973	U
27	0603270F	Electronic Combat Technology	03	53,704	48,408			48,408	U
28	0603401F	Advanced Spacecraft Technology	03	65,727	80,525			80,525	U
29	0603444F	Maui Space Surveillance System (MSSS)	03	10,268	11,878			11,878	U
30	0603456F	Human Effectiveness Advanced Technology Development	03	32,624	37,542			37,542	U
31	0603601F	Conventional Weapons Technology	03	191,704	225,817			225,817	U

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16	1206601F	Space Technology	02						U
		Applied Research		1,409,749				1,409,749	
17	0603030F	AF Foundational Development/Demos	03	103,280				103,280	U
18	0603032F	Future AF Integrated Technology Demos	03	157,619				157,619	U
19	0603033F	Next Gen Platform Dev/Demo	03	199,556				199,556	U
20	0603034F	Persistent Knowledge, Awareness, & C2 Tech	03	102,276				102,276	U
21	0603035F	Next Gen Effects Dev/Demos	03	215,817				215,817	U
22	0603112F	Advanced Materials for Weapon Systems	03						U
23	0603199F	Sustainment Science and Technology (S&T)	03						U
24	0603203F	Advanced Aerospace Sensors	03						U
25	0603211F	Aerospace Technology Dev/Demo	03						U
26	0603216F	Aerospace Propulsion and Power Technology	03						U
27	0603270F	Electronic Combat Technology	03						U
28	0603401F	Advanced Spacecraft Technology	03						U
29	0603444F	Maui Space Surveillance System (MSSS)	03						U
30	0603456F	Human Effectiveness Advanced Technology Development	03						U
31	0603601F	Conventional Weapons Technology	03						U

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Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ e OCO)	c
32	0603605F	Advanced Weapons Technology	03	39,438	37,404			37,404	U
33	0603680F	Manufacturing Technology Program	03	62,187	130,916			130,916	U
34	0603788F	Battlespace Knowledge Development and Demonstration	03	58,369	56,414			56,414	U
35	0604445F	Wide Area Surveillance	03		20,000			20,000	U
36	0303467F	SENSR Spectrum Pipeline SRF	03	7,265					U
37	0303567F	Non-SENSR Spectrum Pipeline SRF	03	155					U
		Advanced Technology Development		876,008	1,066,453			1,066,453	
38	0603260F	Intelligence Advanced Development	04	5,568	5,672			5,672	U
39	0603742F	Combat Identification Technology	04	17,561	32,085			32,085	U
40	0603790F	NATO Research and Development	04	2,221	4,955			4,955	U
41	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	24,994	30,969			30,969	U
42	0603859F	Pollution Prevention - Dem/Val	04	193	3,000			3,000	U
43	0604002F	Air Force Weather Services Research	04		772			772	U
44	0604003F	Advanced Battle Management System (ABMS)	04		8,000			8,000	U
45	0604004F	Advanced Engine Development	04	696,099	671,442			671,442	U
46	0604015F	Long Range Strike - Bomber	04	2,189,945	2,982,499			2,982,499	U
47	0604032F	Directed Energy Prototyping	04	48,316	44,000			44,000	U
48	0604033F	Hypersonics Prototyping	04	494,485	576,000			576,000	U

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Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	Se
32	0603605F	Advanced Weapons Technology	03						U
33	0603680F	Manufacturing Technology Program	03						U
34	0603788F	Battlespace Knowledge Development and Demonstration	03						U
35	0604445F	Wide Area Surveillance	03						U
36	0303467F	SENSR Spectrum Pipeline SRF	03						U
37	0303567F	Non-SENSR Spectrum Pipeline SRF	03						U
		Advanced Technology Development		778,548				778,548	
38	0603260F	Intelligence Advanced Development	04	4,320				4,320	U
39	0603742F	Combat Identification Technology	04	26,396				26,396	U
40	0603790F	NATO Research and Development	04	3,647				3,647	U
41	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	32,959				32,959	U
42	0603859F	Pollution Prevention - Dem/Val	04						U
43	0604002F	Air Force Weather Services Research	04	869				869	U
44	0604003F	Advanced Battle Management System (ABMS)	04	302,323				302,323	U
45	0604004F	Advanced Engine Development	04	636,495				636,495	U
46	0604015F	Long Range Strike - Bomber	04	2,848,410				2,848,410	U
47	0604032F	Directed Energy Prototyping	04	20,964				20,964	U
48	0604033F	Hypersonics Prototyping	04	381,862				381,862	U

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Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ e OCO)	c
49	0604201F	PNT Resiliency, Mods, and Improvements	04	86,445	124,600			124,600	U
50	0604257F	Advanced Technology and Sensors	04	34,585	23,145			23,145	U
51	0604288F	National Airborne Ops Center (NAOC) Recap	04	7,168	12,669			12,669	U
52	0604317F	Technology Transfer	04	18,754	37,614			37,614	U
53	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	41,259	113,121			113,121	U
54	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	57,671	56,325			56,325	U
55	0604776F	Deployment & Distribution Enterprise R&D	04	27,301	28,034			28,034	U
56	0604858F	Tech Transition Program	04	163,132	288,476		26,450	314,926	U
57	0605230F	Ground Based Strategic Deterrent	04	401,244	557,495			557,495	U
58	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04		2,000			2,000	U
59	0207110F	Next Generation Air Dominance	04	413,938	905,000			905,000	U
60	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	24,716	23,190			23,190	U
61	0207522F	Airbase Air Defense Systems (ABADS)	04						U
62	0208099F	Unified Platform (UP)	04	28,327	10,000			10,000	U
63	0305236F	Common Data Link Executive Agent (CDL EA)	04	41,880	36,910			36,910	U

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Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	Se
49	0604201F	PNT Resiliency, Mods, and Improvements	04						U
50	0604257F	Advanced Technology and Sensors	04	24,747				24,747	U
51	0604288F	National Airborne Ops Center (NAOC) Recap	04	76,417				76,417	U
52	0604317F	Technology Transfer	04	3,011				3,011	U
53	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	52,921				52,921	U
54	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	69,783				69,783	U
55	0604776F	Deployment & Distribution Enterprise R&D	04	25,835				25,835	U
56	0604858F	Tech Transition Program	04	219,252				219,252	U
57	0605230F	Ground Based Strategic Deterrent	04	1,524,759				1,524,759	U
58	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04						U
59	0207110F	Next Generation Air Dominance	04	1,044,089				1,044,089	U
60	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	19,356				19,356	U
61	0207522F	Airbase Air Defense Systems (ABADS)	04	8,737				8,737	U
62	0208099F	Unified Platform (UP)	04	5,990				5,990	U
63	0305236F	Common Data Link Executive Agent (CDL EA)	04	39,293				39,293	U

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64	0305251F	Cyberspace Operations Forces and Force Support	04		35,000			35,000	U
65	0305601F	Mission Partner Environments	04	9,694	8,550			8,550	U
66	0306250F	Cyber Operations Technology Development	04	237,393	202,364			202,364	U
67	0306415F	Enabled Cyber Activities	04	15,728	16,632			16,632	U
68	0401310F	C-32 Executive Transport Recapitalization	04						U
69	0901410F	Contracting Information Technology System	04	16,998	20,830			20,830	U
70	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04	236,786	320,598			320,598	U
71	1203710F	EO/IR Weather Systems	04	7,786	125,964			125,964	U
72	1206422F	Weather System Follow-on	04	128,600	205,660			205,660	U
73	1206425F	Space Situation Awareness Systems	04	32,351	29,776			29,776	U
74	1206427F	Space Systems Prototype Transitions (SSPT)	04		142,045			142,045	U
75	1206434F	Midterm Polar MILSATCOM System	04	370,353					U
76	1206438F	Space Control Technology	04	68,604	58,231			58,231	U
77	1206730F	Space Security and Defense Program	04	45,542	56,385			56,385	U
78	1206760F	Protected Tactical Enterprise Service (PTES)	04	45,009	105,003			105,003	U
79	1206761F	Protected Tactical Service (PTS)	04	28,754	163,694			163,694	U
80	1206855F	Evolved Strategic SATCOM (ESS)	04	28,498	167,206			167,206	U

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64	0305251F	Cyberspace Operations Forces and Force Support	04						U
65	0305601F	Mission Partner Environments	04	11,430				11,430	U
66	0306250F	Cyber Operations Technology Development	04	259,823				259,823	U
67	0306415F	Enabled Cyber Activities	04	10,560				10,560	U
68	0401310F	C-32 Executive Transport Recapitalization	04	9,908				9,908	U
69	0901410F	Contracting Information Technology System	04	8,662				8,662	U
70	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04						U
71	1203710F	EO/IR Weather Systems	04						U
72	1206422F	Weather System Follow-on	04						U
73	1206425F	Space Situation Awareness Systems	04						U
74	1206427F	Space Systems Prototype Transitions (SSPT)	04	8,787				8,787	U
75	1206434F	Midterm Polar MILSATCOM System	04						U
76	1206438F	Space Control Technology	04						U
77	1206730F	Space Security and Defense Program	04	56,311				56,311	U
78	1206760F	Protected Tactical Enterprise Service (PTES)	04						U
79	1206761F	Protected Tactical Service (PTS)	04						U
80	1206855F	Evolved Strategic SATCOM (ESS)	04						U

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81	1206857F	Space Rapid Capabilities Office	04	288,289	9,000		17,885	26,885	U
		Advanced Component Development & Prototypes		6,386,187	8,244,911		44,335	8,289,246	
82	0604200F	Future Advanced Weapon Analysis & Programs	05	262	5,000			5,000	U
83	0604201F	PNT Resiliency, Mods, and Improvements	05	45,363	142,782			142,782	U
84	0604222F	Nuclear Weapons Support	05	4,311	4,406			4,406	U
85	0604270F	Electronic Warfare Development	05	1,839	2,066			2,066	U
86	0604281F	Tactical Data Networks Enterprise	05	242,328	189,631			189,631	U
87	0604287F	Physical Security Equipment	05	13,893	9,700			9,700	U
88	0604329F	Small Diameter Bomb (SDB) - EMD	05	75,345	45,241			45,241	U
89	0604429F	Airborne Electronic Attack	05	5,948					U
90	0604602F	Armament/Ordnance Development	05	44,788	28,043			28,043	U
91	0604604F	Submunitions	05	2,989	3,045			3,045	U
92	0604617F	Agile Combat Support	05	22,739	26,944			26,944	U
93	0604618F	Joint Direct Attack Munition	05						U
94	0604706F	Life Support Systems	05	10,334	14,624			14,624	U
95	0604735F	Combat Training Ranges	05	42,383	52,365			52,365	U
96	0604800F	F-35 - EMD	05	67,999	7,628			7,628	U
97	0604932F	Long Range Standoff Weapon	05	646,800	712,539			712,539	U
98	0604933F	ICBM Fuze Modernization	05	124,457	161,199			161,199	U

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81	1206857F	Space Rapid Capabilities Office	04						U
		Advanced Component Development & Prototypes		7,737,916				7,737,916	
82	0604200F	Future Advanced Weapon Analysis & Programs	05	25,161				25,161	U
83	0604201F	PNT Resiliency, Mods, and Improvements	05	38,564				38,564	U
84	0604222F	Nuclear Weapons Support	05	35,033				35,033	U
85	0604270F	Electronic Warfare Development	05	2,098				2,098	U
86	0604281F	Tactical Data Networks Enterprise	05	131,909				131,909	U
87	0604287F	Physical Security Equipment	05	6,752				6,752	U
88	0604329F	Small Diameter Bomb (SDB) - EMD	05	17,280				17,280	U
89	0604429F	Airborne Electronic Attack	05						U
90	0604602F	Armament/Ordnance Development	05	23,076				23,076	U
91	0604604F	Submunitions	05	3,091				3,091	U
92	0604617F	Agile Combat Support	05	20,609				20,609	U
93	0604618F	Joint Direct Attack Munition	05	7,926				7,926	U
94	0604706F	Life Support Systems	05	23,660				23,660	U
95	0604735F	Combat Training Ranges	05	8,898				8,898	U
96	0604800F	F-35 - EMD	05	5,423				5,423	U
97	0604932F	Long Range Standoff Weapon	05	474,430				474,430	U
98	0604933F	ICBM Fuze Modernization	05	167,099				167,099	U

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99	0605030F	Joint Tactical Network Center (JTNC)	05		2,414			2,414	U
100	0605056F	Open Architecture Management	05		30,000			30,000	U
101	0605221F	KC-46	05	77,852	59,561			59,561	U
102	0605223F	Advanced Pilot Training	05	236,840	340,373			340,373	U
103	0605229F	Combat Rescue Helicopter	05	430,483	247,047			247,047	U
104	0605931F	B-2 Defensive Management System	05	244,638	250,100			250,100	U
105	0101125F	Nuclear Weapons Modernization	05	42,001	27,564			27,564	U
106	0207171F	F-15 EPAWSS	05	133,382	47,322			47,322	U
107	0207328F	Stand In Attack Weapon	05	14,542	162,840			162,840	U
108	0207701F	Full Combat Mission Training	05	978	9,797			9,797	U
109	0303267F	Auctioned Spectrum Relocation Fund	05	44,652					U
110	0305176F	Combat Survivor Evader Locator	05						U
111	0401221F	KC-46A Tanker Squadrons	05						U
112	0401310F	C-32 Executive Transport Recapitalization	05	5,989	9,930			9,930	U
113	0401319F	VC-25B	05	713,633	757,923			757,923	U
114	0701212F	Automated Test Systems	05	13,153	2,787			2,787	U
115	0804772F	Training Developments	05						U
116	0901299F	AF A1 Systems	05						U
117	1203176F	Combat Survivor Evader Locator	05	913	2,000			2,000	U

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99	0605030F	Joint Tactical Network Center (JTNC)	05						U
100	0605056F	Open Architecture Management	05	30,547				30,547	U
101	0605221F	KC-46	05						U
102	0605223F	Advanced Pilot Training	05	248,669				248,669	U
103	0605229F	Combat Rescue Helicopter	05	63,169				63,169	U
104	0605931F	B-2 Defensive Management System	05						U
105	0101125F	Nuclear Weapons Modernization	05	9,683				9,683	U
106	0207171F	F-15 EPAWSS	05	170,679				170,679	U
107	0207328F	Stand In Attack Weapon	05	160,438				160,438	U
108	0207701F	Full Combat Mission Training	05	9,422				9,422	U
109	0303267F	Auctioned Spectrum Relocation Fund	05						U
110	0305176F	Combat Survivor Evader Locator	05	973				973	U
111	0401221F	KC-46A Tanker Squadrons	05	106,262				106,262	U
112	0401310F	C-32 Executive Transport Recapitalization	05						U
113	0401319F	VC-25B	05	800,889				800,889	U
114	0701212F	Automated Test Systems	05	10,673				10,673	U
115	0804772F	Training Developments	05	4,479				4,479	U
116	0901299F	AF A1 Systems	05	8,467				8,467	U
117	1203176F	Combat Survivor Evader Locator	05						U

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118	1203269F	GPS III Follow-On (GPS IIIIF)	05	412,202	447,875			447,875	U
119	1203940F	Space Situation Awareness Operations	05	35,569	56,829			56,829	U
120	1206421F	Counterspace Systems	05	19,637	27,037			27,037	U
121	1206422F	Weather System Follow-on	05		2,237			2,237	U
122	1206425F	Space Situation Awareness Systems	05	139,172	362,894			362,894	U
123	1206426F	Space Fence	05	18,841					U
124	1206431F	Advanced EHF MILSATCOM (SPACE)	05	139,927	117,290			117,290	U
125	1206432F	Polar MILSATCOM (SPACE)	05	25,480	412,400			412,400	U
126	1206433F	Wideband Global SATCOM (SPACE)	05	3,833	1,920			1,920	U
127	1206441F	Space Based Infrared System (SBIRS) High EMD	05	58,765	1			1	U
128	1206442F	Next Generation OPIR	05	736,389	1,470,278			1,470,278	U
129	1206445F	Commercial SATCOM (COMSATCOM) Integration	05	47,869	5,000			5,000	U
130	1206853F	National Security Space Launch Program (SPACE) - EMD	05	428,525	432,009			432,009	U
		System Development & Demonstration		5,377,043	6,690,641			6,690,641	
131	0604256F	Threat Simulator Development	06	33,666	59,693			59,693	U
132	0604759F	Major T&E Investment	06	213,273	106,663			106,663	U
133	0605101F	RAND Project Air Force	06	33,308	35,258			35,258	U
134	0605502F	Small Business Innovation Research	06	795,378					U

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118	1203269F	GPS III Follow-On (GPS IIIIF)	05						U
119	1203940F	Space Situation Awareness Operations	05						U
120	1206421F	Counterspace Systems	05						U
121	1206422F	Weather System Follow-on	05						U
122	1206425F	Space Situation Awareness Systems	05						U
123	1206426F	Space Fence	05						U
124	1206431F	Advanced EHF MILSATCOM (SPACE)	05						U
125	1206432F	Polar MILSATCOM (SPACE)	05						U
126	1206433F	Wideband Global SATCOM (SPACE)	05						U
127	1206441F	Space Based Infrared System (SBIRS) High EMD	05						U
128	1206442F	Next Generation OPIR	05						U
129	1206445F	Commercial SATCOM (COMSATCOM) Integration	05						U
130	1206853F	National Security Space Launch Program (SPACE) - EMD	05						U
		System Development & Demonstration		2,615,359				2,615,359	
131	0604256F	Threat Simulator Development	06	57,725				57,725	U
132	0604759F	Major T&E Investment	06	208,680				208,680	U
133	0605101F	RAND Project Air Force	06	35,803				35,803	U
134	0605502F	Small Business Innovation Research	06						U

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135	0605712F	Initial Operational Test & Evaluation	06	17,383	13,793			13,793	U
136	0605807F	Test and Evaluation Support	06	692,784	717,895			717,895	U
137	0605826F	Acq Workforce- Global Power	06	229,904	255,667			255,667	U
138	0605827F	Acq Workforce- Global Vig & Combat Sys	06	243,647	249,992			249,992	U
139	0605828F	Acq Workforce- Global Reach	06	149,306	149,191			149,191	U
140	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06	227,337	235,360			235,360	U
141	0605830F	Acq Workforce- Global Battle Mgmt	06	157,258	160,196			160,196	U
142	0605831F	Acq Workforce- Capability Integration	06	237,297	228,255			228,255	U
143	0605832F	Acq Workforce- Advanced Prgm Technology	06	36,739	39,392			39,392	U
144	0605833F	Acq Workforce- Nuclear Systems	06	126,681	133,231			133,231	U
145	0605898F	Management HQ - R&D	06	11,024	5,590			5,590	U
146	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	187,216	88,445			88,445	U
147	0605978F	Facilities Sustainment - Test and Evaluation Support	06	28,888	29,424			29,424	U
148	0606017F	Requirements Analysis and Maturation	06	46,145	86,715			86,715	U
149	0606398F	Management HQ - T&E	06		5,013			5,013	U

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135	0605712F	Initial Operational Test & Evaluation	06	13,557				13,557	U
136	0605807F	Test and Evaluation Support	06	764,606				764,606	U
137	0605826F	Acq Workforce- Global Power	06						U
138	0605827F	Acq Workforce- Global Vig & Combat Sys	06						U
139	0605828F	Acq Workforce- Global Reach	06						U
140	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06						U
141	0605830F	Acq Workforce- Global Battle Mgmt	06						U
142	0605831F	Acq Workforce- Capability Integration	06	1,362,038				1,362,038	U
143	0605832F	Acq Workforce- Advanced Prgm Technology	06	40,768				40,768	U
144	0605833F	Acq Workforce- Nuclear Systems	06	179,646				179,646	U
145	0605898F	Management HQ - R&D	06	5,734				5,734	U
146	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	70,985				70,985	U
147	0605978F	Facilities Sustainment - Test and Evaluation Support	06	29,880				29,880	U
148	0606017F	Requirements Analysis and Maturation	06	63,381				63,381	U
149	0606398F	Management HQ - T&E	06	5,785				5,785	U

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150	0303255F	Command, Control, Communication, and Computers (C4) - STRATCOM	06						U
151	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	17,258	10,628			10,628	U
152	0702806F	Acquisition and Management Support	06	12,130	5,913			5,913	U
153	0804731F	General Skill Training	06	432	6,475			6,475	U
154	0909999F	Financing for Cancelled Account Adjustments	06	3,593					U
155	1001004F	International Activities	06	3,866	4,071			4,071	U
156	1206116F	Space Test and Training Range Development	06	22,408	14,942			14,942	U
157	1206392F	ACQ Workforce - Space & Missile Systems	06	180,512	167,810			167,810	U
158	1206398F	Space & Missile Systems Center - MHA	06	10,508	10,170			10,170	U
159	1206860F	Rocket Systems Launch Program (SPACE)	06	21,906	13,192			13,192	U
160	1206862F	Tactically Responsive Launch	06		19,000			19,000	U
161	1206864F	Space Test Program (STP)	06	29,731	26,097			26,097	U
		Management Support		3,769,578	2,878,071			2,878,071	
162	0604003F	Advanced Battle Management System (ABMS)	07	27,883	35,611			35,611	U
163	0604233F	Specialized Undergraduate Flight Training	07	10,974	2,584			2,584	U

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150	0303255F	Command, Control, Communication, and Computers (C4) - STRATCOM	06	24,564				24,564	U
151	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	9,883				9,883	U
152	0702806F	Acquisition and Management Support	06	13,384				13,384	U
153	0804731F	General Skill Training	06	1,262				1,262	U
154	0909999F	Financing for Cancelled Account Adjustments	06						U
155	1001004F	International Activities	06	3,599				3,599	U
156	1206116F	Space Test and Training Range Development	06						U
157	1206392F	ACQ Workforce - Space & Missile Systems	06						U
158	1206398F	Space & Missile Systems Center - MHA	06						U
159	1206860F	Rocket Systems Launch Program (SPACE)	06						U
160	1206862F	Tactically Responsive Launch	06						U
161	1206864F	Space Test Program (STP)	06						U
		Management Support		2,891,280				2,891,280	
162	0604003F	Advanced Battle Management System (ABMS)	07						U
163	0604233F	Specialized Undergraduate Flight Training	07	8,777				8,777	U

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164	0604776F	Deployment & Distribution Enterprise R&D	07	257	903			903	U
165	0604840F	F-35 C2D2	07		642,371			642,371	U
166	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	39,794	40,567			40,567	U
167	0605024F	Anti-Tamper Technology Executive Agency	07	32,182	47,193			47,193	U
168	0605117F	Foreign Materiel Acquisition and Exploitation	07	68,368	70,083			70,083	U
169	0605278F	HC/MC-130 Recap RDT&E	07	15,641	17,218			17,218	U
170	0606018F	NC3 Integration	07	18,633	25,917			25,917	U
171	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07	84,908					U
172	0101113F	B-52 Squadrons	07	290,097	323,624			323,624	U
173	0101122F	Air-Launched Cruise Missile (ALCM)	07	5,741	10,217			10,217	U
174	0101126F	B-1B Squadrons	07	58,175	1,000			1,000	U
175	0101127F	B-2 Squadrons	07	101,827	93,076			93,076	U
176	0101213F	Minuteman Squadrons	07	185,640	104,219			104,219	U
177	0101316F	Worldwide Joint Strategic Communications	07	17,767	26,177			26,177	U
178	0101324F	Integrated Strategic Planning & Analysis Network	07	22,231	24,261			24,261	U
179	0101328F	ICBM Reentry Vehicles	07	13,747	65,671			65,671	U
181	0102110F	UH-1N Replacement Program	07	190,523	170,975			170,975	U

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164	0604776F	Deployment & Distribution Enterprise R&D	07	499				499	U
165	0604840F	F-35 C2D2	07	785,336				785,336	U
166	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	27,035				27,035	U
167	0605024F	Anti-Tamper Technology Executive Agency	07	50,508				50,508	U
168	0605117F	Foreign Materiel Acquisition and Exploitation	07	71,229				71,229	U
169	0605278F	HC/MC-130 Recap RDT&E	07	24,705				24,705	U
170	0606018F	NC3 Integration	07	26,356				26,356	U
171	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07						U
172	0101113F	B-52 Squadrons	07	520,023				520,023	U
173	0101122F	Air-Launched Cruise Missile (ALCM)	07	1,433				1,433	U
174	0101126F	B-1B Squadrons	07	15,766				15,766	U
175	0101127F	B-2 Squadrons	07	187,399				187,399	U
176	0101213F	Minuteman Squadrons	07	116,569				116,569	U
177	0101316F	Worldwide Joint Strategic Communications	07	27,235				27,235	U
178	0101324F	Integrated Strategic Planning & Analysis Network	07	24,227				24,227	U
179	0101328F	ICBM Reentry Vehicles	07	112,753				112,753	U
181	0102110F	UH-1N Replacement Program	07	44,464				44,464	U

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182	0102326F	Region/Sector Operation Control Center Modernization Program	07	5,904					U
183	0102412F	North Warning System (NWS)	07						U
184	0205219F	MQ-9 UAV	07	105,088	127,296			127,296	U
185	0205671F	Joint Counter RCIED Electronic Warfare	07	4,000			4,000	4,000	U
186	0207131F	A-10 Squadrons	07	27,537	31,916			31,916	U
187	0207133F	F-16 Squadrons	07	182,190	193,013			193,013	U
188	0207134F	F-15E Squadrons	07	196,035	684,229			684,229	U
189	0207136F	Manned Destructive Suppression	07	13,609	15,521			15,521	U
190	0207138F	F-22A Squadrons	07	563,635	546,298			546,298	U
191	0207142F	F-35 Squadrons	07	490,319	99,943			99,943	U
192	0207146F	F-15EX	07						U
193	0207161F	Tactical AIM Missiles	07	29,042	10,314			10,314	U
194	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	50,728	55,384			55,384	U
195	0207227F	Combat Rescue - Pararescue	07	623	281			281	U
196	0207247F	AF TENCAP	07		21,365			21,365	U
197	0207249F	Precision Attack Systems Procurement	07	14,346	10,696			10,696	U
198	0207253F	Compass Call	07	43,466	31,888			31,888	U
199	0207268F	Aircraft Engine Component Improvement Program	07	116,808	112,505			112,505	U

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182	0102326F	Region/Sector Operation Control Center Modernization Program	07	5,929				5,929	U
183	0102412F	North Warning System (NWS)	07	100				100	U
184	0205219F	MQ-9 UAV	07	162,080				162,080	U
185	0205671F	Joint Counter RCIED Electronic Warfare	07			4,080	4,080	4,080	U
186	0207131F	A-10 Squadrons	07	24,535				24,535	U
187	0207133F	F-16 Squadrons	07	223,437				223,437	U
188	0207134F	F-15E Squadrons	07	298,908				298,908	U
189	0207136F	Manned Destructive Suppression	07	14,960				14,960	U
190	0207138F	F-22A Squadrons	07	665,038				665,038	U
191	0207142F	F-35 Squadrons	07	132,229				132,229	U
192	0207146F	F-15EX	07	159,761				159,761	U
193	0207161F	Tactical AIM Missiles	07	19,417				19,417	U
194	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	51,799				51,799	U
195	0207227F	Combat Rescue - Pararescue	07	669				669	U
196	0207247F	AF TENCAP	07	21,644				21,644	U
197	0207249F	Precision Attack Systems Procurement	07	9,261				9,261	U
198	0207253F	Compass Call	07	15,854				15,854	U
199	0207268F	Aircraft Engine Component Improvement Program	07	95,896				95,896	U

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200	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	40,933	78,498			78,498	U
201	0207410F	Air & Space Operations Center (AOC)	07	98,854	114,864			114,864	U
202	0207412F	Control and Reporting Center (CRC)	07	6,216	8,109			8,109	U
203	0207417F	Airborne Warning and Control System (AWACS)	07	108,795	67,996			67,996	U
204	0207418F	AFSPECWAR - TACP	07	2,562	2,462			2,462	U
206	0207431F	Combat Air Intelligence System Activities	07	10,316	13,668			13,668	U
207	0207438F	Theater Battle Management (TBM) C4I	07						U
208	0207444F	Tactical Air Control Party-Mod	07	6,135	4,117			4,117	U
209	0207448F	C2ISR Tactical Data Link	07	538					U
210	0207452F	DCAPES	07	14,649	19,910			19,910	U
211	0207521F	Air Force Calibration Programs	07						U
212	0207573F	National Technical Nuclear Forensics	07	1,723	1,788			1,788	U
213	0207590F	Seek Eagle	07	24,618	28,237			28,237	U
214	0207601F	USAF Modeling and Simulation	07	16,572	15,725			15,725	U
215	0207605F	Wargaming and Simulation Centers	07	5,916	4,316			4,316	U
216	0207610F	Battlefield Abn Comm Node (BACN)	07	42,349	26,946			26,946	U
217	0207697F	Distributed Training and Exercises	07	3,699	4,303			4,303	U

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200	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	70,792				70,792	U
201	0207410F	Air & Space Operations Center (AOC)	07	51,187				51,187	U
202	0207412F	Control and Reporting Center (CRC)	07	16,041				16,041	U
203	0207417F	Airborne Warning and Control System (AWACS)	07	138,303				138,303	U
204	0207418F	AFSPECWAR - TACP	07	4,223				4,223	U
206	0207431F	Combat Air Intelligence System Activities	07	16,564				16,564	U
207	0207438F	Theater Battle Management (TBM) C4I	07	7,858				7,858	U
208	0207444F	Tactical Air Control Party-Mod	07	12,906				12,906	U
209	0207448F	C2ISR Tactical Data Link	07						U
210	0207452F	DCAPES	07	14,816				14,816	U
211	0207521F	Air Force Calibration Programs	07	1,970				1,970	U
212	0207573F	National Technical Nuclear Forensics	07	396				396	U
213	0207590F	Seek Eagle	07	29,680				29,680	U
214	0207601F	USAF Modeling and Simulation	07	17,666				17,666	U
215	0207605F	Wargaming and Simulation Centers	07	6,353				6,353	U
216	0207610F	Battlefield Abn Comm Node (BACN)	07	6,827				6,827	U
217	0207697F	Distributed Training and Exercises	07	3,390				3,390	U

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218	0208006F	Mission Planning Systems	07	61,164	71,465			71,465	U
219	0208007F	Tactical Deception	07	6,687	7,446			7,446	U
220	0208064F	OPERATIONAL HQ - CYBER	07		7,602			7,602	U
221	0208087F	Distributed Cyber Warfare Operations	07	38,857	35,178			35,178	U
222	0208088F	AF Defensive Cyberspace Operations	07	36,953	38,609			38,609	U
223	0208097F	Joint Cyber Command and Control (JCC2)	07	12,553	11,603			11,603	U
224	0208099F	Unified Platform (UP)	07	26,093	84,702			84,702	U
228	0208288F	Intel Data Applications	07	1,200			1,200	1,200	U
229	0301017F	Global Sensor Integrated on Network (GSIN)	07	3,468					U
230	0301025F	GeoBase	07		2,723			2,723	U
231	0301112F	Nuclear Planning and Execution System (NPES)	07	28,623	44,190			44,190	U
238	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	6,633	3,575			3,575	U
239	0302015F	E-4B National Airborne Operations Center (NAOC)	07	55,707	60,173			60,173	U
240	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	62,146	13,543			13,543	U
241	0303133F	High Frequency Radio Systems	07	49,912	15,881			15,881	U
242	0303140F	Information Systems Security Program	07	35,775	27,726			27,726	U

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218	0208006F	Mission Planning Systems	07	91,768				91,768	U
219	0208007F	Tactical Deception	07	2,370				2,370	U
220	0208064F	OPERATIONAL HQ - CYBER	07	5,527				5,527	U
221	0208087F	Distributed Cyber Warfare Operations	07	68,279				68,279	U
222	0208088F	AF Defensive Cyberspace Operations	07	15,165				15,165	U
223	0208097F	Joint Cyber Command and Control (JCC2)	07	38,480				38,480	U
224	0208099F	Unified Platform (UP)	07	84,645				84,645	U
228	0208288F	Intel Data Applications	07			1,224	1,224	1,224	U
229	0301017F	Global Sensor Integrated on Network (GSIN)	07						U
230	0301025F	GeoBase	07	2,767				2,767	U
231	0301112F	Nuclear Planning and Execution System (NPES)	07	32,759				32,759	U
238	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	2,904				2,904	U
239	0302015F	E-4B National Airborne Operations Center (NAOC)	07	3,468				3,468	U
240	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	61,887				61,887	U
241	0303133F	High Frequency Radio Systems	07						U
242	0303140F	Information Systems Security Program	07	10,351				10,351	U

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243	0303142F	Global Force Management - Data Initiative	07	2,108	2,210			2,210	U
245	0304115F	Multi Domain Command and Control (MDC2)	07		100,880			100,880	U
246	0304260F	Airborne SIGINT Enterprise	07	109,838	85,157			85,157	U
247	0304310F	Commercial Economic Analysis	07	4,014	3,431			3,431	U
250	0305015F	C2 Air Operations Suite - C2 Info Services	07	8,324	9,313			9,313	U
251	0305020F	CCMD Intelligence Information Technology	07	1,586	1,121			1,121	U
252	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07		19,000			19,000	U
253	0305099F	Global Air Traffic Management (GATM)	07	3,966	4,544			4,544	U
254	0305103F	Cyber Security Initiative	07						U
255	0305111F	Weather Service	07	33,563	35,461			35,461	U
256	0305114F	Air Traffic Control, Approach, and Landing System (ATCALs)	07	12,873	8,651			8,651	U
257	0305116F	Aerial Targets	07	6,527	7,448			7,448	U
260	0305128F	Security and Investigative Activities	07	403	425			425	U
261	0305145F	Arms Control Implementation	07	24,804	41,546			41,546	U
262	0305146F	Defense Joint Counterintelligence Activities	07	3,845	6,858			6,858	U
264	0305179F	Integrated Broadcast Service (IBS)	07		8,728			8,728	U

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243	0303142F	Global Force Management - Data Initiative	07	1,346				1,346	U
245	0304115F	Multi Domain Command and Control (MDC2)	07						U
246	0304260F	Airborne SIGINT Enterprise	07	128,110				128,110	U
247	0304310F	Commercial Economic Analysis	07	4,042				4,042	U
250	0305015F	C2 Air Operations Suite - C2 Info Services	07						U
251	0305020F	CCMD Intelligence Information Technology	07	1,649				1,649	U
252	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07	19,265				19,265	U
253	0305099F	Global Air Traffic Management (GATM)	07	4,645				4,645	U
254	0305103F	Cyber Security Initiative	07	384				384	U
255	0305111F	Weather Service	07	23,640				23,640	U
256	0305114F	Air Traffic Control, Approach, and Landing System (ATCALs)	07	6,553				6,553	U
257	0305116F	Aerial Targets	07	449				449	U
260	0305128F	Security and Investigative Activities	07	432				432	U
261	0305145F	Arms Control Implementation	07						U
262	0305146F	Defense Joint Counterintelligence Activities	07	4,890				4,890	U
264	0305179F	Integrated Broadcast Service (IBS)	07	8,864				8,864	U

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265	0305202F	Dragon U-2	07	87,618	36,389			36,389	U
266	0305205F	Endurance Unmanned Aerial Vehicles	07	15,000	15,000			15,000	U
267	0305206F	Airborne Reconnaissance Systems	07	195,323	137,909			137,909	U
268	0305207F	Manned Reconnaissance Systems	07	14,223	11,787			11,787	U
269	0305208F	Distributed Common Ground/Surface Systems	07	52,421	25,009			25,009	U
270	0305220F	RQ-4 UAV	07	221,675	191,733			191,733	U
271	0305221F	Network-Centric Collaborative Targeting	07	14,256	10,757			10,757	U
272	0305238F	NATO AGS	07	51,527	32,567			32,567	U
273	0305240F	Support to DCGS Enterprise	07	26,579	37,774			37,774	U
274	0305600F	International Intelligence Technology and Architectures	07	11,564	13,515			13,515	U
275	0305881F	Rapid Cyber Acquisition	07	4,146	4,383			4,383	U
276	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,385	2,133			2,133	U
277	0307577F	Intelligence Mission Data (IMD)	07	5,717	8,614			8,614	U
278	0401115F	C-130 Airlift Squadron	07	58,408	101,425			101,425	U
279	0401119F	C-5 Airlift Squadrons (IF)	07	28,245	10,223			10,223	U
280	0401130F	C-17 Aircraft (IF)	07	43,288	21,101			21,101	U
281	0401132F	C-130J Program	07	9,924	8,640			8,640	U
282	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	4,182	5,424			5,424	U

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265	0305202F	Dragon U-2	07	18,660				18,660	U
266	0305205F	Endurance Unmanned Aerial Vehicles	07						U
267	0305206F	Airborne Reconnaissance Systems	07	121,512				121,512	U
268	0305207F	Manned Reconnaissance Systems	07	14,711				14,711	U
269	0305208F	Distributed Common Ground/Surface Systems	07	14,152				14,152	U
270	0305220F	RQ-4 UAV	07	134,589				134,589	U
271	0305221F	Network-Centric Collaborative Targeting	07	15,049				15,049	U
272	0305238F	NATO AGS	07	36,731				36,731	U
273	0305240F	Support to DCGS Enterprise	07	33,547				33,547	U
274	0305600F	International Intelligence Technology and Architectures	07	13,635				13,635	U
275	0305881F	Rapid Cyber Acquisition	07	4,262				4,262	U
276	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,207				2,207	U
277	0307577F	Intelligence Mission Data (IMD)	07	6,277				6,277	U
278	0401115F	C-130 Airlift Squadron	07	41,973				41,973	U
279	0401119F	C-5 Airlift Squadrons (IF)	07	32,560				32,560	U
280	0401130F	C-17 Aircraft (IF)	07	9,991				9,991	U
281	0401132F	C-130J Program	07	10,674				10,674	U
282	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	5,507				5,507	U

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283	0401218F	KC-135s	07	2,692					U
284	0401219F	KC-10s	07	5,084	20			20	U
285	0401314F	Operational Support Airlift	07	3,059					U
286	0401318F	CV-22	07	15,981	17,906			17,906	U
287	0401840F	AMC Command and Control System	07	1,626					U
288	0408011F	Special Tactics / Combat Control	07	2,322	3,629			3,629	U
289	0702207F	Depot Maintenance (Non-IF)	07	1,880	1,890			1,890	U
290	0708055F	Maintenance, Repair & Overhaul System	07	49,330	10,311			10,311	U
291	0708610F	Logistics Information Technology (LOGIT)	07	13,065	16,065			16,065	U
292	0708611F	Support Systems Development	07	4,406	539			539	U
293	0804743F	Other Flight Training	07	1,948	2,057			2,057	U
294	0808716F	Other Personnel Activities	07	108	10			10	U
295	0901202F	Joint Personnel Recovery Agency	07	1,947	2,060			2,060	U
296	0901218F	Civilian Compensation Program	07	2,849	3,809			3,809	U
297	0901220F	Personnel Administration	07	4,102	6,476			6,476	U
298	0901226F	Air Force Studies and Analysis Agency	07	1,364	1,443			1,443	U
299	0901538F	Financial Management Information Systems Development	07	86,578	9,323			9,323	U
300	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07		46,789			46,789	U

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283	0401218F	KC-135s	07	4,591				4,591	U
284	0401219F	KC-10s	07						U
285	0401314F	Operational Support Airlift	07						U
286	0401318F	CV-22	07	18,419				18,419	U
287	0401840F	AMC Command and Control System	07						U
288	0408011F	Special Tactics / Combat Control	07	7,673				7,673	U
289	0702207F	Depot Maintenance (Non-IF)	07						U
290	0708055F	Maintenance, Repair & Overhaul System	07	24,513				24,513	U
291	0708610F	Logistics Information Technology (LOGIT)	07	35,225				35,225	U
292	0708611F	Support Systems Development	07	11,838				11,838	U
293	0804743F	Other Flight Training	07	1,332				1,332	U
294	0808716F	Other Personnel Activities	07						U
295	0901202F	Joint Personnel Recovery Agency	07	2,092				2,092	U
296	0901218F	Civilian Compensation Program	07	3,869				3,869	U
297	0901220F	Personnel Administration	07	1,584				1,584	U
298	0901226F	Air Force Studies and Analysis Agency	07	1,197				1,197	U
299	0901538F	Financial Management Information Systems Development	07	7,006				7,006	U
300	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07	45,638				45,638	U

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Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ e OCO)	c
301	1201017F	Global Sensor Integrated on Network (GSIN)	07		3,647			3,647	U
302	1201921F	Service Support to STRATCOM - Space Activities	07	28,636	988			988	U
303	1202140F	Service Support to SPACECOM Activities	07		11,863			11,863	U
304	1202247F	AF TENCAP	07	31,986					U
305	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07	58,582	195,288			195,288	U
306	1203110F	Satellite Control Network (SPACE)	07	26,374	57,891			57,891	U
308	1203165F	NAVSTAR Global Positioning System (Space and Control Segments)	07	8,610					U
309	1203173F	Space and Missile Test and Evaluation Center	07	69,785	4,566			4,566	U
310	1203174F	Space Innovation, Integration and Rapid Technology Development	07	20,250	33,292			33,292	U
311	1203179F	Integrated Broadcast Service (IBS)	07	9,887					U
312	1203182F	Spacelift Range System (SPACE)	07	20,168	5,837			5,837	U
313	1203265F	GPS III Space Segment	07	136,998	42,440			42,440	U
314	1203400F	Space Superiority Intelligence	07	16,278	14,428			14,428	U
315	1203614F	JSpOC Mission System	07	43,108	85,762			85,762	U
316	1203620F	National Space Defense Center	07	53,305	2,653			2,653	U
317	1203873F	Ballistic Missile Defense Radars	07		15,881			15,881	U
318	1203906F	NCMC - TW/AA System	07						U

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Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	Se
301	1201017F	Global Sensor Integrated on Network (GSIN)	07	1,889				1,889	U
302	1201921F	Service Support to STRATCOM - Space Activities	07	993				993	U
303	1202140F	Service Support to SPACECOM Activities	07	8,999				8,999	U
304	1202247F	AF TENCAP	07						U
305	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07						U
306	1203110F	Satellite Control Network (SPACE)	07						U
308	1203165F	NAVSTAR Global Positioning System (Space and Control Segments)	07						U
309	1203173F	Space and Missile Test and Evaluation Center	07						U
310	1203174F	Space Innovation, Integration and Rapid Technology Development	07						U
311	1203179F	Integrated Broadcast Service (IBS)	07						U
312	1203182F	Spacelift Range System (SPACE)	07						U
313	1203265F	GPS III Space Segment	07						U
314	1203400F	Space Superiority Intelligence	07	16,810				16,810	U
315	1203614F	JSpOC Mission System	07						U
316	1203620F	National Space Defense Center	07	2,687				2,687	U
317	1203873F	Ballistic Missile Defense Radars	07						U
318	1203906F	NCCM - TW/AA System	07	6,990				6,990	U

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Line No	Element Number	Program Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ e OCO) c
319	1203913F	NUDET Detection System (SPACE)	07	21,578	49,300			49,300 U
320	1203940F	Space Situation Awareness Operations	07	18,920	17,834			17,834 U
321	1206423F	Global Positioning System III - Operational Control Segment	07	491,601	445,302			445,302 U
322	1206770F	Enterprise Ground Services	07		118,870			118,870 U
9999	9999999999	Classified Programs		16,832,438	17,785,996		78,713	17,864,709 U
		Operational Systems Development		22,982,541	24,480,992		83,913	24,564,905
Total Research, Development, Test & Eval, AF				41,419,014	45,566,955		128,248	45,695,203

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Line No	Element Number	Program Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	See
319	1203913F	NUDET Detection System (SPACE)	07						U
320	1203940F	Space Situation Awareness Operations	07						U
321	1206423F	Global Positioning System III - Operational Control Segment	07						U
322	1206770F	Enterprise Ground Services	07						U
9999	9999999999	Classified Programs		15,777,856				15,777,856	U
		Operational Systems Development		21,466,680		5,304	5,304	21,471,984	
Total Research, Development, Test & Eval, AF				37,391,826		5,304	5,304	37,397,130	

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Summary Recap of Budget Activities -----					
Applied Research					
Advanced Component Development & Prototypes					
System Development & Demonstration					
Management Support					
Operational System Development					
Software & Digital Technology Pilot Programs					
Total Research, Development, Test & Evaluation					
Summary Recap of FYDP Programs -----					
Space					
Classified Programs					
Total Research, Development, Test & Evaluation					

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	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Summary Recap of Budget Activities					
-----	-----	-----	-----	-----	-----
Applied Research	130,874				130,874
Advanced Component Development & Prototypes	1,311,311				1,311,311
System Development & Demonstration	3,744,016				3,744,016
Management Support	258,510				258,510
Operational System Development	4,733,142				4,733,142
Software & Digital Technology Pilot Programs	149,742				149,742
Total Research, Development, Test & Evaluation	10,327,595				10,327,595
Summary Recap of FYDP Programs					
-----	-----	-----	-----	-----	-----
Space	6,694,729				6,694,729
Classified Programs	3,632,866				3,632,866
Total Research, Development, Test & Evaluation	10,327,595				10,327,595

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Fiscal Year (FY) 2021 President's Budget

RDT&E Exhibits in Budget Activity 7

are split into two books:

Vol-III Part 1

Vol-III Part 2

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	27.883	35.611	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
67411L: <i>Advanced Battle Management System</i>	-	27.883	35.611	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 This effort will continue in PE 060043F BA 04 BPAC 640141 beginning in FY21 as BA 04 is most appropriate for the type of work being conducted. Additionally, in FY21 PE 0604003F BA 04 (ABMS RDT&E) merges with PE 0304115F MDC2 (also known as Joint All Domain Command and Control, JADC2 RDT&E) to consolidate development activities and provide greater alignment and transparency in execution. See Section D for consolidated funding.

A. Mission Description and Budget Item Justification

The Advanced Battle Management System (ABMS) portfolio develops the digital infrastructure and tools required for the joint force to provide operationally relevant and fieldable capabilities in support of the National Defense Strategy (NDS). ABMS addresses gaps in interoperability and information sharing for air, land, sea, space, and cyberspace domains. The ABMS lines of effort accelerate the development, integration, transition, and fielding of technologies that enable Joint All-Domain Command and Control.

ABMS investments are divided into seven categories of activities.

Digital Architectures, Standards, and Concept Development: This includes digital engineering and analysis, model-based systems engineering, and related analyses and exploration in support of potential investments in the other six categories.

Sensor Integration: This includes the development, test, and integration of open architecture sensor system. These systems will be based on government-owned standards and provide open and reusable capabilities, initially focused on air and ground moving target indication (AMTI, GMTI).

Multi-Domain Data Management: This includes cloud-based data libraries, data feeds, data wrappers, and data management to improve data discoverability and information sharing across the joint force.

Multi-Domain Secure Processing: This includes hardware and software for multi-level security as well as edge hardware to enable a full range of military operations

Multi-Domain Connectivity: This includes maturation and integration of open software-defined radios and networks, government-owned waveform libraries, and wideband multi-function RF systems. This category also includes the integration and standards required to leverage advances in commercial technology such as 5G networks and proliferated low-earth orbit satellite communications.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
<p>Multi-Domain Applications: This includes cloud-based applications to process sensor data, fuse sensor data from multiple platforms across different domains, combine data into a common multi-domain operating picture, and provide battle management, command, and control (BMC2) functionality.</p> <p>Effects Integration: This includes development and integration of open smart munitions that enable dynamic kill webs, attritable aircraft that generate combat mass and distributed effects, and real-time updates to mission data files to improve electronic warfare system performance.</p> <p>The ABMS approach is not a traditional systems acquisition. Instead of acquisition of platforms, ABMS is moving to acquisition of capabilities that are open, available, deployable, and reconfigurable for installation on or use by multiple systems across multiple domains. These capabilities increase the effectiveness and survivability of Air Force, joint, and coalition partners across permissive and contested environments, in all warfighting domains, and at multiple classification levels. ABMS will leverage existing and emerging technology with emphasis on commercial technology and those at technology readiness levels that will enable rapid transition. The innovations from ABMS will augment new and ongoing initiatives aligned with service multi-domain operational priorities.</p> <p>ABMS funding provides for operational concept development and demonstration, hardware development and integration, and software development and integration. The funding will also enable the limited transition of mature and ready capabilities to appropriate programs of record in synchronization with planned modernization activities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver JADC2 capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.</p> <p>This is not a new start.</p> <p>This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	27.883	35.611	51.104	0.000	51.104
Current President's Budget	27.883	35.611	0.000	0.000	0.000
Total Adjustments	0.000	0.000	-51.104	0.000	-51.104
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-51.104	0.000	-51.104

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Advanced Battle Management System	27.883	35.611	0.000
<p>Description: ABMS leverages and complements ongoing efforts and emerging technologies across services, agencies, laboratories, and industry partners. The hardware development approach is based on continuous integration and delivery of incremental capability improvement over time, with emphasis on open and modular systems that can be rapidly transitioned and widely deployed. Software will be deployed using a development/security/operations (DevSecOps) approach with multiple partners. Key points of emphasis include open and reusable software, cloud deployments for scaling and data management, and cyber resiliency. The DevSecOps approach directed by DoD facilitates integration efforts by traditional and non-traditional software providers, with or without prime contractor involvement.</p> <p>ABMS executes onramp events with a COCOM sponsor every four months. These events show proposed technical solutions across the ABMS product lines, demonstrate capabilities being developed in an operationally-relevant scenario, and have the potential to generate leave-behind capabilities if requested. The participating platforms and COCOMs will vary from event to event. Capabilities developed in the ABMS portfolio will be presented at onramp events as they become ready for demonstration, with multiple capabilities being demonstrated at each event. Each event informs the next development sprint as well as future events while also reducing technology risk. This approach also facilitates rapid integration by making the technology visible and performing initial operationally-relevant testing for a broad COCOM audience. Specific event costs are contained in the JADC2 PE 3040115F (BPAC 673380), formerly known as MDC2, while development costs are contained in the ABMS PE.</p> <p>FY 2020 Plans: Develop airborne gateway technology for rapid connection and information sharing between existing platforms. The first successful demonstration of communications between F-22 and F-35 using gateways was in December 2019. Test new</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>sensor mesh networks including connection to proliferated low-earth orbit (LEO) commercial satellite communications. The first successful demonstration of this multi-domain mesh network was in December 2019. Additional hardware-related activities in FY 2020 include design of a radar testbed, continued capability improvements to gateways, test of a multi-level secure tablet, continued capability improvements to sensor mesh networks, and initial development of advanced radios and apertures.</p> <p>Develop cloud-based tools for processing of sensor data, fusion of data across platforms and domains, combining data into a multi-domain common operating pictures, and battle management, command, and control (BMC2). The first successful demonstration of this software suite was in December 2019. Additional software-related activities in FY 2020 include creation of a radar mode library, waveform upgrades to gateways, and initial tests of software tools and cloud access on a multi-level secure tablet.</p> <p>The first on ramp event was held in December 2019 at Eglin AFB and was led by NORAD and USNORTHCOM. This ABMS onramp included Air Force, Army, and Navy system with key first in the areas of connectivity between platforms, mesh networking, and cloud-based battle management. The next FY2020 events will be held in April 2020 and August 2020.</p> <p>Continue ABMS GMTI Radar Development to meet intent of FY19 Congressional add of \$30M.</p> <p>FY 2021 Plans: This effort will continue in PE 0604003F BA 04 BPAC 640141 beginning in FY21 as BA 04 is most appropriate for the type of work being conducted. Additionally, in FY21 PE 0604003F BA 04 (ABMS RDT&E) merges with PE 0304115F (JADC2 RDT&E), formerly MDC2, to consolidate development activities and provide greater alignment and transparency in execution.</p> <p>Complete ABMS GMTI Radar modes development to meet intent of FY19 Congressional add of \$30M (\$27.883M).</p> <p>Please see section D: Other Program Funding Summary to see comprehensive level of funding.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: See ABMS PE 0604003F BA 04 BPAC 640141 for FY21 details.</p>			
Accomplishments/Planned Programs Subtotals	27.883	35.611	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 0604003F: <i>Advanced Battle Management System (ABMS)</i>	0.000	8.000	302.323	0.000	302.323	449.290	590.878	1,087.601	832.229	Continuing	Continuing
• RDTE 07 0304115F: <i>Multi Domain Command and Control (MDC2)</i>	0.000	100.880	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	100.880

Remarks

E. Acquisition Strategy

ABMS will provide capability through existing program offices, program executive officers, service labs, services or agencies, programs of record, and their respective contracts and agreements. ABMS is not a single program of record. Many lines of effort will be horizontally integrated by the USAF Chief Architect and partner organizations. Program execution (cost, schedule, and performance) will be managed by the Chief Architect Integration Office and the appropriate program office.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	Project (Number/Name) 67411L / <i>Advanced Battle Management System</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ABMS HW, SW, and On Ramps	Various	Various : TBD	-	-		35.611		0.000		-		0.000	Continuing	Continuing	35.611
ABMS GMTI Radar Development (FY19 Congressional Add)	Various	Various : Hanscom AFB	-	27.883		-		-		-		-	Continuing	Continuing	27.883
Subtotal			-	27.883		35.611		0.000		-		0.000	Continuing	Continuing	N/A

Project Cost Totals	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	27.883	35.611	0.000	-	0.000	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	Project (Number/Name) 67411L / <i>Advanced Battle Management System</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Congressional Add Requirements																												
ABMS GMTI Radar Development																												
ABMS Execution and Milestones																												
Software Development and Integration																												
Hardware Maturation and Demonstration																												
Demonstration/On Ramp Events																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	Project (Number/Name) 67411L / <i>Advanced Battle Management System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Congressional Add Requirements				
ABMS GMTI Radar Development	3	2019	4	2021
ABMS Execution and Milestones				
Software Development and Integration	1	2020	4	2020
Hardware Maturation and Demonstration	1	2020	4	2020
Demonstration/On Ramp Events	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	10.974	2.584	8.777	0.000	8.777	5.592	1.243	1.204	4.053	Continuing	Continuing
674101: <i>Undergraduate Remotely Piloted Aircraft Training</i>	-	0.735	0.796	0.809	0.000	0.809	0.826	0.841	0.856	0.871	Continuing	Continuing
676035: <i>T-6 Operational System Development</i>	-	1.718	1.183	1.832	0.000	1.832	0.226	0.232	0.238	3.182	Continuing	Continuing
676037: <i>T-38 Operational System Development</i>	-	8.521	0.605	6.136	0.000	6.136	4.540	0.170	0.110	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Supports Air Education and Training Command's implementation of Specialized Undergraduate Pilot Training and the Department of Defense initiative for joint pilot training.

Undergraduate Remotely Piloted Aircraft Training supports Air Education and Training Command's implementation of Undergraduate Remotely Piloted Aircraft Training. This program provides and maintains the currency of Predator Reaper Integrated Mission Environment Desktop Training System.

T-6 Operational System Development continues follow on development activities to JPATS including but not limited to studies & development efforts, instructional courseware, and logistics support to include Diminishing Manufacturing Sources(DMS) and development activities related to DMS. Included is development for the Next Generation On-Board Oxygen Generation System, Automatic Dependent Surveillance Broadcast Out (ADS-B Out), Crash Survivable Recorder (CSR), Controlled Flight Into Terrain - Prevention (CFIT-Prevention), Pilot Training Next (PTN) and associated upgrades. There are currently 443 aircraft in the Air Force inventory. Remaining service life is up to 39 years from the final delivery in May 2010.

The T-38 program continues studies & development efforts supporting future ACAT III Engineering Change Proposals to address DMSMS issues for the T-38 Platform and regular block upgrades for the T-38C as required to keep the system current. Block upgrades incorporate software and/or hardware improvements for the aircraft and aircrew training devices to address flight safety issues and to comply with new capabilities mandated by Department of Defense, Federal Aviation Administration, or National Airspace System.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Specialized Undergraduate Flight Training capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	11.344	2.584	5.368	0.000	5.368
Current President's Budget	10.974	2.584	8.777	0.000	8.777
Total Adjustments	-0.370	0.000	3.409	0.000	3.409
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.370	0.000			
• Other Adjustments	0.000	0.000	3.409	0.000	3.409

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				Project (Number/Name) 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674101: <i>Undergraduate Remotely Piloted Aircraft Training</i>	-	0.735	0.796	0.809	0.000	0.809	0.826	0.841	0.856	0.871	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This effort supports Air Education and Training Command's (AETC) implementation of Undergraduate Remotely Piloted Aircraft (RPA) Training (URT). URT produces RPA pilots and Sensor Operators from accession sources to man RPA squadrons.

Success of the program is heavily dependent on Predator Reaper Integrated Mission Environment (PRIME) Desktop Training System to prepare undergraduate students for entry in RPA Formal Training Units (FTU). PRIME has completed seven Phases of development and is now at baseline functionality. PRIME is a desktop trainer similar to the Reaper training system now in use to train undergraduate RPA pilots and sensor operators. PRIME currently emulates the MQ-9 Reaper and needs to keep pace with that baseline system and expand to other RPAs in order to maintain concurrency and relevancy. Funds will also be used to develop enhancements that increase fidelity and functionality.

Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues. Diminishing Manufacturing Sources efforts include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient.

Implementation requirements and standards are defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver URT weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Predator Reaper Integrated Mission Environment (PRIME) support	0.735	0.796	0.809
Description: Add Phase 8 operational capabilities.			
FY 2020 Plans:			
-Continue development and implementation of Phase 8 enhancements.			
-Continue to extend and enhance interoperability between PRIME and Modern Air Combat Environment (MACE) software for instructor operations and entity generation.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>-Add metadata crosshair coordinates option in MGRS format (10 digit precision). -Add multisegment line drawing tool to tracker screen. -Add aircraft response to icing. -Add load/save capability. -Implement altimeter display, status messages, and engine feedback on HUD. -Increase functionality/variety/fidelity of MACE PRIME entities.</p> <p>FY 2021 Plans: Stand up a SIL: URT GBTS requires the development of an independent software / hardware testing capability on a stand-alone device. Effort includes researching, designing, developing, and building a SIL. Air Traffic Control Integration Study: Feasibility study of Live ATC integration into the URT GBTS. Flight Planning Software: Replace tactical situation display software with new software solutions that have to be developed and integrated with PRIME. Development of new training simulation software to replace the current software on URTIS and PRIME to train RPA pilots.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase due to inflation.</p>				
Accomplishments/Planned Programs Subtotals		0.735	0.796	0.809
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Contract via Training Systems Acquisition III (TSA III) Task Order to Cubic Corporation, parent company of PRIME software data rights owner (Intific).				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Undergraduate Remotely Piloted Aircraft Training Phased planning, design, and development of software updates	SS/FFP	Cubic Corporation : NV	-	0.707	Mar 2019	0.726	Mar 2020	0.733	Mar 2021	-		0.733	Continuing	Continuing	-
Subtotal			-	0.707		0.726		0.733		-		0.733	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Undergraduate Remotely Piloted Aircraft Training PMA Other Government Cost and Contract Services	SS/CPFF	Program Office : WPAFB, OH	-	0.028	Oct 2018	0.070	Oct 2019	0.076	Oct 2020	-		0.076	Continuing	Continuing	-
Subtotal			-	0.028		0.070		0.076		-		0.076	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	0.735	0.796	0.809	-	0.809	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020						
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				Project (Number/Name) 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>			

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Predator Reaper Integrated Mission Environment (PRIME) Support</i>																												
Phase 8 Planning																												
Phase 8 Design/Development																												
Phase 8 Design/Development continued																												
Phase 9 Planning																												
Phase 9 Design/Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Predator Reaper Integrated Mission Environment (PRIME) Support</i>				
Phase 8 Planning	1	2019	2	2019
Phase 8 Design/Development	2	2019	2	2021
Phase 8 Design/Development continued	2	2021	1	2023
Phase 9 Planning	1	2023	1	2024
Phase 9 Design/Development	1	2024	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676035: <i>T-6 Operational System Development</i>	-	1.718	1.183	1.832	0.000	1.832	0.226	0.232	0.238	3.182	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

T-6 Operational System Development continues follow on development activities to JPATS including but not limited to studies and development efforts, instructional courseware, and logistics support to include Diminishing Manufacturing Sources (DMS) and development activities related to DMS. Included is development for the Next Generation On-Board Oxygen Generation System, Automatic Dependent Surveillance Broadcast Out (ADS-B Out), Crash Survivable Recorder (CSR), Controlled Flight Into Terrain - Prevention (CFIT-Prevention), Pilot Training Next (PTN) and associated upgrades. There are currently 443 aircraft in the Air Force inventory. Remaining service life is up to 39 years from the final delivery in May 2010.

Funding contained in this platform's documentation directly aids Air Education Training Command flying training enterprise to continue its overall pilot production increase starting in FY2020 thus reducing the USAF Pilot Shortage.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver T-6 Operational System Development capabilities. The use of such program funds would be in addition to the civilian pay expense budgeted in program elements 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: T-6A (JPATS) Studies and Analysis	1.518	0.100	1.732
Description: T-6A (JPATS) studies and development activities including but not limited to: Engine Preservation/Upgrade Development, On-Board Oxygen Generation System (OBOGS) Characterization Study, Next Generation On-Board Oxygen Generation System Study, Supplemental Oxygen System Study, Cockpit Environmental Monitoring/Analysis, and Physiological Events (PE) Analysis. Includes engineering and contractor support/services and Program Management Administration (PMA) costs.			
FY 2020 Plans: T-6A Aircraft studies and development activities including but not limited to: Engine Preservation development, On-Board Oxygen Generation System Characterization Study, Next Generation On-Board Oxygen Generation System Study, and Cockpit Environmental Monitoring/Analysis.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
T-6A Aircraft studies and development activities including but not limited to: engine preservation development, cockpit environmental monitoring/analysis, diminishing manufacturing source issues, and upgrades to on-aircraft software packages. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to studying upgrades to the T-6A on-aircraft software.				
Title: Next Generation On-Board Oxygen Generation System Description: The Next Generation On-Board Oxygen Generation System will provide the aircraft with a system that will meet and/or exceed the Military Standard 3050 specifications. The development and fielding of this capability will directly improve the safety of pilot training. This acquisition is a direct response to Air Education and Training Command requirements and on-going Physiological Events (PE) in the T-6A aircraft. FY 2020 Plans: Begin RDT&E activities to include but not limited to: development, integration, test and certification of the Next Generation On-Board Oxygen Generation System that meets or exceeds Mil Standard 3050 specifications. FY 2021 Plans: Continue RDT&E activities to include but not limited to: development, integration, test and certification of the Next Generation On-Board Oxygen Generation System that meets or exceeds Mil Standard 3050 specifications. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to this effort transitioning to procurement.		-	0.703	0.100
Title: Crash Survivable Recorder (CSR) Description: Crash Survivable Recorder (CSR) will provide the aircraft with a system that will meet the minimum crash survivable data collection capability as outlined in Air Force Instruction 63-133 Aircraft Information Program (Change 1, 4 November 2010) and SECDEF Memo of 22 June 06, Reducing Preventable Accidents. Includes engineering and contractor support/services and PMA costs. FY 2020 Plans: Continue RDT&E activities to include but not limited to: development, integration, test and certification of the Crash Survivable Recorder (CSR) to comply with the minimum crash survivable data collection capability as outlined in AFI 63-133 Aircraft Information Program 6 February 2001 Incorporating Change 1, 4 November 2010, and the Secretary of Defense Memo of 22 June 06, Reducing Preventable Accidents. FY 2021 Plans:		0.200	0.380	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
N/A			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding decreased due to this effort transitioning to procurement.			
Accomplishments/Planned Programs Subtotals	1.718	1.183	1.832

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts</i>	0.590	-	0.001	-	0.001	-	1.485	-	-	Continuing	Continuing
• APAF 05 Line Item JPAT00: <i>T-6</i>	53.150	11.826	26.829	-	26.829	14.147	6.148	3.210	30.298	Continuing	Continuing

Remarks

D. Acquisition Strategy
 The Air Force is lead service for the T-6 Operational Systems Development program and currently manages upgrades to the entire family of systems for both the Air Force and Navy. T-6 Operational Systems Development acquisition strategy for satisfying emerging software and hardware requirements is designed to enable competition and control cost. Development resulting from Diminishing Manufacturing Sources and Material Shortages requirement will be evaluated and implemented incrementally to efficiently deliver required capabilities to AETC.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020				
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>					Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>				

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
T-6 Operational System Development Crash Survivable Recorder	C/FFP	TBD : TBD	-	0.200	Mar 2020	0.380	Mar 2020	1.616	Dec 2020	-		1.616	Continuing	Continuing	-
T-6 Operational System Development Alternative On-Board Oxygen Generation System	C/CPAF	TBD : TBD	-	-		0.703	Feb 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	0.200		1.083		1.616		-		1.616	Continuing	Continuing	N/A

Remarks
 The first piece of the Crash Survivable Recorder RDT&E effort is planned to 2Q FY20.
 The first piece of the Controlled Flight Into Terrain - Prevention RDT&E effort will be awarded in 4Q FY20.
 The first piece of the Next Generation On-Board Oxygen System RDT&E effort is planned to begin in 2Q FY20.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		0.216	May 2021	-		0.216	Continuing	Continuing	-
Physiological Event's: Edwards Test Center	PO	Edwards Test Center : Edwards, CA	-	1.458	Oct 2018	0.100	Oct 2019	-		-		-	Continuing	Continuing	-
Subtotal			-	1.458		0.100		0.216		-		0.216	Continuing	Continuing	N/A

Remarks
 Continue Unknown Physiological Event's studies at Edwards AFB. Phase II of this effort began 1Q in FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PMA Contract Services	C/FFP	Not specified. : TBD	-	0.010	Sep 2019	-		-		-		-	Continuing	Continuing	-
PMA Other Government Costs	Various	Not specified. : TBD	-	0.050	Sep 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	0.060		-		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY 2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals			-	1.718	1.183	1.832	-	1.832	-	1.832	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Joint Primary Aircraft Training System	
T-6 (JPATS) Studies	
Avionics Systems Development	
T-6 Crash Survivable Recorder	
Crew Systems Development	
T-6 Alternative On-Board Oxygen Generation System	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676035 / <i>T-6 Operational System Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Joint Primary Aircraft Training System</i>				
T-6 (JPATS) Studies	1	2019	4	2025
<i>Avionics Systems Development</i>				
T-6 Crash Survivable Recorder	2	2020	2	2022
<i>Crew Systems Development</i>				
T-6 Alternative On-Board Oxygen Generation System	2	2020	2	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				Project (Number/Name) 676037 / <i>T-38 Operational System Development</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676037: <i>T-38 Operational System Development</i>	-	8.521	0.605	6.136	0.000	6.136	4.540	0.170	0.110	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The T-38 is a twin engine, two seat (tandem), supersonic jet trainer used by Air Education and Training Command (AETC) as an advanced trainer in Specialized Undergraduate Pilot Training. Modifications are budgeted to enhance operational capability while improving flight safety, reliability and maintainability. There are currently 503 T-38's in the Air Force inventory (53 T-38A, six AT-38B and 444 T-38C) with five T-38Cs pending removal. T-38s first entered service in 1960 and average over 51 years old.

Studies & development efforts supporting future ACAT III Engineering Change Proposals to address obsolescence issues for the T-38 platform and accomplish the regular block upgrades on the T-38C as required to keep the system current. Block upgrades will be accomplished with Operations & Maintenance funding unless the block upgrade provides additional capabilities. Block upgrades incorporate software and/or hardware improvements to comply with new capabilities mandated by Department of Defense, Federal Aviation Administration, or National Airspace System, and to address flight safety issues. The block upgrades support the T-38C aircraft and Aircrew Training Devices.

L3 Display Systems is unable to continue support of the T-38C Multi-Functional Display (MFD) and the Electronic Engine Display (EED) beyond March 2026. Development of replacement displays must begin in FY20 to ensure continued AETC pilot production. There are 2 MFDs and 2 EEDs per aircraft (1,768 displays).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver T-38 Operational systems Development weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: T-38 Avionics Component Integration (AvCI)	8.464	0.605	3.780
Description: T-38C Avionics System obsolescence remediation effort is developing and qualifying replacement components/Line Replaceable Units (LRU) that are becoming non-supportable. Systems include the Mission Display Processor (MDP), Heads-Up Display (HUD) and Very High Frequency (VHF) Communication and Navigation radios. Furthermore, L3 Display Systems is unable to continue support of the T-38C Multi-Functional Display (MFD) and the Electronic Engine Display (EED) beyond March 2026. Development of replacement displays must begin in FY20 to ensure continued AETC pilot production beyond March of 2026.			
FY 2020 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676037 / <i>T-38 Operational System Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
EED and MFD development will start in the 2nd quarter of FY20.				
<p>FY 2021 Plans: Begin T-38C Operational Flight Plan and Aircrew Training Device software efforts for planned Block Upgrade to include requirements development, integration, and fielding. Begin implementation of Product Improvement Change Requests which fix software bugs, provide security enhancements, and new capabilities. Begin development and sustainment requirements development for the Joint Mission Planning framework, Unique Product Component, and Ground Station Software.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase due to T-38C Block 11 software/hardware upgrade development. The primary issue to resolve is meeting mandated cybersecurity requirements in order to maintain the T-38C Authority to Operate.</p>				
<p>Title: T-38 Studies and Development Efforts</p> <p>Description: Studies and efforts to support future ACAT III Engineering Change Proposals to address obsolescence issues and the regular block upgrades that are required to keep the system current.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: Cybersecurity software requirements that impact the T-38C Operational Flight Program will be resolved as part Block 11 development, which will begin in FY21.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase due to development of T-38C Operational Flight Program updates to meet cybersecurity requirements.</p>		0.042	0.000	2.356
<p>Title: T-38A/B ADS-B</p> <p>Description: Develop and integrate an Automatic Dependent Surveillance Broadcast (Out) solution the T-38A/B model fleet. The solution must maintain the military transponder modes.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		0.015	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676037 / <i>T-38 Operational System Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
N/A			
Accomplishments/Planned Programs Subtotals	8.521	0.605	6.136

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

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Line Item T03800: T-38	70.623	37.341	36.806	-	36.806	52.146	65.334	73.261	59.608	Continuing	Continuing

Remarks

D. Acquisition Strategy

The T-38 Platform Operations System Development acquisition strategy for satisfying emerging software and hardware requirements is designed to enable competition and cost control. Developmental requirements resulting from Diminishing Manufacturing Sources and Material Shortages research and reporting will be evaluated and implemented incrementally to efficiently deliver required capabilities to Air Education & Training Command in support of the pilot training program. System block upgrades will be required to maintain aircraft airworthiness and will be implemented based on Air Education & Training Command requirements. An appropriate level of technical data rights is required by all current support contracts.

Contract FA8211-16-D-0001 is a Type D Indefinite Delivery, Indefinite Quantity contract competitively awarded to address T-38C avionics system obsolescence issues and provide Contractor Logistics Support follow-on support. The Avionics Component Integration contract was awarded 8 January 2016. Obsolescence remediation efforts began immediately and the follow-on Contractor Logistics Support effort began 1 April 2017. The period of performance ends 31 March 2026.

The T-38C display obsolescence issues are within scope on the current contract with Boeing. The contract FA8211-16-D-0001 will be utilized for development and procurement.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676037 / <i>T-38 Operational System Development</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
T-38 Avionics System DMSMS mitigation efforts	C/FFP	The Boeing Company : St. Louis, MO	-	8.372	Oct 2018	0.605	Feb 2020	3.683		-		3.683	Continuing	Continuing	-
T-38 A/B Automatic Dependent Surveillance-Broadcast	SS/FFP	The Raytheon Company : Aberdeen, MD	-	0.015	Oct 2018	-		-		-		-	0.000	0.015	-
T-38 Studies and Development Efforts	Various	TBD : NV	-	0.042	Oct 2018	-		-		-		-	Continuing	Continuing	-
T-38C Block 11 Hardware and Software Upgrade Development	C/FFP	The Boeing Company : TBD	-	-		-		2.356	Dec 2020	-		2.356	Continuing	Continuing	-
Subtotal			-	8.429		0.605		6.039		-		6.039	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA Contract Services	C/FFP	Not specified. : NV	-	0.033	Dec 2018	-		0.038	Dec 2020	-		0.038	Continuing	Continuing	-
PMA Other Government Costs	Various	Not specified. : NV	-	0.059	Oct 2017	0.000	Dec 2019	0.059	Dec 2020	-		0.059	Continuing	Continuing	-
Subtotal			-	0.092		0.000		0.097		-		0.097	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	8.521	0.605	6.136	-	6.136	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676037 / <i>T-38 Operational System Development</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>T-38C EED/MFD Development</i>																												
Development																												
Flight test																												
<i>T-38C Block 11 Upgrade</i>																												
Development																												
Flight Test																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	Project (Number/Name) 676037 / <i>T-38 Operational System Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>T-38C EED/MFD Development</i>				
Development	2	2020	2	2023
Flight test	3	2023	1	2024
<i>T-38C Block 11 Upgrade</i>				
Development	1	2021	4	2022
Flight Test	1	2023	3	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.257	0.903	0.499	0.000	0.499	0.000	0.000	0.000	0.000	Continuing	Continuing
674211: <i>GLOBAL ACCESS</i>	-	0.257	0.903	0.499	0.000	0.499	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Agile Transportation for 21st Century (AT21) supports Theater Capability through development of additional deployment and distribution supporting technology.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.903	0.500	0.000	0.500
Current President's Budget	0.257	0.903	0.499	0.000	0.499
Total Adjustments	0.257	0.000	-0.001	0.000	-0.001
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.257	0.000	-0.001	0.000	-0.001

Change Summary Explanation

FY2020 funding added for development of additional deployment and distribution supporting technology.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Deployment & Distribution Enterprise	0.257	0.903	0.499
Description: Develop deployment and distribution technology			
FY 2020 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Develop deployment and distribution technology			
<i>FY 2021 Plans:</i> Continue to develop deployment and distribution technology			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Decrease in requirements			
Accomplishments/Planned Programs Subtotals	0.257	0.903	0.499

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks
FY19 internal reprogramming for \$257K processed moving funds into BA 7 so this is not a new start in FY20.

E. Acquisition Strategy
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604776F / Deployment & Distribution Enterprise R&D	Project (Number/Name) 674211 / GLOBAL ACCESS
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Develop deployment and distribution technology	Various	Not specified. : TBD	-	0.257		0.903	Feb 2020	0.499		-		0.499	Continuing	Continuing	-
Subtotal			-	0.257		0.903		0.499		-		0.499	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	0.257	0.903	0.499	-	0.499	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 674211 / <i>GLOBAL ACCESS</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

No project title.	
Develop deployment and distribution technology	██

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 674211 / <i>GLOBAL ACCESS</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>No project title.</i>				
Develop deployment and distribution technology	2	2020	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	642.371	785.336	0.000	785.336	549.279	450.915	521.012	586.709	Continuing	Continuing
675346: F-35	-	0.000	642.371	785.336	0.000	785.336	549.279	450.915	521.012	586.709	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Total cost, including International partner contributions, USN, USMC, and USAF funding: FY2021: \$1,940.248M.

R-2A table shown above reflects service funding only.

R-2A (section B)/R-3 displays combined program for JSF Continuous Capability Development and Delivery (C2D2).

F-35 C2D2 Includes:

PE 0207142F BPAC 675346

PE 0604840F BPAC 675346

FY13: USN PE 0604800N Project Unit 2261

FY14: USN PE 0604800N Project Unit 9999

FY15-18: USN PE 0604810N Project Unit 2936

FY19: USN PE 0604840N Project Unit 2936

FY13: USMC PE 0604800M Project Unit 2262

FY14: USMC PE 0604800M Project Unit 9999

FY15-18: USMC PE 0604810M Project Unit 2935

FY19: USMC PE 0604840M Project Unit 3410

International Partner Contributions

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the United States Navy, United States Air Force, United States Marine Corps and International Partners countries. There are three variants the F-35A Conventional Takeoff and Landing variant; F-35B Short Take Off and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. Maximum commonality among the variants, consistent with National Disclosure Policy, will minimize total air system life cycle costs. Planning and pre-development systems engineering for Block 4 continues as Initial Operational Capability (IOC) is met for each variant during System Development and Demonstration (SDD).

The JSF Continuous Capability Development & Delivery (C2D2) efforts provide incremental warfighting capability improvements to maintain joint air dominance against evolving threats. Block 4 capability requirements were initiated through ongoing Service-led operational analysis of warfighting gaps identified in the Fifth Generation

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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Fighter Modernization Initial Capabilities Document (ICD), and through F-35 JSF Block 4 Mission Decomposition analysis completed in FY 2014. These analyses serve as the basis for the Block 4 (CDD), staffed through the Air Force Requirements Oversight Council (AFROC) and signed by the USAF Chief of Staff in January 2015. Joint Requirements Oversight Council (JROC) approved the CDD 21 March 2017. Modernization activities in FY 2017 and FY 2018 include systems engineering, risk reduction, and infrastructure required to deliver full air system Block 4 capabilities to support initial fleet availability of Block 4 upgrades in FY 2020 with the fielding of Auto Ground Collision Avoidance System (AGCAS).

Block 4 efforts include a robust weapons integration portfolio and provide new opportunities for International Partners to assess, integrate, and field unique capabilities based on global sovereign requirements.

F-35 C2D2 provides continuing incremental upgrades of the three F-35 variants and associated ground equipment. Upgrades are essential capabilities for Air Interdiction and Strategic Attack, Close Air Support, Suppression and Destruction of Enemy Air Defenses, Offensive and Defensive Counter Air and expanded Surface Warfare. The C2D2 acquisition strategy is based upon incremental deliveries of capabilities. The strategy includes periodic deliveries with a focus on hardware, tech refresh and software. C2D2 capability planning includes an efficient transition from F-35 SDD to C2D2. As SDD development activities ramp down C2D2 will assume responsibility for improvements and modernization efforts.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark and Norway are participants in F-35 modernization. The program shown here reflects United States Air Force funding. Total funding for all Service and International Partners is reported at the accomplishment/planned program level since activities support all aircraft variants. Foreign Military Sales are ongoing separately.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-35 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

PE 0604840F continues funding common requirements for the joint program (US Services and International Partners) previously programmed for in PE 0207142F for common Block 4 requirements beginning in FY 2020. This is not a new start.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	694.455	786.513	0.000	786.513
Current President's Budget	0.000	642.371	785.336	0.000	785.336
Total Adjustments	0.000	-52.084	-1.177	0.000	-1.177
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-52.084			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-1.177	0.000	-1.177

Change Summary Explanation

The FY2020 USAF funding request received Congressional mark of \$52.084M due to prior year execution delays.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development - Block 4 Planning and Systems Engineering	0.000	429.358	583.724	0.000	583.724
<p>Description: Block 4 Planning and Systems Engineering from preliminarily design and requirements decomposition through completion of Developmental Flight Test for all variants of the F-35 aircraft. Modernization efforts include Requirements Decomposition and continuous development and release of capabilities identified as Block 4 upgrades. This is a continuation of the previous Block 4 developmental contracts, which will include activities leading to successful completion of Developmental Flight Test, to include select facility upgrades required for Block 4 research, development, test and evaluation. Included in Block 4 are upgraded capabilities and continuous improvements to maintain Air System viability against evolving threats indicated in the Electronic Warfare Initial Capabilities Document (ICD), the Fifth Generation Fighter Modernization ICD, and the Block 4 Capability Development Document (CDD), reduce life cycle cost, and improve operational suitability. Continuous risk reduction activities to include Air System Integration, preplanning for subsequent Block 4 Modernization events, and investments to deliver the full Block 4 Air System capabilities as needed. C2D2 capability planning includes an efficient transition from F-35 SDD to C2D2. As SDD development activities ramp down C2D2 will assume responsibility for improvements and modernization efforts.</p>					
FY 2020 Plans:					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continued from PE 0207142F Continue Post-PDR risk reduction activities to include Air System Integration and planning. Continue with Agile development of capabilities through Flight Test. Continue development and maturity of key long lead capabilities and service unique weapons. Complete development of software to be available for fielding to meet warfighter need. FY 2021 Base Plans: Continue Post-PDR risk reduction activities to include Air System integration and planning. Continue with Agile development of capabilities through Flight Test. Continue development and maturity of key long lead capabilities and service unique weapons. Complete development of software drops 30P6 (Q1 2021) 30P7 (Q3 2021) to be available for fielding to meet warfighter need. C2D2 capability planning which includes an efficient transition from F-35 SDD to C2D2. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to planned program ramp up of Block 4 capabilities and development efforts.					
Title: Technology Refresh 3 (TR-3) Description: Technology Refresh 3 (TR3) conducts post Critical Design Review (CDR) design activities. This effort will develop and deliver a TR3 system through full flight-worthy certification and production readiness review for Lot 15. The design of TR3 subsystems Integrated Core Processor (ICP), Aircraft Memory System (AMS), and Panoramic Cockpit Display Electronics Unit and Display Unit (PCD-EU, PCD-DU) configurations will contain new backplane technology, commercial operating systems, and modified middleware necessary to support Block 3F functionality and incorporation of all Block 4 capabilities. This work includes nonrecurring engineering for the developing, test, and certification of the ICP, AMS, PCD-EU, and PCD-DU, and is required to support 4x processing growth factor based on the current processing estimated for all 3F capabilities. FY 2020 Plans: Continued from PE 0207142F.	0.000	199.000	241.000	0.000	241.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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The TR-3 program will continue middleware software development to ensure and validate compatibility with current F-35 sensors and weapon loads. Continued lab test and verification will ensure timely first article delivery to the production line by FY 2023.

FY 2021 Base Plans:
The TR-3 program will continue with middleware software development to ensure and validate compatibility with current F-35 sensors and weapon loads. Continued lab test and verification, along with a review and approval of TR-3 hardware for release to flight test will ensure timely first article delivery to the production line by FY23. Key milestone events are Test Readiness Review (TRR) and Flight Readiness Review (FRR) to support Integrated Test.

FY 2021 OCO Plans:
N/A

FY 2020 to FY 2021 Increase/Decrease Statement:
Technical complexity of TR3 system is driving increased cost. Suppliers are challenged to meet demanding schedule with one holistic hardware/software system; therefore, interim releases of hardware reduce risk and enable parallel software development. Schedule pressure in meeting Lot 15 production timeline demands a labor increase to mitigate risk to Lot 15 production.

Title: Infrastructure and Support Costs	0.000	324.263	333.462	0.000	333.462
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Description: Funding will support infrastructure investment planning and other test planning activities required for Block 4 development, integration, test and evaluation. Funding related to the Integrated Test Force, government, and contractor labor. Support efforts for airframe, air vehicle systems, air system integration, mission systems, weapons integration, offboard mission support, autonomic logistics development, joint reprogramming enterprise and modeling and joint simulation environment activities, including Nimble Lightning efforts. Funding related to the Integrated Test Force, government, and contractor labor. Other costs in support of ranges, chase planes and DT site operations. USAF only will fund additional PMA to transition to a final hybrid product support integrator (HPSI) which will support sustainment analysis with product support managers, focused on long term strategic planning and transition to a final integrated support plan.

FY 2020 Plans:
Continued from PE 0207142F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Support efforts for airframe, air vehicle systems, air systems integration, mission systems, weapons integration, offboard mission support, autonomous logistics development, joint reprogramming enterprise and modeling and simulation environment activities. Transfer of integrated test force requirement to Block 4 as F-35 SDD draws to closure. USAF only will fund additional PMA to transition to a final hybrid product support integrator (HPSI) which will support sustainment analysis with product support managers, focused on long term strategic planning and transition to a final integrated support plan. FY 2021 Base Plans: Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Support efforts for airframe, air vehicle systems, air system integration, mission systems, weapons integration, offboard mission support, autonomous logistics development, modeling and simulation, training investments, and joint simulation environment activities to include Nimble Lightning. Continue integrated test focus on Block 4 as F-35. Upgraded capabilities and improvements to include continuous upgrade of joint reprogramming enterprise labs, lab tooling, Mission Data File (MDF) development, and replacement of Ground Data Receptacle and Mission Planning system. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to planned program ramp up of Block 4 capabilities and development efforts.					
Title: Test and Evaluation Description: Integrated Test activities in support of Block 4, to include Lockheed Martin and Pratt & Whitney support at all test sites. Non-recurring engineering required to plan for the service life extension of existing DT aircraft and modification necessary to bring DT aircraft fleet to a more production representative and sustainable configuration, and to develop flight test instrumentation and release test software to meet Block 4 requirements. Additional upgrades required to support development and evaluation of improvements driven by changes in the threat environment and as identified in the Electronic Warfare ICD, the Fifth Generation Fighter Modernization ICS, and the Block 4 Capability Development Document (CDD). FY 2020 Plans: Continued from PE 0207142F.	0.000	531.879	636.200	0.000	636.200

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Funding will support a flight test execution capacity to develop and verify Block 4 and other capabilities. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes continuing work on instrumenting new DT aircraft, and delivery and install of upgraded hardware as part of the DT aircraft viability effort, as well as test engine support. Funding will support Block 4 Integrated Test activities. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment.</p> <p>FY 2021 Base Plans: Funding will support Block 4 Integrated Test activities and flight test execution capacity to develop and verify Block 4 and other capabilities. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes continuing work on instrumenting new test aircraft, delivery and install of upgraded hardware as part of the DT aircraft viability effort, and test engine support. Additionally, this funding supports laboratory upgrades required to support development, verification of capabilities in a relevant environment, as well as any cyber security requirements of Block 4 capabilities.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to planned program ramp up as Block 4 capabilities and development efforts mature. Additional test sites, personnel, and new aircraft are needed to support the additional workload.</p>					
<p>Title: Autonomic Logistics Information System (ALIS) / Operational Data Integrated Network (ODIN) Development</p> <p>Description: Autonomic Logistics Information System (ALIS) continues to deliver the core logistics and maintenance infrastructure requirements for the F-35 enterprise. ALIS includes features such as aircraft scheduling, training delivery, record keeping, technical data delivery, supply chain management, maintenance management, pilot and maintenance debriefing, and mission planning. The ALIS development program is focused on two primary lines of effort: supporting the F-35 enterprise Data Transformation effort and continuously integrating and delivering new capability.</p> <p>Current ALIS will be replaced with a new system called the F-35 Operational Data Integrated Network (ODIN). Led by the F-35 Joint Program Office, ODIN will be developed in a collaborative partnership with government organizations and industry partners. ODIN will be designed from the start with significant warfighter engagement, ensuring that the system fully supports F-35 worldwide operations. Leveraging modern software, data</p>	0.000	162.000	144.000	0.000	144.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
management tools, and processes, ODIN will be a cloud-native system incorporating a government-managed integrated data environment and user-centered applications. The ALIS re-architecture effort that began in FY 2019 will continue under ODIN and complete fielding in FY 2023. ODIN will redesign its software, data, and hardware architecture with a focus on cybersecurity, affordability, resiliency, and supportability.					
Under the umbrella of current ALIS, an Agile DevOps pilot was established to rapidly deliver capability updates to the fleet and change the way that current ALIS delivers software.					
<i>FY 2020 Plans:</i> Continued from PE 0207142F.					
Continue Current ALIS software development efforts as well as begin transition to new Operational Data Integrated Network (ODIN) configuration. Increase the number of DevOps product teams and begin to merge with ODIN effort efforts. Refactor ALIS software in accordance with the ODIN architecture that began in FY19. Demonstrate new software and hardware architecture.					
<i>FY 2021 Base Plans:</i> Continue to support Current ALIS software development efforts, including addressing hardware and software obsolescence. The Agile DevOps pilot program established under ALIS will transition from a pilot program by integrating all practices and processes to develop the Operational Data Integrated Network (ODIN) configuration. This configuration will transition to operational units, and software updates will be continuously integrated and delivered using the new architecture and new development practices.					
<i>FY 2021 OCO Plans:</i> N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Decrease due to the concurrent development of Current ALIS and Operational Data Integrated Network (ODIN) in FY 2020.					
Accomplishments/Planned Programs Subtotals	0.000	1,646.500	1,938.386	0.000	1,938.386
Other Service Funding Adjustment	-	1,004.129	1,153.050	0.000	1,153.050
Air Force Subtotals	0.000	642.371	785.336	0.000	785.336

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0207142F: <i>BPAC 675346: F-35 Squadrons</i>	414.998	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	414.998
• RDTE 07 0207142F (1)...: <i>BPAC 676011: Dual Capable Aircraft</i>	75.321	71.339	106.136	-	106.136	45.260	11.622	11.830	11.830	Continuing	Continuing
• RDTE 07 0604840N: <i>BLI 2936: F-35C C2D2</i>	215.366	354.960	413.875	-	413.875	284.709	198.878	214.861	199.694	Continuing	Continuing
• RDTE 07 0604840M: <i>BLI 3410: F-35B C2D2</i>	222.644	391.165	379.549	-	379.549	323.597	294.404	283.981	244.932	Continuing	Continuing
• RDTE 07 International: <i>International Continuous Capability Development and Delivery</i>	209.763	258.004	359.626	-	359.626	285.969	211.292	208.053	177.542	Continuing	Continuing

Remarks

This is a joint program with no executive service. Service Acquisition Executive (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Navy.

Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to FY2002. The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, and Norway are participants in the SDD phase of JSF.

PE 0604840F replaces PE 0207142F for common Block 4 requirements beginning in FY20.

E. Acquisition Strategy

The C2D2 acquisition strategy is to employ both Cost and Fixed Price Incentive contracts for the Block 4 engineering and development efforts. A new modernization contract structure will be established for all post SDD Block 4 efforts. In addition, a separate Basic Ordering Agreement or Indefinite Delivery/Indefinite Quantity contract is planned to provide a long term approach to upgrading and maintaining laboratories and test aircraft and supporting technology maturation for future C2D2 capabilities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Prime LM 18-C-1004 Phase II Development	C/Various	Lockheed Martin : Ft Worth, TX	-	-	467.078	Nov 2019	563.504	Nov 2020		-		563.504	Continuing	Continuing	-
Prime LM 14-G-0020 (TR3)	C/CPAF	Lockheed Martin : Ft Worth, TX	-	-	199.000	Nov 2019	241.000	Nov 2020		-		241.000	Continuing	Continuing	-
Prime LM BOA 0020 (Nimble Lightning + Pilot Training)	C/CPAF	Various : Various	-	-	4.650	Dec 2019	4.650	Dec 2020		-		4.650	Continuing	Continuing	-
Flight Test Asset	Various	Lockheed Martin : Ft Worth, TX	-	-	69.317	Dec 2019	55.400	Dec 2020		-		55.400	Continuing	Continuing	-
Prime LM DT AC Viability	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-	51.700	Dec 2019	83.100	Dec 2020		-		83.100	Continuing	Continuing	-
Prime PW Propulsion	SS/CPAF	Pratt Whitney : East Hartford, CT	-	-	49.262	Nov 2019	54.400	Nov 2020		-		54.400	Continuing	Continuing	-
Prime LM Developmental Foundation Contract	C/CPIF	Lockheed Martin : Ft Worth, TX	-	-	191.400	Nov 2019	193.400	Nov 2020		-		193.400	Continuing	Continuing	-
Prime TBD JRE Dev.	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-	24.000	Dec 2019	60.900	Dec 2020		-		60.900	Continuing	Continuing	-
Prime LM ALIS / ODIN	C/Various	Lockheed Martin : Ft Worth, TX	-	-	51.000	Dec 2019	69.000	Dec 2020		-		69.000	Continuing	Continuing	-
Prime LM ALIS Dev	C/CPIF	Lockheed Martin : Ft Worth, TX	-	-	40.000	Dec 2019	5.000	Nov 2020		-		5.000	0.000	45.000	-
Prime LM Air Vehicle Integration	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-	20.000	Nov 2019	10.000	Nov 2020		-		10.000	Continuing	Continuing	-
Prime LM F-35B Fatigue Test Article	C/Various	Lockheed Martin : Ft Worth, TX	-	-	8.000	Jan 2020	14.000	Dec 2020		-		14.000	0.000	22.000	-
Training Investments	C/CPIF	Lockheed Martin : Ft Worth, TX	-	-	28.000	Dec 2019	65.000	Dec 2020		-		65.000	0.000	93.000	-
Systems Engineering	Various	Various : Various	-	-	35.480	Jan 2020	37.220	Jan 2021		-		37.220	Continuing	Continuing	-
Subtotal			-	-	1,238.887		1,456.574			-		1,456.574	Continuing	Continuing	N/A

Remarks
FY2020 Support continued from PE 0207142F.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Added Prime LM Air Vehicle Integration line to separate Air System risk reduction activities. Block 4 Modernization on R-2A includes Phase II Development, Air Vehicle Integration and Systems Engineering. Infrastructure and Support on R-2A includes Nimble Lightning, LM JRE Development & Training Investments. Prime LM Phase II Development Contract is a hybrid CPIF/CPAF contract. Prime LM F-35B Fatigue Test Article is a hybrid CPIF/CPFF contract. Per USD(A&S) announcement, changing ALIS Next to ALIS / ODIN. Prime LM ALIS / ODIN Contract is a hybrid CPFF/CPIF contract. Flight Test assets include weapons to support Test and assets needed for flight test instrumentation.															

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
JSE/IPT Development Support	WR	NAWCAD : Paxtuxent River, MD	-	-	50.740	Dec 2019		49.500	Dec 2020	-		49.500	Continuing	Continuing	-
China Lake Development Support	WR	NAWCAD : China Lake, CA	-	-	11.250	Dec 2019		12.755	Dec 2020	-		12.755	Continuing	Continuing	-
Eglin Development Support	Various	Eglin AFB : Eglin AFB, FL	-	-	4.500	Dec 2019		4.755	Dec 2020	-		4.755	Continuing	Continuing	-
Various Development Support	Various	Various : Various	-	-	23.940	Dec 2019		25.400	Dec 2020	-		25.400	Continuing	Continuing	-
Tech Planning Development Support	MIPR	Various : Various	-	-	9.000	Dec 2019		10.000	Dec 2020	-		10.000	Continuing	Continuing	-
JRE Development Support	Various	Various : Various	-	-	21.000	Dec 2019		29.475	Dec 2020	-		29.475	Continuing	Continuing	-
ALIS DevOps Development Support	Various	Various : Various	-	-	55.000	Dec 2019		53.000	Dec 2020	-		53.000	Continuing	Continuing	-
ALIS / ODIN Development Support	MIPR	Various : Various	-	-	16.000	Dec 2019		17.000	Dec 2020	-		17.000	Continuing	Continuing	-
Subtotal			-	-	191.430			201.885		-		201.885	Continuing	Continuing	N/A

Remarks
 FY2020 Support continued from PE 0207142F.
 Changed ALIS Development Support to ALIS DevOps Development Support to capture DevOps effort.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Per USD(A&S) announcement, changing ALIS Next to ALIS / ODIN.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
PAX Developmental Test & Evaluation	WR	NAWCAD : Patuxent River, MD	-	-	57.500	Dec 2019		74.500	Dec 2020	-		74.500	Continuing	Continuing	-
China Lake Developmental Test & Evaluation	WR	NAWCWD : China Lake, CA	-	-	7.200	Dec 2019		7.650	Dec 2020	-		7.650	Continuing	Continuing	-
Edwards AFB Developmental Test & Evaluation	Various	Edwards AFB : Edwards AFB, CA	-	-	40.300	Dec 2019		67.000	Dec 2020	-		67.000	Continuing	Continuing	-
Developmental Test & Evaluation	Various	Various : Various	-	-	3.700	Dec 2019		3.750	Dec 2020	-		3.750	Continuing	Continuing	-
Operational Test & Evaluation	WR	Nellis AFB : Nellis AFB, NV	-	-	38.500	Dec 2019		32.800	Dec 2020	-		32.800	Continuing	Continuing	-
USMC Operational Test & Evaluation	WR	Yuma Air Station : Yuma Air Station, AR	-	-	0.000			7.000	Nov 2020	-		7.000	Continuing	Continuing	-
USN Operational Test & Evaluation	WR	Various : Various	-	-	0.000			16.200	Nov 2020	-		16.200	Continuing	Continuing	-
Subtotal			-	-	147.200			208.900		-		208.900	Continuing	Continuing	N/A

Remarks
 FY2020 Test and Evaluation continued from PE 0207142F.
 Added USMC Operational Test & Evaluation line, USMC added funding for service unique Operational Test support, broken out from Operational Test & Evaluation line.
 Added USN Operational Test & Evaluation line, USN added funding for service unique Operational Test support, broken out from Operational Test & Evaluation line.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
AFLCMC Civilian Pay	Allot	AFLCMC Civ Pay : Wright Patterson AFB, OH	-	-		44.172	Oct 2019	45.497	Oct 2020	-		45.497	Continuing	Continuing	-
Financial Mgmt Database Support IDS	C/CPFF	Various : Various	-	-		1.565	Dec 2019	1.612	Dec 2020	-		1.612	Continuing	Continuing	-
Earned Value/Finance/ Cost ACT-I	C/CPFF	Various : Various	-	-		4.201	Dec 2019	4.327	Dec 2020	-		4.327	Continuing	Continuing	-
Operating Core Support	C/FP	Various : Various	-	-		10.233	Dec 2019	10.540	Dec 2020	-		10.540	Continuing	Continuing	-
Other Core Contractor Sppt.	Various	Various : Various	-	-		5.062	Dec 2019	5.163	Dec 2020	-		5.163	0.000	10.225	-
Travel	Various	Various : Various	-	-		3.750	Oct 2019	3.888	Oct 2020	-		3.888	Continuing	Continuing	-
Subtotal			-	-		68.983		71.027		-		71.027	Continuing	Continuing	N/A

Remarks
FY2020 Management Services continued from PE 0207142F.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Subtotals	-	-	1,646.500	1,938.386	-	1,938.386	Continuing	Continuing	N/A
Other Service Funding Adjustment	-	-	1,004.129	1,153.050	0.000	1,153.050			-
Project Cost Totals	-	-	642.371	785.336	-	785.336	0.000	0.000	-

Remarks
Subtotals and totals may not add due to rounding.

Prior Year reflects \$0M due to PE 0207142F ending in FY19 and being replaced by PE 0604840F in FY20.
 FY 2020 reflects \$642.371USAF/\$354.960M USN/\$391.165M USMC/\$258.004M International/Total \$1,646.500M
 FY 2021 reflects \$785.336M USAF/\$413.875M USN/\$379.549M USMC/\$359.626M International/Total \$1,938.386M

R-2A (section B)/R-3 displays total combined program (i.e. not Service-specific), including International partners.

JSF Continuous Capability Development and Delivery (C2D2) Includes:
 USAF PE 0207142F BPAC 675346

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
USAF PE 0604840F BPAC 675346 USN PE 0604810N Project Unit 2936 - ends FY18 USMC PE 0604810M Project Unit 2935 - ends FY18 USN PE 0604840N Project Unit 2936 - begins FY19 USMC PE 0604840M Project Unit 2935 - begins FY19 USN PE 0604800N Project Unit 9999 (FY14) USMC PE 0604800M Project Unit 999 (FY14) International Partner Contributions									

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

675346 / F-35	
Systems Engineering & Development: Phase II Development	
Systems Engineering & Development: Modernization Contract	
Systems Engineering & Development: Development Foundation	
Systems Engineering & Development: Development & Maturation IDIQ Contract	
Agile Process & Capability Development: Agile Process & Capability Development	
Verification & Validation: DT Aircraft Upgrades	
Verification and Validation: Integrated Test	
Verification and Validation: TR-3 Operational Test	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Delivery	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Delivery	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Delivery	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Delivery	

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 17 Full Funding / Delivery																																
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 18 Full Funding / Delivery																																
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 19 Full Funding / Delivery																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0604840F / F-35 C2D2	Project (Number/Name) 675346 / F-35

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
675346 / F-35				
Systems Engineering & Development: Phase II Development	1	2019	4	2024
Systems Engineering & Development: Modernization Contract	4	2021	4	2024
Systems Engineering & Development: Development Foundation	1	2019	1	2023
Systems Engineering & Development: Development & Maturation IDIQ Contract	3	2023	4	2025
Agile Process & Capability Development: Agile Process & Capability Development	1	2019	4	2025
Verification & Validation: DT Aircraft Upgrades	1	2019	3	2021
Verification and Validation: Integrated Test	1	2019	4	2025
Verification and Validation: TR-3 Operational Test	2	2022	1	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Delivery	2	2019	1	2020
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Delivery	2	2020	1	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Delivery	2	2021	1	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Delivery	2	2022	1	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 17 Full Funding / Delivery	2	2023	1	2024
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 18 Full Funding / Delivery	2	2024	1	2025
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 19 Full Funding / Delivery	2	2025	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	231.414	39.794	40.567	27.035	0.000	27.035	12.737	7.136	0.000	0.000	0.000	358.683
676003: <i>HRM Structural Development</i>	231.414	39.794	40.567	27.035	0.000	27.035	12.737	7.136	0.000	0.000	0.000	358.683
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: N86

A. Mission Description and Budget Item Justification

Air Force Integrated Personnel and Pay System (AFIPPS) will be a web-enabled, Enterprise Resource Planning (ERP) solution that will integrate existing personnel and pay processes into one self-service system. AFIPPS supports how the Air Force owns and operates the Human Resource Management domain and is a component of the AF/A1 digital transformation journey, currently underway. AFIPPS continues the transformation by providing an accurate and single authoritative source of personnel data to ensure timely delivery of pay, entitlements, allowances, and benefits to all Active (RegAF), National Guard (ANG), and Reserve (AFRes) components. AFIPPS represents the AF commitment to modernize business practices and provide enhanced support to service members and their families by integrating personnel and pay systems. AFIPPS will eliminate AF reliance on the end-of-life/unsustainable Defense Finance and Accounting (DFAS) Defense Joint Military Pay System (DJMS) for payroll processing and will ensure continued/improved auditability of service member pay.

The AFIPPS program will directly increase AF readiness for the total force service members, human resources and financial management specialists and AF Commanders. AFIPPS will improve the AF communities experience by allowing members to update via self-initiate pay/personnel actions, commencing automated transmission of verified personnel data, decreasing pay errors and providing accurate personnel/pay data for leadership decision making.

In October 2019, the AFIPPS program revised its release strategy to include two major releases. The program will leverage a Military Personnel Data System (MilPDS) self-service capability deployment to ensure infrastructure for pay and leave capability is in place. The self-service capability will deploy in Jan 2021, allowing the AF community to initiate self-registration, validate member data and verify operational performance. The AFIPPS pay and leave capabilities will be released on the backbone of the MilPDS system in Jan 2022 to coincide with domestic and international transactions.

The FY20 Congressional reduction of 3080 procurement funding leaves program without ability to field pay and leave capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AFIPPS capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. Also, funds will be used to perform studies and innovative integration efforts for common technology capabilities such as cloud migration, technology development, and mobile application.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	41.058	40.567	43.941	0.000	43.941
Current President's Budget	39.794	40.567	27.035	0.000	27.035
Total Adjustments	-1.264	0.000	-16.906	0.000	-16.906
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.264	0.000			
• Other Adjustments	0.000	0.000	-16.906	0.000	-16.906

Change Summary Explanation

The FY2021 funding request was reduced by \$16.906M to account for the availability of prior year execution balances.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Air Force Integrated Personnel and Pay System (AFIPPS) - Product Development	37.795	38.829	26.398	0.000	26.398
Description: Acquire and develop the activities that support the acquisition of a personnel/pay capability for USAF personnel across all components (i.e., RegAF, ANG, and AFRes).					
FY 2020 Plans:					
- Continue system interface modifications developments					
- Continue Oracle Subject Matter Expertise contract					
- Continue contract developing pay capabilities and integrate into existing USAF personnel system					
- Continue AF information technology efforts (e.g., Common Computing Environment, Financial Improvement and Audit Readiness (FIAR)/Federal Information System Controls Audit Manual (FISCAM) audit support, etc.) to ensure AFIPPS is fully integrated into the AF & DoD enterprise networks, databases, and information systems					
- Maintain the required AFIPPS computing environments e.g., development and test environment					
- Implement pre-production DISA sync environment for user evaluation and demonstration of end-to-end HR and payroll capabilities					
- Support DISA infrastructure build out to 500K plus Air Force members					
- Configure self-service capability with member reports and associated account creation					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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<ul style="list-style-type: none"> - Continue to design and implement enterprise architecture for pay - Continue to perform change management and other integration activities - Conduct training for personnel in support of IOT&E and deployment - Continue program support activities <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Update and finalize contract and acquisition documentation to support AFIPPS strategy and Full deployment Authority to proceed (ATP) approval. - Finalize system interface modifications - Continue Oracle Subject Matter Expertise contract - Continue AF information technology efforts (e.g., Common Computing Environment, FIAR/FISCAM audit support, etc) to ensure AFIPPS is fully integrated into the AF & DoD enterprise networks, databases, and information systems upon deployment. - Maintain the required AFIPPS computing environments (e.g. development, test and production). - Deploy enterprise architecture to support 500K+ total force members upon capability release. - Continue to perform change management activities in support of initial capability release deployment. - Complete training of personnel in support of IOT&E and deployment. - Continue program support activities <p>FY 2021 OCO Plans: None</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease between FY2020 and FY2021 is due to the planned software development maturity in FY2020 and the reduction in FY2021 support requirement and software development.</p>					
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<p>Title: AFIPPS - Test and Evaluation</p> <p>Description: Government integrated test and evaluation activities.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue refining Test and Evaluation Master Plan (TEMP) and preparing test plans - Continue AFIPPS integrated user and developer test activities - Routine syncing and regression of the MilPDS baseline with AFIPPS capabilities - Routine testing of developed interfaces 	1.999	1.738	0.637	0.000	0.637
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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Execute Cyber Vulnerability Assessments (CVPA) to evaluate current/future AFIPPS system environments					
FY 2021 Base Plans:					
- Will continue Cyber Vulnerability Assessments (CVPA) to evaluate current/future AFIPPS system environments					
- Will validate AFIPPS payroll with parallel payroll runs with legacy DJMS					
- Will initiate and complete Initial Operational Test and Evaluation					
FY 2021 OCO Plans:					
None					
FY 2020 to FY 2021 Increase/Decrease Statement:					
The decrease between FY2020 and FY2021 is due to the completion of Test & evaluation activities that were started during FY2019/2020 and are planned for completion in FY2021.					
Accomplishments/Planned Programs Subtotals	39.794	40.567	27.035	0.000	27.035

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 834410: <i>INTEGRATED PERSONNEL AND PAY SYSTEM</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	-	-	0.000	0.000

Remarks
Line Item 834410 will be used for future AFIPPS procurement funding.

E. Acquisition Strategy
AFIPPS acquisition strategy focuses on expanding the fielded AF Military Personnel Data System (MilPDS) by integrating pay and leave capabilities. MilPDS is implemented using the commercial Oracle ERP E-Business Suite (EBS). The AFIPPS program will configure/develop the pay module of EBS and ensure the system is fully integrated and deployed. The Government awarded a contract for the pay system development, test, and deployment. The development activities are fully coordinated and integrated with the on-going operation and sustainment of MilPDS.

In October 2019, the AFIPPS program revised its release strategy to include two major releases. The program will leverage a MilPDS self-service capability deployment to ensure infrastructure for pay and leave capability is in place. The self-service capability will deploy in Jan 2021, allowing the AF community to initiate self-registration, validate member data and verify operational performance.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>	
<p>AFIPPS is implementing agile principles to the maximum extent practical during the software development effort. The pay/leave capability will be broken into stories then incorporated into work packages to be developed in three week sprints. Each work package will be developed and tested by the integrated user/developer team on multiple pre-production environments. Once functionality and associated business processes from current payroll and leave systems are integrated and validated against the existing MILPDS baseline, the pay/leave capability will be delivered in a single release.</p> <p>The AFIPPS program will release its pay/leave capability to strategically coincide with all domestic and international financial transactions that occur on the first of the year, mitigating any potential impacts to the warfighter. Incremental pay/leave releases to human resource/financial management specialist and total force are not feasible due to the following:</p> <ul style="list-style-type: none">• Incremental releases require complementary changes to dependent, disparate Legacy IT systems at the same time; changes to those systems requires resources and scheduling for each system owner and management office• Business processes cannot be fielded using a mix of newly re-engineered segments with legacy; an end-to-end re-engineered process is required from day one• Rapid Change Management and Training is required across the AF to accompany each incremental release• Changes to MilPDS infrastructure require significant lead time with DISA; cybersecurity mandates are additional approvals <p>Air Force Program Executive Officer (PEO) for Business and Enterprise Systems (AFPEO BES) is the PEO for AFIPPS. Air Force Life Cycle Management Center (AFLCMC) is the Contracting Authority for the AFIPPS Program and provides Contracts, Legal, and Comptroller support. The Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSD(A&S)] has delegated the program's Milestone Decision Authority (MDA) to the Service Acquisition Executive (SAE) for the Air Force.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605018F / AF Integrated Personnel and Pay System (AF-IPPS)	Project (Number/Name) 676003 / HRM Structural Development
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Common Computing Environment (CCE)	Various	Various : Various	1.065	-		-		-		-		-	5.504	6.569	6.589
Prime Development & Integration Efforts	C/CPAF	ACCENTURE FEDERAL SVCS : ARLINGTON, VA	22.493	22.135	Nov 2018	30.618	Dec 2019	17.861	Dec 2020	-		17.861	7.052	100.159	100.229
Application Hosting Environment	MIPR	DISA EIS : Pensacola, FL	58.093	1.867	Nov 2018	0.929	Mar 2020	1.420	Dec 2020	-		1.420	0.468	62.777	62.777
COTs Licenses	Various	Various : Various	15.463	1.954	Oct 2018	1.745	Apr 2020	2.133	Apr 2021	-		2.133	6.162	27.457	27.457
Development Environment	C/CPIF	DTSI : San Antonio, TX	0.000	3.317	Feb 2019	-		-		-		-	0.000	3.317	3.317
Engineering Support (FFRDC)	SS/CPAF	CMU-SEI : Pittsburgh, PA	11.917	-		-		-		-		-	0.000	11.917	11.917
Oracle EBS Subject Matter Experts	C/T&M	DLT SOLUTIONS, LLC : HERNDON, VA	0.619	1.583	Oct 2018	0.746	Feb 2020	-		-		-	0.000	2.948	2.948
Financial Improvement and Audit Readiness(FIAR) and Acquisition Planning Subject Matter Experts	C/FP	Various : Various	0.970	0.242	Oct 2018	0.246	Aug 2020	0.250	Aug 2021	-		0.250	0.000	1.708	1.708
Training: Oracle eBusiness Suite (EBS Development/ Government Training)	C/FP	ASPECT SOFTWARE INC : PHOENIX, AZ	3.456	1.018	Nov 2018	-		0.441	Jan 2021	-		0.441	0.330	5.245	5.245
Direct Mission Support (Other)	Various	Various : Various	53.862	-		-		-		-		-	0.000	53.862	53.862
Subtotal			167.938	32.116		34.284		22.105		-		22.105	19.516	275.959	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Independent Verification & Validation (IV&V)	Various	Various : Various	2.354	-		-		-		-		-	0.000	2.354	2.354

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605018F / AF Integrated Personnel and Pay System (AF-IPPS)	Project (Number/Name) 676003 / HRM Structural Development
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Gov't Integrated Test & Evaluation Activities	MIPR	Various : Various	1.781	0.360	Dec 2018	0.740	Dec 2019	0.637	Nov 2020	-		0.637	0.112	3.630	3.630
Development and Test Infrastructure	C/CPIF	DTSI : San Antonio, TX	0.720	1.639	Dec 2018	0.998	Jul 2020	0.000	Jul 2021	-		0.000	0.000	3.357	3.357
Subtotal			4.855	1.999		1.738		0.637		-		0.637	0.112	9.341	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technology Acquisition Support Services (ETASS)	C/CPFF	Oasis Systems, LLC : Lexington, MA	12.762	0.000		-		-		-		-	0.000	12.762	12.762
Engineering, Professional, and Administrative Support Services (EPASS)	C/CPAF	Oasis Systems, LLC : Lexington, MA	0.000	4.890	Nov 2018	3.984	Mar 2020	3.724	Mar 2021	-		3.724	0.000	12.598	12.598
Other Program Support Cost	Various	Various : Various	25.838	0.639	Nov 2018	0.406	Jan 2020	0.414	Jan 2021	-		0.414	0.245	27.542	27.542
Professional Acquisition Support Services II (PASS II)	C/CPAF	Quantech Services, Inc. : Lexington, MA	16.192	0.000		-		-		-		-	0.000	16.192	16.192
Specialized Cost Services (SCS): EPASS	C/CPAF	BusinessTechnologies & Solutions : Beavercreek, OH	3.829	0.150	Apr 2019	0.155	Apr 2020	0.155	Apr 2021	-		0.155	0.000	4.289	4.289
Subtotal			58.621	5.679		4.545		4.293		-		4.293	0.245	73.383	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals		231.414	39.794	40.567	27.035	-	27.035	19.873	358.683

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605018F / AF Integrated Personnel and Pay System (AF-IPPS)	Project (Number/Name) 676003 / HRM Structural Development

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Integrated Personnel and Pay System</i>	
AFIPPS Development and Test Environments	[REDACTED]
Enterprise Architecture Design/Implement	[REDACTED]
Prime Development, Integration, and Deployment	[REDACTED]
AF Information Technology Efforts	[REDACTED]
Government Integrated Test and Evaluation Activities	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>	Project (Number/Name) 676003 / <i>HRM Structural Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Integrated Personnel and Pay System</i>				
AFIPPS Development and Test Environments	1	2019	3	2021
Enterprise Architecture Design/Implement	1	2019	4	2020
Prime Development, Integration, and Deployment	1	2019	2	2021
AF Information Technology Efforts	1	2019	4	2023
Government Integrated Test and Evaluation Activities	1	2019	3	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	32.182	47.193	50.508	0.000	50.508	52.241	49.907	53.636	54.406	Continuing	Continuing
675066: <i>Anti-Tamper Technology Executive Agent</i>	-	32.182	47.193	50.508	0.000	50.508	52.241	49.907	53.636	54.406	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): N42

A. Mission Description and Budget Item Justification

The Anti-Tamper (AT) Technology Executive Agency budget funds activities related to the DoD Executive Agent for AT (ATEA) responsibilities required by DoD Directive 5200.47E, "Anti-Tamper (AT)." These responsibilities are unique to the DoD ATEA and the Air Force Component Office of Primary Responsibility (OPR) for AT. The DoD ATEA is responsible for developing and enforcing AT policy and guidance, assessing AT technologies (hardware and software), maintaining and developing new AT technology assessment capabilities, maintaining and maturing AT laboratory equipment and infrastructure, establishing and maintaining a library of AT technologies, providing security guidance and support mechanisms, providing outreach and education to the DoD AT community, providing intelligence support, and evaluating AT implementations across all DoD acquisition programs, foreign military sales, and direct commercial sales. The AF OPR for AT evaluates AT on applicable AF acquisition programs, FMS, and DCS as well as manages AF AT technology development.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Anti-Tamper Executive Agent weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

AT protects critical program information (CPI) in U.S. weapon systems that may be sold to foreign governments or that could possibly fall into enemy hands on the battlefield. AT protections permit the U.S. to preserve its technological advantage and the combat capabilities of critical weapons systems while supporting the warfighters' mission requirements. Furthermore, AT adds longevity to DoD weapon systems and critical technologies by deterring efforts to reverse engineer or develop weapon countermeasures against the system or system component.

All DoD acquisition programs, Foreign Military Sales, and Direct Commercial Sales with critical program information (CPI) require a validated AT Plan. The AT program includes resources required for subject matter experts (SMEs) to review AT Plans and conduct AT validation on all DoD Weapon Systems, and perform AT assessments of both commercial off the shelf and government off the shelf products. As technology advances, AT continues to perform AT hardware/software assessment capabilities. These capabilities include the acquisition of specialized equipment, maintenance and/or renovations to support the integration of this equipment, and modifications to new and/or existing laboratory facilities to meet equipment and security requirements.

The DoD ATEA coordinates technology development among the DoD Services/Agencies, National Laboratories, and Industry. The DoD ATEA technology development strategy is to coordinate DoD AT technology development across the Services which fund development of new AT technology, as well as enhance existing AT

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>
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technology efforts to increase the technology readiness level (TRL) and facilitate transition for programs to implement. The AT technology development and enhancement efforts include: advanced AT sensor hardware, secure processing, crypto-analysis, tamper penalties, modifying and developing technology to address vulnerability and susceptibility of fielded parts, and other AT enablers.

The Air Force AT OPR conducts Anti-Tamper technology development to meet Air Force service needs to mature promising AT technologies to transition to Air Force weapons systems. Technology development priorities are given to those technologies that most benefit AF acquisition programs. These activities are coordinated through the ATEA as a part of the ATEA technology development roadmap and to coordinate with Navy and Army AT technology development efforts.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	32.770	47.193	50.583	0.000	50.583
Current President's Budget	32.182	47.193	50.508	0.000	50.508
Total Adjustments	-0.588	0.000	-0.075	0.000	-0.075
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.588	0.000	-0.075	0.000	-0.075

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: DoD Anti-Tamper Technology Executive Agent (DoDATEA)	22.646	35.403	37.787
Description: AT technology coordination and evaluations, hardware/software vulnerability assessments, capability development, laboratory equipment and infrastructure improvements; outreach and education to the AT Community, AT implementation validation and evaluation as well as implementation of AT policy development.			
FY 2020 Plans: - Validate and evaluate AT implementations on all DoD Acquisition programs; conduct vulnerability assessments, improve laboratory equipment and infrastructure, and provide intelligence support. Develop AT policy and continue to train the acquisition workforce on AT policy and technology.			
FY 2021 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>- Validate and evaluate AT implementations on all DoD Acquisition programs; conduct vulnerability assessments, improve laboratory equipment and infrastructure, and provide intelligence support. Develop AT policy and continue to train the acquisition workforce on AT policy and technology.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to additional laboratory recapitalization requirements in FY21.</p>				
<p>Title: DoDATEA Program Management Support</p> <p>Description: Includes civilian pay, A&AS, outreach and education, travel, supplies, and AFLCMC/WWG support.</p> <p>FY 2020 Plans: Support program office efforts, including civilian pay, A&AS, intelligence support, outreach and education, travel, and supplies.</p> <p>FY 2021 Plans: Support program office efforts, including civilian pay, A&AS, intelligence support, outreach and education, travel, and supplies.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to inflation.</p>		5.136	6.690	6.721
<p>Title: Air Force Anti-Tamper Office Technology Development</p> <p>Description: The Air Force AT office conducts Anti-Tamper technology development to meet Air Force service needs to mature promising AT technologies to transition to Air Force weapon systems.</p> <p>The AT technology development and enhancement efforts include: advanced AT sensor hardware, secure processing, crypto-analysis, tamper penalties, and other AT enablers.</p> <p>The AF AT office will fund and manage new technology efforts to protect AF CPI. These new AT technology requirements will be obtained from AF programs and these new AT technologies will then transition to Air Force and DoD programs.</p> <p>FY 2020 Plans: The Air Force AT office conducts Anti-Tamper technology development to meet Air Force service needs to mature promising AT technologies to transition to Air Force weapons systems.</p>		4.400	5.100	6.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>The AT technology development and enhancement efforts include: advanced AT sensor hardware, secure processing, crypto-analysis, tamper penalties, and other AT enablers. Technology development priorities will be given to those technologies that most benefit AF acquisition programs.</p> <p>FY 2021 Plans: The Air Force AT office conducts Anti-Tamper technology development to meet Air Force service needs to mature promising AT technologies to transition to Air Force weapons systems.</p> <p>The AT technology development and enhancement efforts include: advanced AT sensor hardware, secure processing, crypto-analysis, tamper penalties, and other AT enablers. Technology development priorities will be given to those technologies that most benefit AF acquisition programs.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to program ramp-up.</p>			
Accomplishments/Planned Programs Subtotals	32.182	47.193	50.508

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The DoD ATEA acquisition strategy is to coordinate DoD AT technology developments across the Services which fund development and assessments of new AT technology, as well as enhance existing AT technology efforts by increasing TRL. The ATEA will coordinate the Technology Roadmap with major Prime vendors. Evaluating their AT CRADA projects is of major importance. The ATEA will also coordinate with the Service AT personnel to foster communication and understand what programs Services are developing for their AT implementation. Emerging research areas such as materials, cryptography and electronic circuits have the potential to bring new AT capabilities with increased processing power, reduced power draw, and smaller form factor. The goal of the research is to mature promising technologies to the point they can be transitioned to a program office or industry for implementation in our weapon systems. Priorities will be given to those technologies that most benefit the DoD AT community.

The Air Force AT Office will fund and manage new technology efforts to protect Air Force critical program information. These new AT technology requirements will be obtained from AF programs and these new AT technologies will then transition to Air Force programs.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	Project (Number/Name) 675066 / <i>Anti-Tamper Technology Executive Agent</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Air Force Anti-Tamper Office Technology Development	Various	Not specified. : NV	-	4.400		5.100		6.000		-		6.000	Continuing	Continuing	-
Subtotal			-	4.400		5.100		6.000		-		6.000	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
DoD Anti-Tamper Technology Executive Agent (DoDATEA)	Various	Not specified. : NV	-	22.646		35.403		37.787		-		37.787	Continuing	Continuing	-
Subtotal			-	22.646		35.403		37.787		-		37.787	Continuing	Continuing	N/A

Remarks
This funding is to support DoD ATEA requirements. However, funding is broken out between DoD ATEA and Air Force AT requirements.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
DoDATEA Program Management Support	Various	Not specified. : NV	-	5.136		6.690		6.721		-		6.721	Continuing	Continuing	-
Subtotal			-	5.136		6.690		6.721		-		6.721	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	32.182	47.193	50.508	-	50.508	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force							Date: February 2020			
Appropriation/Budget Activity 3600 / 7			R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>			Project (Number/Name) 675066 / <i>Anti-Tamper Technology Executive Agent</i>				
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks
Additional funding breakout and award dates are classified per the Anti-Tamper Security Classification Guide. Please contact the ATEA if additional information is required.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	Project (Number/Name) 675066 / <i>Anti-Tamper Technology Executive Agent</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

ATEA	
ATEA Program Office	
AT RDT&E	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	Project (Number/Name) 675066 / <i>Anti-Tamper Technology Executive Agent</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
ATEA				
ATEA Program Office	1	2019	4	2025
AT RDT&E	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	68.368	70.083	71.229	0.000	71.229	72.463	73.760	75.080	67.239	Continuing	Continuing
675897: <i>Foreign Materiel Acquisition and Exploitation</i>	-	68.368	70.083	71.229	0.000	71.229	72.463	73.760	75.080	67.239	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Foreign Materiel Acquisition and Exploitation (FMA&E) program element supports the military services' and defense agencies' Foreign Material Program activities.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	68.368	70.083	71.360	0.000	71.360
Current President's Budget	68.368	70.083	71.229	0.000	71.229
Total Adjustments	0.000	0.000	-0.131	0.000	-0.131
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.131	0.000	-0.131

Change Summary Explanation

FY 2020 to FY 2021 funding increased due to inflation.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605117F / Foreign Materiel Acquisition and Exploitation	Project (Number/Name) 675897 / Foreign Materiel Acquisition and Exploitation
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675897: Foreign Materiel Acquisition and Exploitation	-	68.368	70.083	71.229	0.000	71.229	72.463	73.760	75.080	67.239	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Foreign Materiel Acquisition and Exploitation (FMA&E) program element supports the military services' and defense agencies' Foreign Material Program activities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Foreign Materiel Acquisition and Exploitation	68.368	70.083	71.229
Description: Classified details can be found in OSD Comptroller's classified Defense Wide Justification Book Volume 6.			
FY 2020 Plans: Classified			
N/A			
FY 2021 Plans: Classified			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase is due to inflation.			
Accomplishments/Planned Programs Subtotals	68.368	70.083	71.229

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

N/A

Remarks

N/A

D. Acquisition Strategy

Classified details can be found in OSD Comptroller's classified Defense-Wide Justification Book Volume 6.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0605117F / Foreign Materiel Acquisition and Exploitation				675897 / Foreign Materiel Acquisition and Exploitation							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Classified details can be found in OSD Comptroller's classified Defense-Wide Justification Book Volume 6.		Various	Various : TBD	-	68.132	Apr 2019	69.611	Apr 2020	70.757	Apr 2021	-	70.757	Continuing	Continuing	-
Subtotal			-	68.132		69.611		70.757		-		70.757	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SAF/CDM Salary and Travel	Allot	SAF/CDMA : Fairfax, VA	-	0.236	Oct 2018	0.472	Oct 2019	0.472	Oct 2020	-		0.472	Continuing	Continuing	-
Subtotal			-	0.236		0.472		0.472		-		0.472	Continuing	Continuing	N/A
Project Cost Totals			-	68.368		70.083		71.229		-		71.229	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	Project (Number/Name) 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Foreign Materiel Acquisition & Exploitation</i>																												
FY20 requirements and funding requests submitted by Services/Agencies																												
Requirements and funding requests validated and prioritized																												
FY20 FMP Plan approved and published																												
FY20 Plan executed and updated as required																												
Additional acquisition opportunities reviewed quarterly; FY20 execution reprioritized																												
Additional exploitation opportunities reviewed quarterly; FY20 execution reprioritized																												
FY21 requirements and funding requests submitted by Services/Agencies																												
FY21 requirements and funding requests validated and prioritized																												
FY21 FMP Plan approved and published																												
FY21 Plan executed and updated as required																												
Additional acquisition opportunities reviewed quarterly; FY21 execution reprioritized																												
Additional exploitation opportunities reviewed quarterly; FY21 execution reprioritized																												
FY22 requirements and funding requests submitted by Services/Agencies																												
FY22 requirements and funding requests validated and prioritized																												
FY22 FMP Plan approved and published																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	Project (Number/Name) 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Additional acquisition opportunities reviewed quarterly; FY22 execution reprioritized																												
Additional exploitation opportunities reviewed quarterly; FY22 execution reprioritized																												
FY23 requirements and funding requests submitted by Services/Agencies																												
FY23 requirements and funding requests validated and prioritized																												
FY23 FMP Plan approved and published																												
FY23 FMP Plan executed and updated as required																												
Additional acquisition opportunities reviewed quarterly; FY23 execution reprioritized																												
Additional exploitation opportunities reviewed quarterly; FY23 execution reprioritized																												
FY24 requirements and funding requests submitted by Services/Agencies																												
FY24 requirements and funding requests validated and prioritized																												
FY24 FMP Plan approved and published																												
FY24 FMP Plan executed and updated as required																												
Additional acquisition opportunities reviewed quarterly; FY24 execution reprioritized																												
Additional exploitation opportunities reviewed quarterly; FY24 execution reprioritized																												
FY25 requirements and funding requests submitted by Services/Agencies																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	Project (Number/Name) 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

FY25 requirements and funding requests validated and prioritized	█																											
FY25 FMP Plan approved and published	█																											
FY25 FMP Plan executed and updated as required	████████████████████																											
Additional acquisition opportunities reviewed quarterly; FY25 execution reprioritized	████████████████████																											
Additional exploitation opportunities reviewed quarterly; FY25 execution reprioritized	████████████████████																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	Project (Number/Name) 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Foreign Materiel Acquisition & Exploitation</i>				
FY20 requirements and funding requests submitted by Services/Agencies	3	2019	4	2019
Requirements and funding requests validated and prioritized	4	2019	4	2019
FY20 FMP Plan approved and published	4	2019	4	2019
FY20 Plan executed and updated as required	1	2020	1	2021
Additional acquisition opportunities reviewed quarterly; FY20 execution reprioritized	1	2020	1	2021
Additional exploitation opportunities reviewed quarterly; FY20 execution reprioritized	1	2020	1	2021
FY21 requirements and funding requests submitted by Services/Agencies	3	2020	4	2020
FY21 requirements and funding requests validated and prioritized	4	2020	4	2020
FY21 FMP Plan approved and published	4	2020	4	2020
FY21 Plan executed and updated as required	1	2021	1	2022
Additional acquisition opportunities reviewed quarterly; FY21 execution reprioritized	1	2021	1	2022
Additional exploitation opportunities reviewed quarterly; FY21 execution reprioritized	1	2021	1	2022
FY22 requirements and funding requests submitted by Services/Agencies	3	2021	4	2021
FY22 requirements and funding requests validated and prioritized	4	2021	4	2021
FY22 FMP Plan approved and published	4	2021	4	2021
Additional acquisition opportunities reviewed quarterly; FY22 execution reprioritized	1	2022	1	2023
Additional exploitation opportunities reviewed quarterly; FY22 execution reprioritized	1	2022	1	2023
FY23 requirements and funding requests submitted by Services/Agencies	3	2022	4	2022
FY23 requirements and funding requests validated and prioritized	4	2022	4	2022
FY23 FMP Plan approved and published	4	2022	4	2022
FY23 FMP Plan executed and updated as required	1	2023	1	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	Project (Number/Name) 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Additional acquisition opportunities reviewed quarterly; FY23 execution reprioritized	1	2023	1	2024
Additional exploitation opportunities reviewed quarterly; FY23 execution reprioritized	1	2023	1	2024
FY24 requirements and funding requests submitted by Services/Agencies	3	2023	4	2023
FY24 requirements and funding requests validated and prioritized	4	2023	4	2023
FY24 FMP Plan approved and published	4	2023	4	2023
FY24 FMP Plan executed and updated as required	1	2024	1	2025
Additional acquisition opportunities reviewed quarterly; FY24 execution reprioritized	1	2024	1	2025
Additional exploitation opportunities reviewed quarterly; FY24 execution reprioritized	1	2024	1	2025
FY25 requirements and funding requests submitted by Services/Agencies	3	2024	4	2024
FY25 requirements and funding requests validated and prioritized	4	2024	4	2024
FY25 FMP Plan approved and published	4	2024	4	2024
FY25 FMP Plan executed and updated as required	1	2025	4	2025
Additional acquisition opportunities reviewed quarterly; FY25 execution reprioritized	1	2025	4	2025
Additional exploitation opportunities reviewed quarterly; FY25 execution reprioritized	1	2025	4	2025

Note

The schedule on the previous page, representing the Foreign Material Program acquisition and exploitation processes, repeats for each fiscal year. Out of cycle Ad-Hoc foreign material acquisition and exploitation reviews are held when required throughout each fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605278F / <i>HC/MC-130 Recap RDT&E</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	23.459	15.641	17.218	24.705	0.000	24.705	52.502	53.720	12.587	24.213	52.162	276.207
675006: <i>HC/MC-130 Recap</i>	23.459	15.641	17.218	5.739	0.000	5.739	28.677	49.632	7.408	18.939	0.000	166.713
675910: <i>Block 8.X</i>	0.000	0.000	0.000	18.966	0.000	18.966	23.825	4.088	5.179	5.274	52.162	109.494

Program MDAP/MAIS Code: 257

A. Mission Description and Budget Item Justification

HC/MC-130 Recapitalization provides a Medium lift tanker aircraft to replace and augment the aging USAF fleet of combat rescue HC-130P/N and special operations MC-130E/H/P/W aircraft for the Combat Search and Rescue (CSAR) forces, and Air Force Special Operation Forces, which are experiencing airworthiness, maintainability, and operations limitations. The HC/MC-130 Recap incorporates production line modifications to the C-130J common/baseline configuration to convert them to the HC/MC model. The program also funds post-production modifications to add special mission systems required for behind-enemy-line operations required of CSAR and Special Operations aircraft.

The RDT&E portion of the Recap program funds engineering support and studies to conduct rapid development activities, and develops major "block" upgrades to deliver specific increments of capability in common configurations across the fielded fleet. Currently, Block 7.0/8.1 leverages the baseline C-130J (PE 0401132F) Block 7.0/8.1 upgrade, but funds unique HC/AC/MC-130J integration requirements. The Block 7.0/8.1 project will deliver Communication, Navigation and Surveillance/Air Traffic Management (CNS/ATM) capabilities required for compliance with evolving international standards, thereby allowing HC/MC-130J aircraft to operate in international airspace. It also incorporates capabilities such as Link-16, a new Flight Management System (FMS), Civil GPS Navigation and Data Link, Identification Friend or Foe (IFF) Transponder Mode-5, and Automatic Dependent Surveillance-Broadcast Out (ADS-B Out).

The HC-130J Block 7.0/8.1 Integrated Baseline Review (IBR) will occur to account for the removal of the MC-130J from the original baseline. HC Block 7.0/8.1 trial kit install (TKI) will begin. The USAF has also decoupled the IFF Mode 5 and ADS-B Out portions of Block 7.0/8.1, to accelerate those requirements and comply with 2020 mandates. The USAF also added a budget line to comply with new communication modernization to include Mobile User Objective System (MUOS), Crypto Modernization, and Saturn and High Frequency (HF) Radio Satellite Communications (SATCOM) mandate.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver HC/MC-130J weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

The program may also include any Contractor Manpower Equivalent (CME)/A&AS support deemed necessary to support the program objectives. The HC/MC-130 Recap RDT&E permits the initiation and employment of rapid acquisition authorities to respond to emerging threats and requirements as needed.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	16.174	17.218	24.750	0.000	24.750
Current President's Budget	15.641	17.218	24.705	0.000	24.705
Total Adjustments	-0.533	0.000	-0.045	0.000	-0.045
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.533	0.000			
• Other Adjustments	0.000	0.000	-0.045	0.000	-0.045

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E				Project (Number/Name) 675006 / HC/MC-130 Recap			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675006: HC/MC-130 Recap	23.459	15.641	17.218	5.739	0.000	5.739	28.677	49.632	7.408	18.939	0.000	166.713
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

HC/MC-130 Recapitalization will replace and augment the aging USAF fleets of combat rescue HC-130P/N and special operations MC-130E/P/H aircraft which are experiencing airworthiness, maintainability and operational limitations.

The RDT&E portion of the Recap program funds three major thrusts to include but not limited to Continuous Improvement Program, HC Block 7.0/8.1, and Governmental Test.

The HC-130J Recap RDT&E effort integrates Block 7.0/8.1 into a HC-130J, provides program capability updates, studies, and integration with other HC-130J unique modifications. The HC-130J Block 7.0/8.1 program follows the same "Block Upgrade" strategy being used in the C-130J program (PE 0401132F).

The USAF will be fielding the IFF Mode 5, ADS-B Out and Link-16 portions of Block 7.0/8.1 ahead of the remaining 36 capabilities in order to comply with the 2020 mandates.

This program element includes necessary civilian pay expenses required to manage, execute, and deliver HC/MC-130 Recap Program weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

HC/MC-130 Recap RDT&E permits the initiation and employment of rapid acquisition authorities to respond to emerging threats and requirements as needed.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: HC/MC-130 Recap Continuous Improvement Program (CIP)	1.626	3.085	2.257	-	2.257
Description: Recurring Software and hardware enhancements to address evolving requirements for Special Operations Forces and Personnel Recovery missions. These enhancements will be incorporated in both production and fielded aircraft. These enhancements will include, but are not limited to, parallel operational flight program (OFP) updates.					
FY 2020 Plans: Supports continuous improvement cycle of both hardware and software of multiple onboard systems.					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675006 / HC/MC-130 Recap
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Supports continuous improvement cycle of both hardware and software of multiple onboard systems FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to fewer support hardware and software improvements of multiple onboard systems.					
Title: HC-130 Block 7.0/8.1 Description: Combined software/hardware upgrade for Block 7.0/8.1. Block 7.0/8.1 includes, but is not limited to: Link 16, a new Flight Management System (FMS), Civil Global Positioning System (GPS) Navigation, a Special Mission Processor Interface (SMP-I), Identification Friend or Foe (IFF) Mode 5, Civil Data Link, Automatic Dependent Surveillance-Broadcast Out (ADS-B-Out) and the CSO 2.5. FY 2020 Plans: HC-130J will continue to develop software, hardware, hardware modifications, technical data and begin developmental testing. FY 2021 Base Plans: Operational testing and technical data package. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease due to reduced HC-130J TKI testing requirement.	13.503	13.817	3.162	-	3.162
Title: HC/MC-130J Government Test Support Description: Test and evaluation planning, conduct, and support to include MITRE for developmental and operational testing. FY 2020 Plans: Developmental and operational testing including Block 7.0/8.1 DT&E as well as communication modernization testing. FY 2021 Base Plans: Development and operational testing for HC-130J Block 7.0/8.1 DT&E as well as communication modernization testing. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase due to inflation.	0.512	0.316	0.320	-	0.320
Accomplishments/Planned Programs Subtotals	15.641	17.218	5.739	-	5.739

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675006 / HC/MC-130 Recap
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• APAF 05 Line Item HCMC00: <i>HC/MC-130 Modifications</i>	125.654	34.850	20.780	58.020	78.800	49.290	14.978	4.447	33.472	0.000	341.491
• APAF 02 Line Item C130JH: <i>HC-130J</i>	183.837	0.000	0.000	-	0.000	0.000	0.000	5.035	-	0.000	188.872
• APAF 02 Line Item C-130JM: <i>MC-130J</i>	935.879	897.607	402.794	-	402.794	399.180	120.294	27.577	44.305	0.000	2,827.636

Remarks

D. Acquisition Strategy

Lockheed Martin is the primary contractor for Research and Development work in support of the HC/MC-130J Recap program. Block 7.0/8.1 strategy takes the common core Block 7.0/8.1 developed in the C-130J program and integrates it into the HC-130J. Block 7.0/8.1 will also integrate with HC- unique mods. The C-130J ADS-B Out program includes all C-130J variants.

Development work done to date on the HC-130J Recap program has been on Cost Plus Award Fee (CPAF) and Cost Plus Incentive Fee (CPIF) type contracts.

The Continuous Improvement Program (CIP) acquisition strategy is developed on an as needed basis.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0605278F / HC/MC-130 Recap RDT&E				675006 / HC/MC-130 Recap							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
HC/MC-130 Recap Continuous Improvement Program (CIP)	SS/CPPI	Lockheed Martin : Marietta, GA	0.000	1.626	May 2019	3.085	Mar 2020	2.257	Mar 2021	-		2.257	0.000	6.968	1.198
HC-130 Recap Block 7.0/8.1	SS/CPPI	Lockheed Martin : Marietta, GA	23.459	13.503	Apr 2019	13.817	Oct 2019	3.162	Oct 2020	-		3.162	18.391	72.332	81.441
Subtotal			23.459	15.129		16.902		5.419		-		5.419	18.391	79.300	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
HC-130J 7.0/8.1 Government Support Test	RO	46th Test Wing: EAFB, FL : TBD	0.000	0.512	Apr 2019	0.316	Apr 2020	0.320	Apr 2021	-		0.320	0.000	1.148	-
Subtotal			0.000	0.512		0.316		0.320		-		0.320	0.000	1.148	N/A
Project Cost Totals			23.459	15.641		17.218		5.739		-		5.739	18.391	80.448	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675006 / HC/MC-130 Recap
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

HC/MC-130 Recap Development	
HC-130J Government Testing	
HC-130 RECAP Block 7.0/8.1 Development	
Continuous Improvement Program (CIP)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675006 / HC/MC-130 Recap
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>HC/MC-130 Recap Development</i>				
HC-130J Government Testing	1	2019	4	2023
HC-130 RECAP Block 7.0/8.1 Development	3	2019	4	2021
Continuous Improvement Program (CIP)	2	2020	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E				Project (Number/Name) 675910 / Block 8.X			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675910: <i>Block 8.X</i>	0.000	0.000	0.000	18.966	0.000	18.966	23.825	4.088	5.179	5.274	52.162	109.494
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Integrates Block 7.0/8.1 into AC/MC-130J; provides program capability updates, studies, and integration with other MC and AC unique modifications.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver HC/MC-130 Recap Program weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

AC-130J RDT&E permits the initiation and employment of rapid acquisition authorities to respond to emerging threats and requirements as needed.

Working to transition Budget name from Block 8.X to System Upgrades.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: AC/MC-130J Block 7.0/8.1 Upgrade</p> <p>Description: Combined software/hardware upgrade for AC/MC Block 7.0/8.1. Block 7.0/8.1 includes, but is not limited to: Flight Management System (FMS), Civil Global Positioning System (GPS) Navigation, a Special Mission Processor Interface (SMP-I), Identification Friend or Foe (IFF) Mode 5, Civil Data Link, Automatic Dependent Surveillance-Broadcast Out (ADS-B-Out) and the CSO 2.5.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Base Plans: AC/MC-130J 7.0/8.1 Block upgrade development activities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to AC/MC-130J Block 7.0/8.1 upgrades.</p>	0.000	0.000	15.966	-	15.966
<p>Title: Communication Modernization</p> <p>Description: Complies with mandates and will provide secure voice, data, video, network-centric communications in real-time; allow continuous satellite communications (SATCOM) as satellite constellation transitions.</p>	-	0.000	3.000	-	3.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675910 / Block 8.X
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<i>FY 2020 Plans:</i> N/A					
<i>FY 2021 Base Plans:</i> Perform integration study with the ARC-210 radio.					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding increased due to development of Communication Modernization effort.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	18.966	-	18.966

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

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy for AC/MC-130J Block 7.0/81 is being developed. Block 8.X strategy takes the common core Block 7.0/8.1 developed in the C-130J program and integrates it into the AC/MC-130J configurations.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675910 / Block 8.X
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MC/AC Block 7.0/8.1	C/CPAF	Not specified. : TBD	0.000	0.000		0.000		18.966	Apr 2021	-		18.966	0.000	18.966	-
Subtotal			0.000	0.000		0.000		18.966		-		18.966	0.000	18.966	N/A
Project Cost Totals			0.000	0.000		0.000		18.966		-		18.966	0.000	18.966	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675910 / Block 8.X
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Block 8.X	
Communications Modernization	
Block 8.X development for AC/MC-130	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0605278F / HC/MC-130 Recap RDT&E	Project (Number/Name) 675910 / Block 8.X
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Block 8.X				
Communications Modernization	2	2021	4	2024
Block 8.X development for AC/MC-130	1	2021	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606018F / <i>NC3 Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	18.633	25.917	26.356	0.000	26.356	26.932	27.414	0.000	0.000	Continuing	Continuing
674877: <i>NC3 Integration, Assessment, and Improvement</i>	-	18.633	25.917	26.356	0.000	26.356	26.932	27.414	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Nuclear Command, Control, and Communications (NC3) is critical to our Nation's nuclear deterrence. Nuclear Deterrence Operations (NDO) is an Air Force Core Function. Within this core function, Nuclear Command and Control (NC2) is the exercise of authority and direction by the President, as Commander in Chief, through established command lines, over nuclear weapon operations of military forces. The President's authority and direction are exercised through the Nuclear Command and Control System (NCCS). The NCCS is the designated combination of flexible and enduring elements including facilities, equipment, communications, procedures, personnel, and the structure in which these elements are integrated, all of which are essential for planning, directing, and controlling nuclear weapon operations. These functions are accomplished through the NC3 system of systems.

The NC3 system of systems provides connectivity from the President or Secretary of Defense through the National Military Command System (NMCS) to nuclear execution forces worldwide. To enhance NC3 mission success, the AF formalized AF NC3 elements as a specified AF Weapon System (WS), AN/USQ-225. Activities funded in this Program integrate legacy systems, ongoing NC3 programs, and future capabilities for the overall AF NC3 WS.

The AF Nuclear Weapon Center NC3 Integration Directorate (AFNWC/NC) will ensure current, new, and future NC3 capabilities are fully integrated as part of the Air Force's overall effort to sustain, modernize, and recapitalize the nuclear enterprise. AFNWC/NC will be responsible for integrating NC3 materiel management across Air Force Materiel Command (AFMC) to include authority and responsibility for weapon system architecture, weapon system configuration management, weapon system state-of-health reporting, risk management, supply chain management, overall integration, system test, verification, and certification. AFNWC/NC is responsible for defining, building, and sustaining current and future AF NC3 WS system of systems configuration baselines, and marshaling necessary Supporting Centers in AFMC and other units/agencies in the Air Force and the Department of Defense (DoD) to support and/or accomplish these tasks. AFNWC/NC will collaborate with AFMC Supporting Centers to champion the full spectrum of doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) efforts, in support of U.S. Strategic Command as the Enterprise Lead for NC3, the Under Secretary of Defense for Acquisition and Sustainment as the NC3 Enterprise Capability Portfolio Manager, and Air Force Global Strike Command as the Lead Command championing NDO requirements for all Combatant Commands.

This program funds activities for integrating AF NC3 WS materiel, authority, and responsibility for the AF NC3 WS architecture, modeling & simulation, digital engineering, configuration management, risk management, weapon system state-of-health reporting, supply chain supportability and risk management, and overall AF NC3 WS integration, development, system test, verification, fielding, and certification. This program also supports modernization and integration activities associated with Joint All Domain Command and Control (JADC2) and Advanced Battle Management System (ABMS) initiatives.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606018F / NC3 Integration
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver NC3 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	19.312	25.917	26.404	0.000	26.404
Current President's Budget	18.633	25.917	26.356	0.000	26.356
Total Adjustments	-0.679	0.000	-0.048	0.000	-0.048
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.679	0.000	-0.048	0.000	-0.048

Change Summary Explanation

No significant changes

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: NC3 Integration, Assessment, and Improvement	18.633	25.917	26.356
Description: To include but not limited to:			
- Modeling and simulation of the AF NC3 WS current and future capabilities			
- Conducting capability gap analysis			
- Establishing NC3 capability recapitalization and modernization plans			
- Developing and conducting the AF NC3 WS test and certification program as well as expanding existing High Frequency (HF) and other frequency testbeds utilizing a phased approach			
- Conducting NC3 system component verification			
- Implementing and employing program and material management controls for the AF NC3 WS including configuration management, risk management, supply chain supportability and risk management, maintenance data collection and reporting capabilities and AF NC3 WS health monitoring solutions			
- Issue tracking and resolution, assessments and analysis, and governance			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606018F / <i>NC3 Integration</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>- Providing data-driven system of system solutions, and shaping NC3 component program acquisition strategies for AF NC3 WS sustainment and performance capability improvements</p> <p>- Initiating and implementing new capability programs/systems and changes to existing programs to align with AF NC3 WS requirements, test and certification, and future capabilities</p> <p>- Interfacing with JADC2 & ABMS leadership to ensure NC3 Modernization efforts are synchronized with larger AF modernization efforts & identifying risk areas where advanced tech demos may be required</p> <p><i>FY 2020 Plans:</i> NC3 weapon system integration efforts including, but not limited to:</p> <ul style="list-style-type: none"> - Continue to implement test and evaluation certification program for NC3 WS - Continue to expand existing communication spectrum and cyber assessment test bed utilizing a phased approach - Continue to perform NC3 physics, communication and networking analysis - Continue to develop and evolve technical framework of the NC3 WS to meet mission threats of 2030 and beyond - Continue to conduct WS analysis, develop WS capability model, plan WS updates, and implement WS updates - Continue to evaluate options for system-of-system performance improvements within constraints of NC3 WS strategic vision and roadmap - Continue to analyze, model, and prototype emerging NC3 technologies - Continue to develop and implement AF NC3 WS program and materiel management control processes including risk management, configuration management, supply chain management, maintenance data collection and reporting and NC3 WS health assessment application, integrated scheduling, budgeting and cost controls, etc. - Continue to conduct NC3 WS health assessments, reporting, and issue resolution - Continue to map out the NC3 WS supply chain and develop supply chain monitoring capability, supply chain supportability and supply chain risk management - Continue to develop layered architecture to measure and report capability impacts - Continue to develop and coordinate Operational Performance Criteria Document (OPCD) to support weapon system configuration element specs, test and evaluation, and assessment of weapon capabilities and limitations - Continue to establish authoritative intelligence community analysis for high-altitude electromagnetic pulse (HEMP) - Continue to improve integration and interoperability of the NC3 WS - Continue to conduct WS risk, issue, and opportunity analysis, and mitigation/corrective action/pursuit plan development - Interfacing with JADC2 & ABMS leadership to ensure NC3 Modernization efforts are synchronized with larger AF modernization efforts & identifying risk areas where advanced tech demos may be required <p><i>FY 2021 Plans:</i> NC3 weapon system integration efforts including, but not limited to:</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606018F / NC3 Integration
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Continue to implement test and evaluation certification program for NC3 WS - Continue to expand existing communication spectrum and cyber assessment test bed utilizing a phased approach - Continue to perform NC3 physics, communication and networking analysis - Continue to develop and evolve technical framework of the NC3 WS to meet mission threats of 2030 and beyond - Continue to conduct WS analysis, develop WS capability model, plan WS updates, and implement WS updates - Continue to evaluate options for system-of-system performance improvements within constraints of NC3 WS strategic vision and roadmap - Continue to analyze, model, and prototype emerging NC3 technologies - Continue to develop and implement AF NC3 WS program and materiel management control processes including risk management, configuration management, supply chain management, maintenance data collection and reporting and NC3 WS health assessment application, integrated scheduling, budgeting and cost controls, etc. - Continue to conduct NC3 WS health assessments, reporting, and issue resolution - Continue to map out the NC3 WS supply chain and develop supply chain monitoring capability, supply chain supportability and supply chain risk management - Continue to develop layered architecture to measure and report capability impacts - Continue to develop and coordinate Operational Performance Criteria Document (OPCD) to support weapon system configuration element specs, test and evaluation, and assessment of weapon capabilities and limitations - Continue to establish authoritative intelligence community analysis for high-altitude electromagnetic pulse (HEMP) - Continue to improve integration and interoperability of the NC3 WS - Continue to conduct WS risk, issue, and opportunity analysis, and mitigation/corrective action/pursuit plan development <p>N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase is due to inflation factor for continuing NC3 Integration.</p>			
Accomplishments/Planned Programs Subtotals	18.633	25.917	26.356

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
The NC3 Integration acquisition strategy applies WS acquisition lifecycle principles across the system of systems AF NC3 WS. Key elements include configuration management, supply chain supportability and risk management, maintenance data collection and reporting, risk management, integration, test, verification, and

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606018F / <i>NC3 Integration</i>
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certification, as well as modeling, simulation, gap analysis, and architecture development for capabilities in sustainment, development, and for future capabilities. To conduct these essential activities a combination of competitively awarded contracts, classified contracts, as well as sole source contracts, will be used to augment AF organic capabilities with technical skill sets from Federally Funded Research and Development Centers (FFRDCs), research laboratories, University Affiliated Research Centers (UARCs), and industry Advisory and Assistance Services (A&AS) providers.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 7				PE 0606018F / NC3 Integration				674877 / NC3 Integration, Assessment, and Improvement								
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
DMS FFRDC/UARC/A&AS	Various	Various : Various	-	13.273	Nov 2018	19.959	Oct 2019	20.308	Oct 2020	-		20.308	Continuing	Continuing	-	
DMS Supply Chain Risk Management	MIPR	NSWC : Crane, IN	-	1.200	Jan 2019	1.400	Jan 2020	1.400	Jan 2021	-		1.400	Continuing	Continuing	-	
Subtotal			-	14.473		21.359		21.708		-		21.708	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
Integration Studies /Test Support	Various	Various : Various	-	-		0.222	Oct 2019	0.226	Oct 2020	-		0.226	Continuing	Continuing	-	
Subtotal			-	-		0.222		0.226		-		0.226	Continuing	Continuing	N/A	
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
PMA (Eng/Acq Spt/Travel/Supplies)	Various	Various : Various	-	4.160	Oct 2018	4.336	Oct 2019	4.422	Oct 2020	-		4.422	Continuing	Continuing	-	
Subtotal			-	4.160		4.336		4.422		-		4.422	Continuing	Continuing	N/A	
Project Cost Totals			-	18.633		25.917		26.356		-		26.356	Continuing	Continuing	N/A	
Remarks																
FY21 Management Services includes Direct Cite Authority (DCA) for 12 civilian positions; \$1.94M.																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606018F / NC3 Integration	Project (Number/Name) 674877 / NC3 Integration, Assessment, and Improvement

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NC3 WS Integration																												
AF NC3 WS Test and Certification Program																												
NC3 Health Assessment and Analysis																												
Enhance Target Architecture through Development of NC3 Technologies																												
Implement AF NC3 WS Program and Materiel Management Control Process																												
AF NC3 WS Risk Management Program, Monthly Working Group, and Quarterly Board																												
AF NC3 Maintenance Data Reporting																												
NC3 Supply Chain Risk Analysis																												
NC3 Supply Chain Normalization and Supply Health Reporting																												
AF NC3 WS NC3 Configuration Boards Biannually																												
AF Nuclear Weapon System Enterprise Review Biannually																												
NC3 Availability Improvement Program (NAIP)																												
AF NC3 WS Review Biannually																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606018F / <i>NC3 Integration</i>	Project (Number/Name) 674877 / <i>NC3 Integration, Assessment, and Improvement</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>NC3 WS Integration</i>				
AF NC3 WS Test and Certification Program	1	2019	4	2025
NC3 Health Assessment and Analysis	1	2019	4	2025
Enhance Target Architecture through Development of NC3 Technologies	1	2019	4	2025
Implement AF NC3 WS Program and Materiel Management Control Process	1	2019	4	2025
AF NC3 WS Risk Management Program, Monthly Working Group, and Quarterly Board	1	2019	4	2025
AF NC3 Maintenance Data Reporting	1	2019	4	2025
NC3 Supply Chain Risk Analysis	1	2019	4	2025
NC3 Supply Chain Normalization and Supply Health Reporting	1	2019	4	2025
AF NC3 WS NC3 Configuration Boards Biannually	1	2019	4	2025
AF Nuclear Weapon System Enterprise Review Biannually	1	2019	4	2025
NC3 Availability Improvement Program (NAIP)	1	2019	4	2025
AF NC3 WS Review Biannually	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	84.908	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	84.908
677821: <i>Cyberspace Vulnerability Assessment</i>	-	84.908	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	84.908
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program funds cyber vulnerability assessments of Air Force weapons systems and critical infrastructure as well as non-recurring engineering for mitigations. The effort leverages the methodology described in the Air Force Cyber Campaign Plan (CCP) to provide Air Force mission assurance in a cyber-contested environment. Under the Air Force CCP, the Air Force is accomplishing work mandated by Section 1647 of the Fiscal Year (FY) 2016 National Defense Authorization Act (NDAA) and Section 1650 of the FY 2017 NDAA. Section 1647 of the FY 2016 NDAA directs the Secretary of Defense to complete an evaluation of the cyber vulnerabilities of each major weapon system of the Department of Defense. Section 1650 of the FY 2017 NDAA mandates the Secretary of Defense submit a plan for assessing the cyber vulnerability of critical defense infrastructure and begin assessments of this infrastructure. This funding focuses on aspects of the Air Force CCP that develop processes, products, and people to perform the short term goals of conducting system cyber vulnerability assessments, cyber mitigations, and pilot programs and work toward the long term goal of achieving an enduring cyber resilient Air Force. The program builds upon existing efforts regarding the identification and mitigation of cyber vulnerabilities, and does not duplicate similar ongoing efforts or conduct redundant assessments on systems that have already been evaluated.

In addition, this program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. It may also include necessary civilian pay expenses required to perform analysis and developmental activities required in support of the transition of weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force				Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>				
B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
Previous President's Budget	87.800	0.000	0.000	0.000	0.000	
Current President's Budget	84.908	0.000	0.000	0.000	0.000	
Total Adjustments	-2.892	0.000	0.000	0.000	0.000	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	-2.892	0.000				
• Other Adjustments	0.000	0.000	0.000	0.000	0.000	
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2019	FY 2020	FY 2021
Title: Address Weapon System Cyber Vulnerabilities				10.929	0.000	0.000
Description: Develop processes, products, and people to conduct weapon system cyber vulnerability assessments, cyber mitigations, demonstrations, and pilot programs toward the long term goal of achieving an enduring cyber resilient Air Force.						
FY 2020 Plans: This effort completed in FY 2019.						
FY 2021 Plans: Not Applicable						
FY 2020 to FY 2021 Increase/Decrease Statement: Not Applicable						
Title: Address Infrastructure Cyber Vulnerabilities				68.309	0.000	0.000
Description: Develop processes, products, and people to conduct infrastructure/control systems/Operational Technology cyber vulnerability assessments, cyber mitigations, demonstrations, and pilot programs toward the long term goal of achieving an enduring cyber resilient Air Force.						
FY 2020 Plans: This effort completed in FY 2019.						
FY 2021 Plans:						

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Not Applicable			
FY 2020 to FY 2021 Increase/Decrease Statement: Not Applicable			
Title: Exercise Participation Description: This effort supports exercise participation, Combatant Command support, and assessment team activities to validate candidate weapon system and infrastructure cyber vulnerabilities. FY 2020 Plans: This effort completed in FY 2019. FY 2021 Plans: Not Applicable FY 2020 to FY 2021 Increase/Decrease Statement: Not Applicable	5.670	0.000	0.000
Accomplishments/Planned Programs Subtotals	84.908	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606942F / Assessments and Evaluations Cyber Vulnerabilities	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Industry Collaboration for Critical Infrastructure Mitigations (1650)	TBD	Various : TBD	-	10.000	Jan 2019	0.000		0.000		-		0.000	0.000	10.000	-
More Situational Awareness for Industrial Control Systems (MOSAICS) SANDIA	MIPR	Albuquerque, NM : TBD	-	2.075	May 2019	0.000		0.000		-		0.000	0.000	2.075	-
More Situational Awareness for Industrial Control Systems (MOSAICS) SPAWAR	MIPR	North Charleston, SC : TBD	-	0.300	Apr 2019	0.000		0.000		-		0.000	0.000	0.300	-
Subtotal			-	12.375		0.000		0.000		-		0.000	0.000	12.375	N/A

Remarks
In FY 2019, the Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics transitioned the responsibility of funding NDAA 1647 and 1650 activities directly to the Services.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Exercise and Assessment Team Participation (STRATCOM)	TBD	Various : TBD	-	4.000	Jan 2019	0.000		0.000		-		0.000	0.000	4.000	-
Booz Allen Hamilton Contractor Support (1647)	Various	Rome, NY : TBD	-	1.400	May 2019	0.000		0.000		-		0.000	0.000	1.400	-
Subtotal			-	5.400		0.000		0.000		-		0.000	0.000	5.400	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606942F / Assessments and Evaluations Cyber Vulnerabilities	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
346th Test Squadron - More Situational Awareness for Industrial Control Systems (MOSAICS)	PO	San Antonio, TX : TBD	-	0.225	Sep 2019	0.000		0.000		-		0.000	0.000	0.225	-
47th Test Squadron - More Situational Awareness for Industrial Control Systems (MOSAICS)	PO	Albuquerque, NM : TBD	-	0.400	Mar 2019	0.000		0.000		-		0.000	0.000	0.400	-
Air Force Operational Test and Evaluation Center (1647)	Various	Various : TBD	-	6.729	Apr 2019	0.000		0.000		-		0.000	0.000	6.729	-
Air Force Test Center (1647)	PO	Valparaiso, FL : TBD	-	18.500	Feb 2019	0.000		0.000		-		0.000	0.000	18.500	-
Cyber Testing for Weapon Systems (1647)	Various	Various : TBD	-	0.995	Aug 2019	0.000		0.000		-		0.000	0.000	0.995	-
RQ4 Assessment Support (1647)	MIPR	Dayton, OH : TBD	-	2.200	Nov 2018	0.000		0.000		-		0.000	0.000	2.200	-
Critical Infrastructure Assessments (1650)	Various	Various : TBD	-	37.834	Jan 2019	0.000		0.000		-		0.000	0.000	37.834	-
Subtotal			-	66.883		0.000		0.000		-		0.000	0.000	66.883	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	Various	Various : TBD	-	0.250		0.000		0.000		-		0.000	0.000	0.250	-
Subtotal			-	0.250		0.000		0.000		-		0.000	0.000	0.250	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>	Project (Number/Name) 677821 / <i>Cyberspace Vulnerability Assessment</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	84.908	0.000	0.000	-	0.000	0.000	84.908	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force	Date: February 2020	
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>	Project (Number/Name) 677821 / <i>Cyberspace Vulnerability Assessment</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Cyberspace Vulnerability Assessment</i>																												
Conduct cyber vulnerability assessments for weapon systems																												
Develop and assess prototype weapon system cyber mitigations																												
Conduct Category 1 cyber vulnerability assessments for infrastructure																												
Conduct Category 2 cyber vulnerability assessments for infrastructure																												
Develop and assess infrastructure prototype cyber mitigations																												
Participate in exercises and red team activities																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>	Project (Number/Name) 677821 / <i>Cyberspace Vulnerability Assessment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Cyberspace Vulnerability Assessment</i>				
Conduct cyber vulnerability assessments for weapon systems	1	2019	4	2020
Develop and assess prototype weapon system cyber mitigations	1	2019	4	2020
Conduct Category 1 cyber vulnerability assessments for infrastructure	2	2019	2	2020
Conduct Category 2 cyber vulnerability assessments for infrastructure	4	2019	4	2020
Develop and assess infrastructure prototype cyber mitigations	1	2019	4	2020
Participate in exercises and red team activities	1	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	290.097	323.624	520.023	0.000	520.023	568.349	489.435	430.644	276.376	Continuing	Continuing
671803: <i>B-52 AFMC Test Assets</i>	-	0.000	4.069	15.654	0.000	15.654	4.263	4.263	0.000	2.666	0.000	30.915
671805: <i>B-52 VLF/LF Modernization</i>	-	0.000	10.000	12.976	0.000	12.976	8.967	20.567	0.000	0.000	0.000	52.510
671807: <i>Advanced Targeting POD Display Upgrade</i>	-	0.000	5.397	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.397
671810: <i>B-52 AEHF Integration</i>	-	0.000	0.000	5.024	0.000	5.024	37.443	37.442	55.669	79.078	Continuing	Continuing
675039: <i>B-52 System Improvements</i>	-	77.946	12.050	11.166	0.000	11.166	0.050	0.050	0.000	0.000	Continuing	Continuing
675041: <i>Bomber Tactical Data Link</i>	-	26.017	2.878	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.895
675050: <i>CONNECT</i>	-	6.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.055
675055: <i>GPS-IU</i>	-	28.424	1.986	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	30.410
675056: <i>B-52 Radar Modernization Program (RMP)</i>	-	77.333	109.278	168.692	0.000	168.692	187.452	177.035	110.989	46.860	Continuing	Continuing
675057: <i>B-52 Low Cost Improvement (LCI)</i>	-	2.605	2.607	2.600	0.000	2.600	2.656	2.705	0.000	0.000	Continuing	Continuing
675129: <i>B-52 CERP</i>	-	59.717	175.359	299.402	0.000	299.402	327.518	247.373	263.986	147.772	Continuing	Continuing
675160: <i>B-52 Crypto Modernization</i>	-	12.000	0.000	4.509	0.000	4.509	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The B-52H is a long-range bomber capable of delivering the widest variety of nuclear and conventional standoff and direct attack munitions in the Air Force. The Air Force plans to fly the B-52H to at least 2050.

The B-52H modernization efforts are needed to perform current and future wartime missions and to ensure relevance, lethality and survivability. Additionally, modernization projects alleviate aircraft obsolescence issues due to Diminishing Manufacturing Sources (DMS) while at the same time providing improved capabilities to the B-52H weapon system that require significant hardware and software development and testing.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-52 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	325.264	325.974	515.207	0.000	515.207
Current President's Budget	290.097	323.624	520.023	0.000	520.023
Total Adjustments	-35.167	-2.350	4.816	0.000	4.816
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-4.350			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	2.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-25.304	0.000			
• SBIR/STTR Transfer	-9.863	0.000			
• Other Adjustments	0.000	0.000	4.816	0.000	4.816

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 675039: *B-52 System Improvements*

Congressional Add: *IR Missile Warning System*

Congressional Add: *AFGSC Innovation Hub*

Congressional Add: *Mission Data Recorder*

Congressional Add Subtotals for Project: 675039

Project: 675041: *Bomber Tactical Data Link*

Congressional Add: *Bomber Tactical Data Link - Congressional Add*

Congressional Add Subtotals for Project: 675041

Project: 675160: *B-52 Crypto Modernization*

Congressional Add: *B-52 Crypto Modernization Congressional Add*

	FY 2019	FY 2020
	24.000	0.000
	0.000	2.000
	10.000	0.000
	34.000	2.000
	1.450	0.000
	1.450	0.000
	12.000	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)

	FY 2019	FY 2020
Congressional Add Subtotals for Project: 675160	12.000	-
Congressional Add Totals for all Projects	47.450	2.000

Change Summary Explanation

Change Summary Explanation

FY19: Decrease of (-\$35.167M) consists of: SBIR Transfers and reprogramings.

FY20: Decrease of (-\$2.350M) consists of: ATP (-\$4.35M) (Congressional Mark), B-52 Modernization AFGSC Initiative +\$2.00M (Congressional Add)

FY21: Increase of \$4.816M consists of: ATP (-\$1.191M), AFMC Test Assets (-\$0.028M), CERP (-\$0.661M), LCI (-\$0.005M), RMP (-\$0.308M), Crypto Modernization +4.509M, VLF/LF (-\$0.024M), AEHF +\$2.524M.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 671803 / B-52 AFMC Test Assets			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
671803: B-52 AFMC Test Assets	-	0.000	4.069	15.654	0.000	15.654	4.263	4.263	0.000	2.666	0.000	30.915
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior to FY 2020, Project 671803, B-52 AFMC Test Assets funding is documented in Project 675039, B-52 System Improvement

A. Mission Description and Budget Item Justification

The B-52 AFMC Test Assets project will provide funding for the test aircraft, manpower, and facilities at the Air Force Test Center located at Edwards AFB, California. This project will support the developmental testing and sustainment needs of the B-52 weapon system. Funds include cost of one Test Aircraft #60-036 Programmed Depot Maintenance (PDM) performed at Tinker AFB OK.

Costs include any analysis, documentation, and related expenses necessary to establish a program of record and support the B-52 weapon system. Additionally, other costs include PMA and centralized support and initiatives for anticipated weapon system enhancements (to include efforts to improve weapon system operational capabilities, safety, supportability, maintainability, reliability, and total cost of ownership).

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continue aircrew safety and mission effectiveness.

Funds may be used to address emerging and short-notice Diminishing manufacturing and material shortage (DMSMS) issues.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 AFMC Test Aircraft Asset Support	0.000	4.069	15.654	0.000	15.654
Description: B-52 Test Support provides funding for the test aircraft, manpower and facilities at the Air Force Test Center, Edwards AFB and Programmed Depot Maintenance (PDM). This will support the developmental testing and sustainment needs of the B-52.					
FY 2020 Plans: Provide funding for the test aircraft, manpower and facilities at the Air Force Test Center, Edwards AFB. This will support the developmental testing and sustainment needs of the B-52.					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671803 / <i>B-52 AFMC Test Assets</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Provide funding for the test aircraft, manpower and facilities at the Air Force Test Center, Edwards AFB. This will support the developmental testing and sustainment needs of the B-52. Increase Trainer capabilities and upgrades. <i>FY 2021 OCO Plans:</i> N/A <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Increase due to enhancing capability of trainers.					
Accomplishments/Planned Programs Subtotals	0.000	4.069	15.654	0.000	15.654

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

N/A

Remarks

D. Acquisition Strategy

Funding sent to Edwards AFB for the test aircraft, manpower, and facilities at the Air Force Test Center located at Edwards AFB, California.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671803 / <i>B-52 AFMC Test Assets</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>AFMC Test Aircraft support</i>	
Test Support	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671803 / <i>B-52 AFMC Test Assets</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AFMC Test Aircraft support</i>				
Test Support	1	2020	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671805 / B-52 VLF/LF Modernization
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
671805: B-52 VLF/LF Modernization	-	0.000	10.000	12.976	0.000	12.976	8.967	20.567	0.000	0.000	0.000	52.510
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior to FY 2020, Project 671805 B-52 VLF/LF Modernization funding is documented in Project 675039 B-52 System Improvements

A. Mission Description and Budget Item Justification

The B-52 VLF/LF Modernization integrates a receive-only, low frequency receiver and antenna subsystem to provide a secure, survivable strategic nuclear communication capability for the B-52. This project will consist of integrating an existing VLF/LF terminal into the B-52. Integration includes Group A wiring, rack and antenna, and the Group B terminal Line Replaceable Unit (LRU).

Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. As the VLF/LF provides future communication growth to the B-52, emerging security/certification requirements (nuclear certification, cyber security, program protection, crypto modernization, etc.) as well as other aircraft upgrades (Link 16, EHF, 1760 IWBU, Mode S/Mode 5, IFF, BSB, Re-Engine, etc.) may require studies and/or support for potential impact to VLF/LF. Funds may be used to procure, test, and field terminals.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 Very Low Frequency/Low Frequency (VLF/LF)	0.000	10.000	12.976	0.000	12.976
Description: Provides secure, survivable, receive-only strategic nuclear communication for the B-52					
FY 2020 Plans: Continue EMD phase to support fielding decision. Award EMD contract FY20 2Q. Accomplish System Requirements Review (SRR) and Preliminary Design Review (PDR)					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671805 / B-52 VLF/LF Modernization
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue EMD phase to support fielding decision. Accomplish Preliminary Design Review (PDR) and Critical Design Review (CDR).					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase is to ramp up to EMD phase to support fielding decision.					
Accomplishments/Planned Programs Subtotals	0.000	10.000	12.976	0.000	12.976

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 B05200: BP11 Production	0.000	0.000	0.000	-	0.000	33.523	19.497	8.065	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Milestone Decision Authority (MDA) approved the 25 January 2019 decision of the B-52 VLF/LF Acquisition Strategy Panel (ASP), which authorized the program to enter into the EMD phase with the Original Equipment Manufacturer (OEM). The program office received a proposal from the OEM on 16 August 2019. The program office plans to award an EMD contract in 2QFY20.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671805 / B-52 VLF/LF Modernization
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SBIR Reduction	TBD	Not specified. : TBD	-	-		-		0.456	Mar 2021	0.000		0.456	Continuing	Continuing	-
VLF/LF EMD	SS/CPFF	Various : Oklahoma, OK	-	-		6.430	Mar 2020	10.302	Jan 2021	-		10.302	Continuing	Continuing	-
Subtotal			-	-		6.430		10.758		0.000		10.758	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
VLF/LF Program Office Support	Various	Various : TBD	-	-		1.515	Mar 2020	1.098	Sep 2021	0.000		1.098	Continuing	Continuing	-
VLF/LF Trainers	Allot	Not specified. : TBD	-	-		0.046	Mar 2020	0.000		-		0.000	Continuing	Continuing	-
Subtotal			-	-		1.561		1.098		0.000		1.098	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
VLF/LF Test	PO	Not specified. : TBD	-	-		0.046	Jan 2021	0.168	Apr 2021	-		0.168	Continuing	Continuing	-
VLF/LF Cyber Security	TBD	Not specified. : TBD	-	-		0.046	Jan 2021	-		-		-	Continuing	Continuing	-
VLF/LF Certifications	TBD	Not specified. : TBD	-	-		0.046	Jan 2021	0.400	Sep 2021	0.000		0.400	Continuing	Continuing	-
Subtotal			-	-		0.138		0.568		0.000		0.568	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Not specified.	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
A&AS, Travel, Centralized Support	Various	Various : TBD	-	-		1.871	Mar 2020	0.552	Sep 2021	0.000		0.552	Continuing	Continuing	-
Subtotal			-	-		1.871		0.552		0.000		0.552	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671805 / <i>B-52 VLF/LF Modernization</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	10.000	12.976	0.000	12.976	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671805 / <i>B-52 VLF/LF Modernization</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>B-52 VLF/LF Modernization</i>																												
ASP		■																										
EMD																												
MS C																												
IOC																												
Production																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671805 / <i>B-52 VLF/LF Modernization</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-52 VLF/LF Modernization</i>				
ASP	1	2019	1	2019
EMD	2	2020	3	2023
MS C	3	2023	3	2023
IOC	2	2024	2	2024
Production	4	2023	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 671807 / Advanced Targeting POD Display Upgrade			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
671807: <i>Advanced Targeting POD Display Upgrade</i>	-	0.000	5.397	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.397
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY19: B-52 Advanced Target POD MFCD funding is documented in Project 675039 B-52 System Improvements
 FY20: A new Project 671807 for B-52 Advanced Target POD MFCD was created
 FY21: \$11.116M was incorrectly mapped to the old Project 675039 for ATP MFCD work.

A. Mission Description and Budget Item Justification

The B-52 Advanced Targeting Pod (ATP) Multi-Functional Color Display (MFCD) project consists of a monitor upgrade with a 10 gigabyte Ethernet connection. The current targeting pod display is outdated and experiencing a historic break rate. Additionally, the current monitor does not support current and emerging video resolution improvements of the fielded Sniper and LITENING ATPs. The B-52's ATP is now capable of transmitting HD color and video at a much higher resolution than the current monochrome monitor; this upgrade will improve situational awareness and combat lethality.

Costs include any analysis, documentation, and related expenses necessary to establish a Program of Record and support the B-52 weapon system. Additionally, other costs include PMA and centralized support and initiatives for anticipated weapon system enhancements (to include efforts to improve weapon system operational capabilities, safety, supportability, maintainability, reliability, and total cost of ownership).

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continue aircrew safety and mission effectiveness.

Funds may be used to address emerging and short-notice Diminishing manufacturing and material shortage (DMSMS) issues.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 Advanced Target Pod Multi-Functional Color Display	0.000	5.397	0.000	0.000	0.000
Description: B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. ATPs are capable of transmitting high definition color, picture in picture video at a much higher resolution than the current monochrome ATP monitor can display. Capability increase will improve combat lethality and situational awareness.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671807 / Advanced Targeting POD Display Upgrade

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Pre-EMD activities including ASP and requirements development for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. FY 2021 Base Plans: See Project 675039 for \$11.116M for ATP MFCD work that was incorrectly mapped to the old Project FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increased funding due to additional development activities for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection and increase EMD efforts. \$11.116M currently identified in Project 675039.					
Accomplishments/Planned Programs Subtotals	0.000	5.397	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 B05200: <i>Advanced Target Pod MFCD Production</i>	-	-	-	-	-	22.884	16.195	16.487	-	0.000	55.566
• APAF 06 000999: <i>Initial Spares</i>	-	-	-	-	-	-	2.229	2.269	-	0.000	4.498

Remarks

D. Acquisition Strategy
Acquisition Strategy pending approval from MOA. Anticipated 2QFY20

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671807 / Advanced Targeting POD Display Upgrade
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Target Pod Multi-Functional Color Display Development	TBD	TBD : TBD	-	-		3.097	Nov 2020	-		-		-	Continuing	Continuing	-
Advanced Targeting Pod LITENING OFF	SS/CPAF	Northrop Grumman : Rolling Meadows, IL	-	-		1.000	Apr 2020	-		-		-	Continuing	Continuing	-
Advanced Targeting Pod Sniper OFF	SS/CPAF	Lockheed Martin : Orlando, FL	-	-		1.000	Apr 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	-		5.097		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration, Travel and Management Support	C/CPAF	AFLCMC: Tinker AFB, OK : Tinker AFB, OK	-	-		0.300	Sep 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	-		0.300		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	-	5.397	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671807 / Advanced Targeting POD Display Upgrade

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ATP-MFCD																												
MDD	■																											
EMD																												
Integration Studies																												
Milestone C																												
Production																												
IOC																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671807 / <i>Advanced Targeting POD Display Upgrade</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
ATP-MFCD				
MDD	1	2019	1	2019
EMD	1	2021	1	2022
Integration Studies	2	2019	4	2020
Milestone C	1	2022	1	2022
Production	2	2022	2	2024
IOC	4	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 671810 / B-52 AEHF Integration			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
671810: B-52 AEHF Integration	-	0.000	0.000	5.024	0.000	5.024	37.443	37.442	55.669	79.078	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior to FY 2020, Project 671810 B-52 AEHF Integration funding is documented in Project 675041 B-52 Bomber Tactical Data Link

A. Mission Description and Budget Item Justification

The B-52 Advance Extremely High Frequency (AEHF) Integration SATCOM system provides a survivable, low probability of intercept/detection, high bandwidth system that ensures secure intra/inter-flight and two-way command and control communications in the modern anti-access/aerial denial battle space. This communications upgrade replaces the Military Strategic and Tactical Relay (MILSTAR) Ultra High Frequency (UHF) SATCOM capability (MILSTAR is nearing system end of life) on the B-52. The AEHF Integration effort will integrate the radio, antenna and system components required to provide two-way EHF communication for the B-52.

Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. As AEHF Integration provides future communication growth to the B-52, emerging security/certification requirements (nuclear certification, cyber security, program protection, crypto modernization, etc.) as well as other aircraft upgrades (Link 16, VLF/LF, 1760 IWBU, Mode S/Mode 5, IFF, BSB, CERP, etc.) may require studies and/or support for potential impact to AEHF. Funds may be used to procure, test, and field terminals.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

Trainers and Upgrades for B-52 AEHF

In order to maintain currency with the latest aircraft configuration, the B-52 Systems Improvements projects will update existing trainers or use Computer-Based Training (CBT) to add any new systems improvement functionality to meet user training requirements and update/maintain the Systems Integration Lab (SIL) for the Weapon System Trainers (WSTs).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 AEHF Integration	0.000	0.000	5.024	0.000	5.024
Description: The B-52 Advance Extremely High Frequency (AEHF) Integration SATCOM system provides a survivable, low probability of intercept/detection, high bandwidth system that ensures secure intra/inter-flight					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671810 / B-52 AEHF Integration
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B. Accomplishments/Planned Programs (\$ in Millions)

and two-way command and control communications in the modern anti-access/aerial denial battle space. This communications upgrade replaces the Military Strategic and Tactical Relay (MILSTAR) and its Ultra High Frequency (UHF) SATCOM capability (MILSTAR is nearing system end of life) on the B-52. The AEHF Integration effort will integrate the radio, antenna and system components required to provide two-way EHF communication for the B-52.

FY 2020 Plans:

see Project 675041 B-52 Bomber Tactical Data Link for FY20 work

FY 2021 Base Plans:

Ramp to risk reduction efforts

FY 2021 OCO Plans:

N/A

FY 2020 to FY 2021 Increase/Decrease Statement:

Increase due to ramp in risk reduction efforts

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><i>FY 2020 Plans:</i> see Project 675041 B-52 Bomber Tactical Data Link for FY20 work</p> <p><i>FY 2021 Base Plans:</i> Ramp to risk reduction efforts</p> <p><i>FY 2021 OCO Plans:</i> N/A</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Increase due to ramp in risk reduction efforts</p>					
Accomplishments/Planned Programs Subtotals	0.000	0.000	5.024	0.000	5.024

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

N/A

Remarks

D. Acquisition Strategy

The Milestone Decision Authority (MDA) for AEHF is AFNWC/NC and the program will utilize the B-1/B-52 Flexible Acquisition and Sustainment Contract to award studies and the Engineering, Manufacturing and Development effort to the Original Equipment Manufacturer. The OEM will be responsible for the integration of the AEHF terminal which will be provided as Government Furnished Equipment.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671810 / B-52 AEHF Integration
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AEHF Development	SS/CPAF	various : various	-	-		0.000		1.000	Mar 2021	-		1.000	Continuing	Continuing	-
Risk Reduction	C/CPAF	various : various	-	-		-		3.824	Mar 2021	-		3.824	Continuing	Continuing	-
Subtotal			-	-		0.000		4.824		-		4.824	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Other Government Services	C/CPAF	Not specified. : TBD	-	-		-		0.100	Mar 2021	-		0.100	Continuing	Continuing	-
Subtotal			-	-		-		0.100		-		0.100	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Support	Various	various : various	-	-		-		0.100	Mar 2021	-		0.100	Continuing	Continuing	-
Subtotal			-	-		-		0.100		-		0.100	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals		-	-	0.000	5.024	-	5.024	Continuing	Continuing

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 671810 / B-52 AEHF Integration
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

EMD	
EMD	
Integration Studies	
Flight Test	
Milestone C	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 671810 / <i>B-52 AEHF Integration</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>EMD</i>				
EMD	1	2020	3	2025
Integration Studies	1	2020	1	2022
Flight Test	3	2024	2	2025
Milestone C	3	2025	3	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 675039 / B-52 System Improvements			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675039: B-52 System Improvements	-	77.946	12.050	11.166	0.000	11.166	0.050	0.050	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2020, PE 0101113F, B-52 Squadrons, Project 675039, B-52 System Integration efforts were transferred to PE 0101113F, B-52 Squadrons, Project 671805, B-52 VLF/LF Modernization, Project 671803, B-52 Test Support, and Project 671807 Advanced Target POD MFCD in order to provide a separate BPACs for FY19 new start effort.

In FY 2021, Project 671807 Advanced Target POD MFCD funding is shown in B-52 Squadrons, Project 675039.

Correct implementation of funding

- \$11.116M Project 671807 Advanced Target POD MFCD funding

- \$0.050M B-52 System Integration efforts

A. Mission Description and Budget Item Justification

B-52 System Improvements is a comprehensive project to facilitate future capabilities and ensure the B-52's viability in performing current and future wartime missions. The scope of work may include development of an AoA, studies and analysis, a CDD, and/or any other analysis or documentation necessary to establish a POR. Additionally, this project may include airborne integration experiments or demonstrations of emerging technologies. Support of the platform integration efforts are necessary to identify and resolve challenges associated with integrating multiple programs and activities planned for the B-52 fleet.

B-52 AMFC Test Support: The B-52 Test Support (FY19 only) project will provide funding for the test aircraft, manpower, and facilities at the Air Force Test Center located at Edwards AFB, California. This project in FY19 will support the developmental testing and sustainment needs of the B-52 weapon system.

B-52 VLF/LF Modernization: The B-52 VLF/LF Modernization integrates a receive-only, low frequency receiver and antenna subsystem to provide a secure, survivable strategic nuclear communication capability for the B-52. This project will consist of integrating an existing VLF/LF terminal into the B-52. Integration includes Group A wiring, rack and antenna, and the Group B terminal Line Replaceable Unit (LRU).

Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. As the VLF/LF provides future communication growth to the B-52, emerging security/certification requirements (nuclear certification, cyber security, program protection, crypto modernization, etc.) as well as other aircraft upgrades (HERC (LRSO), Link 16, EHF, 1760 IWBU, Mode S/Mode 5, IFF, BSB, CERP, etc.) may require studies and/or support for potential impact to VLF/LF. Funds may be used to procure, test, and field terminals.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675039 / <i>B-52 System Improvements</i>
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DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

B-52 Advanced Targeting Pod (ATP) Multi-Functional Color Display (MFCD)

The B-52 Advanced Targeting Pod (ATP) Multi-Functional Color Display (MFCD) project consists of a monitor upgrade with a 10 gigabyte Ethernet connection. The current targeting pod display is outdated and experiencing a historic break rate. Additionally, the current monitor does not support current and emerging video resolution improvements of the fielded Sniper and LITENING ATPs. The B-52's ATP is now capable of transmitting HD color and video at a much higher resolution than the current monochrome monitor; this upgrade will improve SA and combat lethality.

B-52 Infrared Missile Warning System - cancelled

The project will complete design, integration, and testing for overseas operations for installation on the B-52. The current missile warning system was designed in the 1970s and must be replaced to counter current and future threats.

B-52 Mission Data Recorder

Provides permanent crash survivable flight data recorder information to meet FAA and other regulatory requirements. Produces digital recordings enhancing aircrew mission reconstruction and release validation in AOR.

B-52 AFGSC Innovation Hub

Support Air Force Global Strike Command (AFGSC) A5B's efforts to take innovative approaches to B-52 modernization.

Costs include any analysis, documentation, and related expenses necessary to establish a POR and support the B-52 weapon system. Additionally, other costs include PMA and centralized support and initiatives for anticipated weapon system enhancements (to include efforts to improve weapon system operational capabilities, safety, supportability, maintainability, reliability, and total cost of ownership).

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continue aircrew safety and mission effectiveness.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 Systems Improvements	0.050	0.050	0.050	0.000	0.050
Description: Initiate Analysis of Alternatives, modeling, simulation, testing, and demonstration, including but not limited to: Studies of existing and planned avionics, communications/navigation, electrical, weapons, flight, and nuclear-related aircraft systems and subsystems to support the future viability of the B-52 fleet.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675039 / B-52 System Improvements			
B. Accomplishments/Planned Programs (\$ in Millions)					
Continue Analysis of Alternatives, modeling, simulation, testing, and demonstration, including but not limited to: Studies of existing and planned avionics, communications/navigation, electrical, weapons, flight, and nuclear-related aircraft systems and subsystems to support the future viability of the B-52 fleet					
FY 2021 Base Plans: Continue Analysis of Alternatives, modeling, simulation, testing, and demonstration, including but not limited to: Studies of existing and planned avionics, communications/navigation, electrical, weapons, flight, and nuclear-related aircraft systems and subsystems to support the future viability of the B-52 fleet					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Will be level FY20 to FY21 once funding put into correct BPACs (\$0.050M in FY20 vs \$0.050M in FY21).					
FY21 funding of \$11.166M consists of a. \$0.050M (Other Mods) Program code APB000 - BPAC 675039 - will remain b. \$11.116M (Advanced Targeting POD) Program Code DDV000 - BPAC 671807) - will be transferred to correct BPAC					
Title: AFMC Test Assets					
Description: B-52 AFMC Test Assets provides funding for the test aircraft, manpower and facilities at the Air Force Test Center, Edwards AFB. This will support the developmental testing and sustainment needs of the B-52 from FY19-23.					
FY 2020 Plans: N/A. Funds moved to BPAC 671803					
FY 2021 Base Plans: N/A					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
Title: B-52 VLF/LF Modernization					
	17.766	0.000	0.000	0.000	0.000
	24.551	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675039 / B-52 System Improvements
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: The B-52 Very Low Frequency (VLF)/Low Frequency (LF) effort integrates a receive-only, VLF/LF receiver and antenna subsystem to provide a secure, survivable strategic nuclear communication capability for the B-52. This project will consist of integrating an existing VLF/LF terminal into the B-52. Integration includes Group A wiring, rack and antenna, and the Group B terminal Line Replaceable Unit (LRU).</p> <p>FY 2020 Plans: N/A. N/A. Funds moved to BPAC 671805</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>					
<p>Title: Advanced Target POD MFCD</p> <p>Description: B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. ATPs are capable of transmitting high definition color, picture in picture video at a much higher resolution than the current monochrome ATP monitor can display. Capability increase will improve combat lethality and situational awareness.</p> <p>FY 2020 Plans: Funds moved to BPAC 671807</p> <p>FY 2021 Base Plans: Begin EMD development activities for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. (this funding was incorrectly mapped to this Project and should be mapped to 671807).</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	1.579	0.000	11.116	0.000	11.116

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675039 / B-52 System Improvements
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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If mapped correctly to Project 671807, the increase from FY20 (\$5.397) to FY21 (\$11.116M) for Advanced Target POD MFCF funding for additional development activities for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection and increase EMD efforts.					
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<p>Title: Mission Data Recorder - Non Congressional Add in FY20</p> <p>Description: Data recorder design and flight testing.</p> <p>FY 2020 Plans: Continuing work related to the Mission Data Recorder to make the T-1 modification a Permanent Modification to the platform.</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans: Funding decreased from \$10M to \$0M. Projected completion of RDT&E activities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>	0.000	10.000	0.000	0.000	0.000
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Accomplishments/Planned Programs Subtotals	43.946	10.050	11.166	0.000	11.166
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	FY 2019	FY 2020
<p>Congressional Add: IR Missile Warning System</p> <p>FY 2019 Accomplishments: Complete design, integration, and testing for overseas operations for installation on B-52.</p> <p>FY 2020 Plans: N/A. Program will be cancelled</p>	24.000	0.000
<p>Congressional Add: AFGSC Innovation Hub</p> <p>FY 2019 Accomplishments: N/A</p> <p>FY 2020 Plans: Support future investments such as Agile PODs, Future Comm Data Links, Hypersonic Kill Chain Research & Development</p>	0.000	2.000
<p>Congressional Add: Mission Data Recorder</p>	10.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675039 / B-52 System Improvements
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	FY 2019	FY 2020
<i>FY 2019 Accomplishments:</i> Data recorder design and flight testing.		
<i>FY 2020 Plans:</i> Develop Data recorder design and flight testing.		
Congressional Adds Subtotals	34.000	2.000

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 B052000: BP11 Aircraft Procurement Low Cost Mods	0.452	5.460	0.470	-	0.470	0.480	0.489	0.498	0.506	Continuing	Continuing

Remarks

D. Acquisition Strategy

Analyses of Alternatives will be conducted by various AFLCMC organizations and AFGSC.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675039 / B-52 System Improvements
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Improvements Studies and Analysis	SS/ Various	The Boeing Company, 559 SMXS/MXDPBA : Oklahoma City, OK	-	-		-		-		-		-	Continuing	Continuing	-
VLF/LF EMD - BPAC 671805	SS/CPFF	Various : Oklahoma City, OK	-	21.663	Jul 2019	-		-		-		-	Continuing	Continuing	-
Advanced Target POD MFCD - BPAC 671807	TBD	TBD : Oklahoma City, OK	-	1.579	Jun 2019	-		11.116	Jan 2021	-		11.116	Continuing	Continuing	-
AEHF Integration - BPAC 671810	TBD	TBD : Oklahoma City, OK	-	-		-		-		-		-	Continuing	Continuing	-
Low Cost Mods TBD BPAC 675057	TBD	TBD : Oklahoma City, OK	-	-		-		-		-		-	Continuing	Continuing	-
Mission Data Recorder	TBD	TBD : Oklahoma City, OK	-	10.000	Mar 2019	10.000	May 2020	-		-		-	Continuing	Continuing	-
IR Missile Warning System	C/CPAF	NA : TBD	-	24.000	Mar 2019	-		-		-		-	Continuing	Continuing	-
AFGSC Innovation Hub	C/CPAF	TBD : Barksdale, LA	-	-		2.000	Jul 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	57.242		12.000		11.116		-		11.116	Continuing	Continuing	N/A

Remarks
TBD

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
VLF/LF Program Office Support- BPAC 671805	RO	Not specified. : TBD	-	0.521	Jul 2019	-		-		-		-	Continuing	Continuing	-
VLF/LF Trainers- BPAC 671805	Allot	Not specified. : TBD	-	0.552	Jul 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	1.073		-		-		-		-	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675039 / B-52 System Improvements
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFMC Test Aircraft support - BPAC 671803	PO	AFTC : Edwards AFB, CA	-	17.766	Aug 2019	-		-		-		-	Continuing	Continuing	-
VLF/LF Test - BPAC 671805	PO	Not specified. : TBD	-	0.169	Jul 2019	-		-		-		-	Continuing	Continuing	-
VLF/LF Cyber Security - BPAC 671805	TBD	Not specified. : TBD	-	0.150	Jul 2019	-		-		-		-	Continuing	Continuing	-
VLF/LF Certification - BPAC 671805	TBD	Not specified. : TBD	-	0.046	Jul 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	18.131		-		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
B-52 Centralized Support, Program Management Administration, TDY, A&AS Contractor Support - 675039	Various	TBD : NV	-	0.050	Jan 2019	0.050	Mar 2020	0.050	Jan 2021	-		0.050	Continuing	Continuing	-
B-52 Centralized Support, Travel - 675039	Various	Various : TBD	-	1.450		-		-		-		-	Continuing	Continuing	-
Subtotal			-	1.500		0.050		0.050		-		0.050	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	77.946	12.050	11.166	-	11.166	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675039 / <i>B-52 System Improvements</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Systems Improvements	
System Improvements Studies and Analysis, etc. (Began 2Q16)	
AFMC Test Aircraft support - BPAC 671803	
Test Support	
B-52 VLF/LF Modernization - BPAC 671805	
EMD	
ATP - MFCD BPAC 671807	
EMD	
IR Missile Warning System UON	
Integration and Test	
Production and Installation	
Mission Data Recorder	
Permanent Modification of Mission Data Recorder	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675039 / <i>B-52 System Improvements</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Systems Improvements</i>				
System Improvements Studies and Analysis, etc. (Began 2Q16)	1	2019	4	2025
<i>AFMC Test Aircraft support - BPAC 671803</i>				
Test Support	1	2019	4	2019
<i>B-52 VLF/LF Modernization - BPAC 671805</i>				
EMD	3	2019	4	2019
<i>ATP - MFCD BPAC 671807</i>				
EMD	3	2019	4	2019
<i>IR Missile Warning System UON</i>				
Integration and Test	1	2019	2	2019
Production and Installation	3	2019	4	2019
<i>Mission Data Recorder</i>				
Permanent Modification of Mission Data Recorder	2	2019	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675041 / Bomber Tactical Data Link
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675041: <i>Bomber Tactical Data Link</i>	-	26.017	2.878	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.895
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2020, PE 0101113F, B-52 Squadrons, Project 675041, B-52 Bomber Tactical Data Link efforts were transferred to PE 0101113F, B-52 Squadrons, Project 671810, B-52 AEHF Integration in order to provide a separate BPACs for FY19 new start effort.

A. Mission Description and Budget Item Justification

The B-52 Combat Network Communications Technology (CONNECT) Capability Development Document (CDD), dated 18 March 2004, captures the requirements for a Tactical Data Link (TDL) capability on the B-52. The B-52 TDL provides low latency, jam-resistant situational awareness and C2 communications needed to support in-theater operations and missions. This project will consist of integrating an existing off-the-shelf Link 16 terminal into the B-52. Integration includes Group A wiring, rack and antennae, and the Group B terminal, blanking unit and notch filter LRUs. The TDL terminal will be fully integrated with CONNECT. This Line-of-Sight (LOS) Link 16 capability allows the warfighter to utilize this capability by maintaining situational awareness, avoiding threats, and employing an array of weapons.

Funds may be used to address emerging and short-notice DMSMS issues. As the Link-16 upgrade brings additional capability to the B-52, emerging security requirements (JRE messaging, crypto modernization, etc.) as well as other aircraft upgrades (1760 IWBW, Mode S/Mode 5, IFF, BSB updates, RMP, CERP, etc.) may require study/support for potential impact to the CONNECT and Link-16 system. Funds may also be used for Engineering Development Models (EDMs) as well as testing and fielding terminals.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Additionally, implementation requirements and standards are defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

Funds may be used to procure, test, and field terminals. DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative. Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness. In order to maintain currency with the latest aircraft configuration, the B-52 Systems Improvements projects will update existing trainers or use Computer-Based Training (CBT) to add any new systems improvement functionality to meet user training requirements and update/maintain the Systems Integration Lab (SIL) for the Weapon System Trainers (WSTs).

Funds may be used to resolve emerging safety of flight and DMS issues, accommodate technology insertion, and fulfill FAA (or other) mandates necessary to ensure continued aircrew safety and mission effectiveness.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675041 / Bomber Tactical Data Link
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Bomber Tactical Data Link</p> <p>Description: The TDL will provide low latency, jam-resistant situation awareness and command/control needed to support in-theater operations/missions via a line-of-sight (LOS) Link 16 capability. The program will consist of integrating an existing off-the-shelf Link 16 terminal into the B-52. This will include Group A wiring, rack and antennae and the Group B terminal, blanking unit and notch filter LRUs. The terminals will be installed inside the fuselage of the aircraft and external antennas will be mounted on the fuselage. The TDL terminal and LOS capability will be integrated with the rest of the CONECT subsystem.</p> <p>FY 2020 Plans: Continue EMD, complete DT and OT, begin Weapons System Trainer Upgrade</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in funding due to phasing down of EMD activities</p>	11.118	2.878	0.000	0.000	0.000
<p>Title: B-52 AEHF Integration</p> <p>Description: The B-52 Advanced Extremely High Frequency (AEHF) Integration SATCOM system provides a survivable, low probability of intercept/detection, high bandwidth system that ensures secure intra/inter-flight and two-way command and control communications in the modern anti-access/aerial denial battle space. This communications upgrade replaces the Military Strategic and Tactical Relay (MILSTAR) and its Ultra High Frequency (UHF) SATCOM capability (MILSTAR is nearing system end of life) on the B-52. The AEHF Integration effort will integrate the radio, antenna and system components required to provide two-way EHF communication for the B-52.</p> <p>FY 2020 Plans: Funds moved to BPAC 671810</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans:</p>	13.449	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675041 / Bomber Tactical Data Link
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	24.567	2.878	0.000	0.000	0.000

	FY 2019	FY 2020
Congressional Add: Bomber Tactical Data Link - Congressional Add	1.450	0.000
FY 2019 Accomplishments: Completed Critical Design Review (1QFY19). Approved of new unit that will be beneficial to multiple future B-52H Communication Systems modernization programs.		
FY 2020 Plans: N/A		
Congressional Adds Subtotals	1.450	0.000

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

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Line Item B05200: BP11 Production	-	11.925	25.977	-	25.977	20.696	9.854	3.796	-	0.000	72.248
• APAF 06 000999: Initial Spares	-	2.381	2.495	-	2.495	-	-	-	-	0.000	4.876
• RDTE 07 BPAC 671810: B-52 AEHF (not including Bomber Tactical Datalink)	13.449	0.000	0.000	-	0.000	0.000	0.000	0.000	-	Continuing	Continuing

Remarks

FY19 is only year containing both Bomber Tactical Data Link and AEHF funding.
FY20 - only contains Bomber Tactical Data Link funding

D. Acquisition Strategy

The Milestone Decision Authority (MDA) approved the 28 October 2016 decision of the B-52 Link-16 Acquisition Strategy Panel (ASP), which authorized the program to enter into the EMD phase with the Original Equipment Manufacturer (OEM). Once complete, the program will proceed to Milestone C and Full Rate Production.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675041 / Bomber Tactical Data Link
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Link 16 EMD - Wright Patt - BPAC 675041	SS/ Various	Boeing : Oklahoma City, OK	-	6.409	Feb 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	6.409		-		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Trainers - Link 16 BPAC 675041	C/CPAF	Not specified. : TBD	-	2.039	Feb 2019	2.878	Apr 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	2.039		2.878		-		-		-	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Studies Link 16 BPAC 675041	C/CPAF	Not specified. : TBD	-	1.447	Feb 2019	-		-		-		-	Continuing	Continuing	-
Test Link 16 BPAC 675041	C/CPAF	Not specified. : TBD	-	1.207	Feb 2019	-		-		-		-	Continuing	Continuing	-
Studies AEHF Development - BPAC 671810	C/CPAF	Not specified. : TBD	-	13.404	May 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	16.058		-		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Centralized Support - Link 16 BPAC 675041	Various	Various : NV	-	1.466	Mar 2019	-		-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675041 / Bomber Tactical Data Link
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Bomber Tactical Data Link</i>	
EMD	
Milestone C	
Production and Install	
IOC	
FOC	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675041 / <i>Bomber Tactical Data Link</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Bomber Tactical Data Link</i>				
EMD	1	2019	4	2020
Milestone C	1	2021	1	2021
Production and Install	1	2021	3	2024
IOC	2	2022	2	2022
FOC	3	2024	3	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>				Project (Number/Name) 675050 / <i>CONNECT</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675050: <i>CONNECT</i>	-	6.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.055
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The B-52H Combat Network Communication Technology (CONNECT) acquisition project supports nuclear and conventional operations by upgrading the B-52H fleet with data and voice communications capabilities along with improved threat and situational awareness to support participation in network centric operations. This CONNECT modification includes procurement of 74 aircraft kits + 2 EMD kits that will be installed in conjunction with Programmed Depot Maintenance (PDM). Ground station mission planning hardware, support equipment, initial spares, and Interim Contractor Support will be procured. Additional initial support/readiness efforts will develop and upgrade B-52H training devices with CONNECT functionality. The CONNECT training device upgrades provide full CONNECT functionality to support aircrew training. The Aircrew Training Devices (ATDs) include three B-52H Weapon System Trainers (WST) and two Offensive Station Mission Trainers (OSMT), and the upgrades will also be installed in the Systems Integration Lab (SIL). The Other Government Cost line includes, but is not limited to, Diminishing Manufacturing Sources (DMS) costs to maintain the production configuration through the identification, review and monitoring of items with high obsolescence risk potential, classification of identified items according to criticality, identification of alternatives and implementation of resolutions. Resolutions may include non-recurring engineering (NRE) and/or replacement costs for DMS components, bridge buys of DMS components until NRE can be completed or Life of Type buys, whichever is most appropriate. Included in the Support Equipment line is the planning for establishment of an organic Depot capability, stand-up of the depot, procurement of depot equipment and procurement of the CONNECT ground station. Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

As the CONNECT upgrade brings additional capability to the B-52, emerging communication and security requirements (upgrades to IBR, JRE messages, crypto modernization, etc.) and aircraft upgrades (1760 IWBU, Mode S/Mode 5 Identification, IFF, etc.) may require study for potential impacts to CONNECT. In order to maintain currency with the latest aircraft configuration, the CONNECT project will update existing trainers (using stimulate/simulate/computer-based training or a mix) to add CONNECT functionality to meet user-training requirements, and update/maintain the SIL for the WSTs. In order to assist PDM during after-install checkout and Barksdale AFB and Minot AFB units with maintenance checkout and operational training, a CONNECT ground station is being developed.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Additionally, implementation requirements and standards are defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

Funds support Weapons System Trainers for the CONNECT program.

Funds may be used to address emerging and short-notice DMSMS issues. Funds may also be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675050 / CONECT

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: B-52 CONECT</p> <p>Description: Diminishing Manufacturing Source (DMS) redesign development and test effort. Continued engineering design of CONECT capability into the B-52 training systems. Began incorporating changes required due to updates in Government Furnished Equipment (GFE) and crypto modernization requirements. Incorporated/integrated CONECT with recurring updates of the B-52 software baseline. As the CONECT upgrade brings additional capability to the B-52, emerging communication and security requirements (upgrades to the IBR, JRE messages, crypto modernization, etc.) and aircraft upgrades (1760 Internal Weapons Bay Upgrade, Mode S/Mode 5 IFF, etc.) may require study for potential impacts to CONECT. CONECT will update the existing trainers and/or use computer-based training to add CONECT functionality to meet user-training requirements, and update/maintain the System Integration Lab (SIL) and for the WST. A CONECT ground station, is required in order to assist PDM during after-install checkout, and provide Barksdale/Minot units with maintenance checkout and operational training capability.</p> <p>FY 2020 Plans: FY19 last year of RDT&E funding</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>	6.055	0.000	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	6.055	0.000	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Line Item B05200: BP11 Production	23.844	13.567	0.000	-	0.000	32.790	5.671	-	-	0.000	75.872
• APAF 06 000999: Initial Spares	-	-	-	-	-	-	-	-	-	0.000	0.000
• APAF 07 Line Item B05200: Post Production Support	12.819	2.341	0.936	-	0.936	5.656	5.757	-	-	0.000	27.509

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675050 / <i>CONNECT</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

D. Acquisition Strategy

The B-52 CONECT EMD prime contract is a sole source to Boeing Defense, Space & Security (DSS) in Oklahoma City, OK. Boeing DSS designs, develops, tests and procures necessary equipment from their subcontractors; developed engineering drawings, logistic and technical data. Advanced Training Consulting is the current contractor for the trainer update to integrate CONECT into the existing trainers.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675050 / CONECT
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFTRS R3 Integration	SS/CPAF	The Boeing Company : Oklahoma City, OK	-	1.000	Dec 2018	-		-		-		-	0.000	1.000	-
CONECT Weapon Sys Trainer Update	C/Various	Aviation Training Consultants LLC : Edmond, OK	-	2.417	Feb 2019	-		-		-		-	0.000	2.417	-
Subtotal			-	3.417		-		-		-		-	0.000	3.417	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Support	Various	Not specified. : NV	-	1.138	Apr 2019	-		-		-		-	0.000	1.138	-
Subtotal			-	1.138		-		-		-		-	0.000	1.138	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EMD Test Jet to FRP Configuration	C/CPAF	Not specified. : TBD	-	1.500	Dec 2018	-		-		-		-	0.000	1.500	-
Subtotal			-	1.500		-		-		-		-	0.000	1.500	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals			-	6.055	0.000	-	-	-	0.000	6.055

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675050 / CONECT
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

CONECT	
Weapon System Trainer (WST) Upgrade	
WST System Integration Lab (SIL) Development	
System Integration Lab Relocation	
Offensive Station Mission Trainer (OSMT) Development	
Production and Installation	
FOC	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675050 / <i>CONNECT</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CONNECT				
Weapon System Trainer (WST) Upgrade	1	2019	4	2019
WST System Integration Lab (SIL) Development	1	2019	1	2019
System Integration Lab Relocation	1	2019	4	2019
Offensive Station Mission Trainer (OSMT) Development	2	2019	4	2019
Production and Installation	1	2019	3	2021
FOC	3	2021	3	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 675055 / GPS-IU			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675055: GPS-IU	-	28.424	1.986	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	30.410
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The GPS IU Upgrade program will provide increased throughput and memory capacity by replacing the current processor, static memory, and necessary associated electronics with a newer processor, more memory, and sustainable electronic packages. This program will replace six Circuit Card Assemblies (CCA) which include combining three Circuit Cards into one Input/Output (I/O) CCA. The Backplane and Motherboard will require an upgrade to integrate the new CCAs: the Central Processing Unit / 1553, the power supply CCA, and the video graphics cards. The Input/Output CCA will combine the Discrete Inputs Analog, Audio Video (DAAV), Discrete Outputs (DOA) and Serial Busses functionality. This upgrade will improve system reliability and address Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues on subcomponents of the IU.

In addition the new GPS IU will retain the existing functions and interfaces of the legacy GPS IU, and provide additional interfaces to allow for future growth requirements: Which include two Ethernet Ports and two connectors on face-plate for future growth.

The GPS IU integrates GPS Position, Navigation and Timing (PNT) data into navigation, communications, and weapons systems on board the B-52. The GPS IU acts as a controller for a MIL-STD-1553 data bus communications path. The major areas of support include GPS interface control and monitoring, targeting pod functions, navigation displays for the Pilot and Copilot stations, and Identification Friend or Foe (IFF) control functions.

Originally developed with a 33MHz processor with 4MB of Static Random Access Memory (SRAM), the GPS IU has become overloaded as more software has been added to the B-52. Currently operating at 86% throughput capacity and at 90% memory capacity, exceeding the designated safety threshold of 95% memory load in 2019. The GPS IU is also facing parts obsolescence issues. Studies show that the current spares will be exhausted by 2020. The upgrade will improve system reliability and address Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues on subcomponents of the IU. The modified GPS IU will retain the existing functions and interfaces of the legacy GPS IU, and provide additional interfaces to allow for future growth requirements.

GPS IU requires upgrading to incorporate any other GPS dependent capabilities on the B-52 platform. B-52 fleet will have the capability to carry additional GPS dependent weapons and targeting pods, and the increased capacity to incorporate future GPS-dependent capabilities beyond 2018.

Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) and Development Testing (DT)/ Operational Testing(OT) issues.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675055 / <i>GPS-IU</i>
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DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Global Positioning System (GPS) Interface Unit (IU)	28.424	1.986	0.000	-	0.000
Description: Global Positioning System (GPS) Interface Unit (IU) Upgrade will replace six circuit card assemblies in the GPS IU, the backplane, and the chassis.					
FY 2020 Plans: Configuration Control Board, and Technology Readiness Review					
FY 2021 Base Plans: Development/Operational Flight test. Completion of EMD, Milestone C and FRP Decision					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases due to ramp down of EMD effort in preparation for Production					
Accomplishments/Planned Programs Subtotals					
	28.424	1.986	0.000	-	0.000

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 06 Line Item	-	11.097	23.871	-	23.871	-	0.000	-	-	0.000	34.968
<i>B05200: BP11 Production</i>											
• APAF 06 000999: <i>Initial Spares</i>	-	-	-	-	-	8.052	1.543	-	-	0.000	9.595

Remarks

D. Acquisition Strategy

The GPS IU Modernization program began development in the Technology Maturation and Risk Reduction (TMRR) phase via a sole source contract to Boeing Defense, Space & Security (DSS) in Oklahoma City, OK. Development is currently in the EMD phase via a sole source contract to Boeing DSS, OKC, awarded Sep 2018. Deliverables include software, eight modernized prototypes, logistics support, ground and flight test support, and engineering drawings. MS B was approved June 2018.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675055 / GPS-IU
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS-IU TMRR	SS/ Various	Boeing : Oklahoma City, OK	-	-		-		-		-		-	0.000	0.000	-
GPS-IU EMD Contract	SS/ Various	Boeing : Oklahoma City, OK	-	28.164	Mar 2019	-		-		-		-	0.000	28.164	-
Subtotal			-	28.164		-		-		-		-	0.000	28.164	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
419th test	PO	Not specified. : TBD	-	-		1.986	Mar 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	-		1.986		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA, Contractor Support, Travel	Various	Various : NV	-	0.260	Oct 2018	-		-		-		-	0.000	0.260	-
Subtotal			-	0.260		-		-		-		-	0.000	0.260	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals		-	28.424	1.986	-	-	-	Continuing	Continuing

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675055 / <i>GPS-IU</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

GPS-IU	
EMD	
DT/OT	
MS C	
Production & Installs	
FOC	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675055 / <i>GPS-IU</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>GPS-IU</i>				
EMD	1	2019	4	2021
DT/OT	2	2021	3	2021
MS C	3	2021	3	2021
Production & Installs	4	2021	1	2023
FOC	1	2023	1	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 675056 / B-52 Radar Modernization Program (RMP)			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675056: B-52 Radar Modernization Program (RMP)	-	77.333	109.278	168.692	0.000	168.692	187.452	177.035	110.989	46.860	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The B-52 Radar Modernization Program (RMP) supports nuclear and conventional operations by replacing the current APQ-166 radar on the B-52H aircraft. The APQ-166 system will be increasingly difficult to sustain due to diminished manufacturing sources and obsolescent technologies; the current failure rate of the APQ-166 places long-duration missions at risk. This modernization program will encompass the radar antenna array and up to 14 individual LRUs that comprise the entire radar system. Development, production and installation of new components and systems to replace the legacy equipment; to be installed on all 76 B-52H aircraft. RMP will take advantage of advances in technology and on-going development efforts to acquire, to the maximum extent possible, previously developed Radar systems and integrate them into the B-52. The use of new technology will increase both the overall reliability of the radar system and the capabilities for new missions. This Radar Modernization Program will allow the operational command (AF Global Strike Command) to fully utilize the capabilities of the B-52H aircraft to employ an array of nuclear and conventional weapons and to perform mission-essential navigation and weather avoidance functions. In addition, applicable training devices for the new radar subsystem must also be developed, modified and/or upgraded in conjunction with the aircraft modifications.

This upgrade will affect all three Weapon System Trainers (WST), the WST Training Systems Integration Laboratory (SIL), and both B-52 Offensive Station Maintenance Trainers (OSMT). As the RMP upgrade brings additional capability to the B-52, emerging security/certification requirements (nuclear certification, cyber security, program protection, crypto modernization, etc.), increased radar integration (advanced targeting pod, mission planning, open mission systems considerations, crew vehicle interfaces and Electronic Warfare System), as well as other aircraft upgrades (e.g., Link 16, EHF, 1760 IWBU, Mode S/Mode 5, IFF, GPS/INS, BSB, Re-Engine, EWS, etc.) may impact the RMP. Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. DMS efforts to include removal of end-of-life/obsolete software/hardware within the weapons system and simulators systems enabling a move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative may also be required. Additionally, funds may be used to resolve emerging safety of flight, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and nuclear/conventional mission effectiveness.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Radar Modernization Program	77.333	109.278	168.692	0.000	168.692
Description: Support nuclear and conventional operations by replacing the current APQ-166 radar on the B-52H aircraft. Development and production of new systems to replace the legacy equipment and to be installed on all 76 B-52H aircraft.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675056 / B-52 Radar Modernization Program (RMP)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><i>FY 2020 Plans:</i> Continue integration/technical design with OEM and subcontractors, leading to completion of a weapons system level Preliminary Design Review (PDR). Additionally, procure initial System Integration Laboratory (SIL) Kits and complete Milestone B and award EMD contract in 2QFY21.</p> <p><i>FY 2021 Base Plans:</i> Continue integration/technical design with OEM and subcontractors, leading to completion of a weapons system level Preliminary Design Review (PDR). Entering EMD Phase.</p> <p><i>FY 2021 OCO Plans:</i> N/A</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Complete RR and enter EMD Phase.</p>					
Accomplishments/Planned Programs Subtotals	77.333	109.278	168.692	0.000	168.692

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Lineltem B05200: BP11 Production	-	0.009	0.000	-	0.000	2.361	39.493	193.597	-	Continuing	Continuing
• APAF 07 Line Item B05200: Post Production Support	-	-	0.098	-	0.098	0.100	0.102	0.104	-	Continuing	Continuing
• APAF 06 000999: Initial Spares	-	0.118	0.197	-	0.197	0.200	0.204	0.208	-	Continuing	Continuing

Remarks

D. Acquisition Strategy
The Milestone Decision Authority approved the B-52 RMP Acquisition Strategy (AS) on 13 March 2018. Per the AS, the OEM completed radar and other supplier selections in June 2019. The OEM is executing ongoing contract work with the subsystem suppliers, integration, acquisition planning, and risk reduction activities leading to a system PDR by 4th Qtr FY20.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675056 / B-52 Radar Modernization Program (RMP)
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		152.358	Dec 2020	-		152.358	Continuing	Continuing	-
Risk Reduction	TBD	Not specified. : NV	-	73.205	Jul 2019	98.723	Mar 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	73.205		98.723		152.358		-		152.358	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		1.249	Mar 2020	-		-		-	Continuing	Continuing	-
Cyber Security Support	C/CPAF	Not specified. : TBD	-	0.732	Dec 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			-	0.732		1.249		-		-		-	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		1.200	Dec 2020	-		1.200	Continuing	Continuing	-
Trainers	C/CPAF	Not specified. : TBD	-	-		-		6.000	Dec 2020	-		6.000	Continuing	Continuing	-
Test RMP BPAC 675056	C/CPAF	Not specified. : TBD	-	0.276	Dec 2018	0.300	Mar 2020	-		-		-	Continuing	Continuing	-
Studies RMP Development	C/CPAF	Not specified. : TBD	-	1.966	Dec 2018	0.550	Mar 2020	1.500	Dec 2020	-		1.500	Continuing	Continuing	-
Subtotal			-	2.242		0.850		8.700		-		8.700	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Management Support, A&AS, PMA	Various	Not specified. : NV	-	1.154	Aug 2019	8.456	Mar 2020	7.634	Dec 2020	-		7.634	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675056 / B-52 Radar Modernization Program (RMP)

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Radar Modernization Program</i>																												
Acquisition Planning	■																											
Risk Reduction	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Development Request for Proposal Release				■																								
MS B										■																		
EMD										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Flight Testing														■	■	■	■	■	■	■	■	■	■	■	■	■	■	
MS C																										■	■	
Production																										■	■	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675056 / <i>B-52 Radar Modernization Program (RMP)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Radar Modernization Program</i>				
Acquisition Planning	1	2019	1	2019
Risk Reduction	1	2019	2	2021
Development Request for Proposal Release	4	2019	4	2019
MS B	2	2021	2	2021
EMD	2	2021	2	2025
Flight Testing	3	2022	3	2024
MS C	4	2024	4	2024
Production	2	2025	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 675057 / B-52 Low Cost Improvement (LCI)			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675057: B-52 Low Cost Improvement (LCI)	-	2.605	2.607	2.600	0.000	2.600	2.656	2.705	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program will include projects to facilitate future B-52 capabilities. Scope of work may involve, but is not limited to, Avionics, Navigation, Situational Awareness (SA) and Defensive Systems. Additionally, develop and integrate emerging technologies for specialized B-52 missions to include Intelligence Surveillance and Reconnaissance (ISR), Targeting and Weapons. Additionally, this funding also includes future prototyping efforts.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Additionally, implementation requirements and standards are defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

Funds may be used to address emerging and short-notice DMSMS issues. Funds may be used to resolve emerging safety of flight and DMS issues, accommodate technology insertion, and fulfill FAA (or other) mandates necessary to ensure continued aircrew safety and mission effectiveness.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 Low Cost Improvements	2.605	2.607	2.600	0.000	2.600
Description: Develop and integrate emerging technologies for specialized B-52 missions to include ISR, targeting, and weapons. This includes performing demonstrations and experimentation of emerging and advanced technologies, as well as supporting external agency projects of the technology in a relevant environment.					
FY 2020 Plans: Develop and integrate emerging technologies for specialized B-52 missions to include ISR, targeting, and weapons. This includes performing demonstrations and experimentation of emerging and advanced technologies, as well as supporting external agency projects of the technology in a relevant environment. Perform work necessary to make the Mission Data Recorder a permanent modification on the platform.					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675057 / B-52 Low Cost Improvement (LCI)
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Develop and integrate emerging technologies for specialized B-52 missions to include ISR, targeting, and weapons. This includes performing demonstrations and experimentation of emerging and advanced technologies, as well as supporting external agency projects of the technology in a relevant environment. <i>FY 2021 OCO Plans:</i> N/A <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A.					
Accomplishments/Planned Programs Subtotals	2.605	2.607	2.600	0.000	2.600

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 Line item B05200: BP11 Production	2.362	2.412	2.457	-	2.457	2.508	2.553	2.600	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Studies and Analyses will be conducted by various AFLCMC organizations and AFGSC.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675057 / B-52 Low Cost Improvement (LCI)
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Studies and analyses to develop and integrate emerging technologies for the B-52	C/Various	TBD : NV	-	2.605	Jan 2019	2.607	Mar 2020	2.600	Mar 2021	-		2.600	Continuing	Continuing	-
Subtotal			-	2.605		2.607		2.600		-		2.600	Continuing	Continuing	N/A
Project Cost Totals			-	2.605		2.607		2.600		-		2.600	Continuing	Continuing	N/A

Remarks

<u>Remarks</u>	
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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675057 / B-52 Low Cost Improvement (LCI)	

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Low Cost Improvements	
Low Cost Improvements Studies and Analyses	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675057 / <i>B-52 Low Cost Improvement (LCI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Low Cost Improvements</i>				
Low Cost Improvements Studies and Analyses	2	2021	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 675129 / B-52 CERP			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675129: B-52 CERP	-	59.717	175.359	299.402	0.000	299.402	327.518	247.373	263.986	147.772	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

B-52 CERP is a Middle Tier Section 804 program and not an MDAP.

A. Mission Description and Budget Item Justification

The B-52 Commercial Engine Replacement Program (CERP) supports nuclear and conventional operations by replacing the current TF33-PW-103 engine on the B-52H aircraft. The TF33-PW-103 engine is increasingly difficult to sustain due to diminished manufacturing sources and obsolescent technologies; the AF Propulsion Directorate projects the engine will become unsustainable by 2030. This sustainment program will replace the current TF33-PW-103 engine with jet engines of similar size, weight, and thrust characteristics. The development, production and installation of new engines and related subsystems will replace the legacy equipment on all 76 B-52H aircraft. B-52 CERP will take advantage of advances in technology and on-going development efforts to acquire engines and integrate them into the B-52. The use of new technology will increase both the overall reliability/maintainability of the propulsion system and produce additional electrical power generation capabilities for emerging requirements. The B-52 CERP will allow the operational command (AF Global Strike Command) to fully utilize the capabilities of the B-52H aircraft to employ an array of nuclear and conventional weapons while saving fuel and extending the range/loiter capabilities of the aircraft. In addition, applicable training devices for the engine throttles and engine health monitoring subsystem must also be developed, modified and/or upgraded in conjunction with the aircraft modifications. This upgrade will also require corresponding modification of the Weapon System Trainers (WST). As B-52 CERP brings additional capability to the B-52, emerging security/certification requirements (nuclear hardening, cyber security, program protection, etc.) will also need to be addressed. Several concurrent aircraft upgrades during the CERP may necessitate the construction of facilities or facility upgrades/modification. In addition, it may necessitate studies be performed to determine optimal engine installation and deployment options.

Cost includes any other analysis or documentation and related expenses necessary to establish a program of record and support the B-52 Weapon System. Cost includes Program Management Administration (PMA) costs, centralized support and initiatives for anticipated weapon system enhancements, to include efforts to improve weapon system operational capabilities, safety, supportability, maintainability, reliability, and total cost of ownership.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 CERP	59.717	175.359	299.402	-	299.402

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675129 / B-52 CERP
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: This sustainment program will replace the current TF33-PW-103 engine with jet engines of similar size, weight, and thrust characteristics. The development, production and installation of new engines and related subsystems will replace the legacy equipment on all 76 B-52H aircraft. B-52 CERP will take advantage of advances in technology and on-going development efforts to acquire engines and integrate them into the B-52.</p> <p>FY 2020 Plans: Moving out of System Requirements phase, Initiate Rapid Prototyping phase 1 with Boeing as the integrator. Initiate and ensure proper Source Selection process.</p> <p>FY 2021 Base Plans: Continue Rapid Prototyping phase 1. Select engine vendor. VSP Increment 1</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase in approved funding needed to continue Rapid Prototype phase 1 contract and award engine vendor contract.</p>					
Accomplishments/Planned Programs Subtotals	59.717	175.359	299.402	-	299.402

C. Other Program Funding Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
<p>Line Item</p> <ul style="list-style-type: none"> • APAF 05 0101113F: B-52 SQUADRONS 	-	-	-	-	-	-	-	-	683.929	Continuing	Continuing

Remarks

D. Acquisition Strategy
Acquisition strategy and FY16 NDAA Section 804 authority approved Sept 2018. Completing Risk Reduction activities, and initiating Rapid Prototyping phase 1 activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675129 / B-52 CERP
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Improvements Studies and Analysis	SS/ Various	The Boeing Co : Oklahoma City, OK	-	-		-		-		-		-	Continuing	Continuing	-
Risk Reduction, Acquisition Planning, preliminary integration design and Engine Source Selection System Performance Requirements decomposition	SS/CPFF	The Boeing Co : Oklahoma City, OK	-	20.000	Dec 2018	-		-		-		-	Continuing	Continuing	-
Integration Risk Analysis via Other Transaction	C/FFP	SOSSEC Consortium : Atkinson, NH	-	29.000	May 2019	-		-		-		-	Continuing	Continuing	-
Rapid Prototyping Phase 1 Contract Award	SS/CPIF	The Boeing Co : Oklahoma City, OK	-	-		169.359	Mar 2020	113.075	Mar 2021	-		113.075	Continuing	Continuing	280.000
Engine Contract Award	C/FFP	TBD : TBD, OK	-	-		-		175.426	Mar 2021	-		175.426	Continuing	Continuing	-
Subtotal			-	49.000		169.359		288.501		-		288.501	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Edwards AFTC	PO	Edwards AFB : Edwards AFB	-	-		-		5.000	Oct 2020	-		5.000	Continuing	Continuing	-
Subtotal			-	-		-		5.000		-		5.000	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration, Centralized Support, A&AS support, TDY, OGC	Various	EPASS Contract for A&AS : WPAFB, OH	-	10.717	Nov 2018	6.000	Mar 2020	5.901	Oct 2020	-		5.901	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force										Date: February 2020				
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons					Project (Number/Name) 675129 / B-52 CERP				

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	10.717		6.000		5.901		-		5.901	Continuing	Continuing	N/A
Project Cost Totals			-	59.717		175.359		299.402		-		299.402	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675129 / <i>B-52 CERP</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>B-52 CERP</i>	
System Requirement Phase	
Virtual Power Pod Prototype	
Prototype Development Phase 1	
Virtual System Prototype Increment 1	
Prototype Development Phase 2	
Virtual System Prototype Increment 2	
Physical System Prototype 1	
Physical System Prototype 2	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675129 / <i>B-52 CERP</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-52 CERP</i>				
System Requirement Phase	1	2019	4	2020
Virtual Power Pod Prototype	1	2020	1	2020
Prototype Development Phase 1	2	2020	1	2022
Virtual System Prototype Increment 1	3	2021	3	2021
Prototype Development Phase 2	1	2022	4	2025
Virtual System Prototype Increment 2	2	2022	2	2022
Physical System Prototype 1	1	2025	1	2025
Physical System Prototype 2	2	2025	2	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons				Project (Number/Name) 675160 / B-52 Crypto Modernization			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675160: B-52 Crypto Modernization	-	12.000	0.000	4.509	0.000	4.509	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Upgrades aircraft with Mobile User Objective System (MUOS) capable ARC-210 radio systems to prevent loss of BLOS voice and data communications capability.

Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: B-52 Crypto Modernization	-	0.000	4.509	0.000	4.509
Description: Upgrades aircraft with MUOS capable ARC-210 radio systems to prevent loss of BLOS voice and data communications capability.					
FY 2020 Plans: Continue to utilize FY19 funds to support Critical Design review (CDR). The program office is requesting additional funding through the Unfunded Requirement (UFR) process to continue the support of EMD contract, test & evaluation, and Milestone C efforts.					
FY 2021 Base Plans: Support Critical Design review (CDR). The program office is requesting additional funding through the Unfunded Requirement (UFR) process to continue the support of EMD contract, test & evaluation, and Milestone C efforts.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675160 / B-52 Crypto Modernization
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY19 funding used to bridge through FY20.					
Accomplishments/Planned Programs Subtotals	-	0.000	4.509	0.000	4.509

	FY 2019	FY 2020
Congressional Add: B-52 Crypto Modernization Congressional Add	12.000	-
FY 2019 Accomplishments: The program office awarded a contract to the OEM on 20 December 2018. The program office completed Software Requirements Review (SRR) and Preliminary Design Review (PDR) during FY19.		
Congressional Adds Subtotals	12.000	-

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Line item B05200: BP11 Production	-	0.000	0.000	-	0.000	3.485	2.397	-	-	0.000	5.882

Remarks
Combined Acquisition Strategy (AS) and AS Panel conducted Dec 2017 and approved Jan 2018. Initial POE submitted / approved Apr 2018. EMD contract awarded Dec 2018

D. Acquisition Strategy
The Milestone Decision Authority (MDA) approved the 31 January 2018 decision of the B-52 Crypto Modernization Acquisition Strategy Panel (ASP), which authorized the program to enter into the EMD phase with the Original Equipment Manufacturer (OEM). The program office awarded a contract to the OEM on 20 December 2018. EMD efforts are underway and scheduled to be complete by FY23. Once complete, the program office will brief the updated ASP and Milestone C for full rate production and fielding for approval from the MDA.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / B-52 Squadrons	Project (Number/Name) 675160 / B-52 Crypto Modernization
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Crypto Modernization</i>	
Risk Reduction Activities	
EMD	
MS C	
IOC	
Production and Installation	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101113F / <i>B-52 Squadrons</i>	Project (Number/Name) 675160 / <i>B-52 Crypto Modernization</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Crypto Modernization</i>				
Risk Reduction Activities	1	2019	2	2019
EMD	1	2019	4	2022
MS C	1	2023	1	2023
IOC	4	2023	4	2023
Production and Installation	1	2023	2	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	5.741	10.217	1.433	0.000	1.433	0.459	1.000	0.517	0.526	Continuing	Continuing
674797: <i>ALCM Upgrades</i>	-	5.741	10.217	1.433	0.000	1.433	0.459	1.000	0.517	0.526	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AGM-86B, Air Launched Cruise Missile (ALCM), is a subsonic, air-to-surface strategic nuclear missile, operational since 1982. Armed with a W-80 warhead, it is designed to evade air and ground-based defenses in order to strike targets at any location within any enemy's territory. The ALCM is designed for B-52H internal and external carriage.

RDT&E funds support development of new tests and evaluation procedures, software, and equipment. RDT&E funds also provide sustainment solutions for Line Replaceable Units (LRU) and technology insertion to ensure ALCM sustainability supports Air Force strategic nuclear deterrence and Global Strike mission requirements through 2030. Additionally, RDT&E funds support aging and surveillance analysis to pro-actively identify components which will degrade system reliability.

The ALCM Test Plan Development and Evaluation program develops plans and procedures for testing nuclear systems, and implements those procedures as directed by the Chairman, Joint Chiefs of Staff (CJCS) and to satisfy the recurring requirements to test Chemical, Biological, Radiological, and Nuclear (CBRN) susceptibility.

An extensive Service Life Extension Program (SLEP) is in place to address age related issues and to ensure reliability and sustainability through 2030. Technology insertion is anticipated to address serviceability of components at or near end of life.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ALCM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F or 0605833F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	5.955	10.217	8.436	0.000	8.436
Current President's Budget	5.741	10.217	1.433	0.000	1.433
Total Adjustments	-0.214	0.000	-7.003	0.000	-7.003
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.214	0.000	-7.003	0.000	-7.003

Change Summary Explanation

FY21 funding reduced for higher Air Force priorities

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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<p>Title: Inertial Navigation Element (INE)</p> <p>Description: Conducting analysis and engineering efforts to ensure short and long term supportability of the ALCM Inertial Navigation Element (INE).</p> <p>FY 2020 Plans: Complete development and certification that INE unit is ready for production.</p> <p>FY 2021 Plans: No FY21 requirement or INE, all development complete in FY21.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: INE development completed in FY20</p>	2.840	1.057	0.000
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<p>Title: ALCM Test Plan Development and Evaluation</p> <p>Description: Develop test procedures to implement CJCS-directed requirement for Electromagnetic (EM) testing for nuclear systems.</p> <p>FY 2020 Plans:</p>	2.901	9.160	1.433
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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Continue testing in a CBRN environment.			
<i>FY 2021 Plans:</i> Execute Neutron Test in support of ALCM Chemical Biological Radiological and Neutron (CBRN) Survivability Requirement IAW AFI 10-2607			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Executing test identification for future CBRN tests to meet AF 10-2607 Survivability requirement			
Accomplishments/Planned Programs Subtotals	5.741	10.217	1.433

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 Line Item MALCBG: <i>ALCM, Missile Modifications</i>	47.632	77.387	80.837	-	80.837	83.498	69.296	-	-	Continuing	Continuing
• MPAF 04 Line Item MALCBG: <i>ALCM, Replenishment Spares</i>	2.280	2.321	2.359	-	2.359	2.407	2.451	-	-	Continuing	Continuing
• OPAF 03 Line Item MALCBG: <i>ALCM, Electronics & Telecommunications Equipment (BP83)</i>	1.775	1.806	1.840	-	1.840	1.873	1.906	-	-	Continuing	Continuing
• MPAF 04 Line Item 999/Replen Spa...: <i>ALCM, Initial Spares</i>	0.308	0.119	0.328	-	0.328	0.435	0.441	-	-	Continuing	Continuing

Remarks

E. Acquisition Strategy

Previously, the Air Launched Cruise Missile (ALCM) was assessed in the nuclear environment for Chemical, Biological, Radiological and Nuclear (CBRN) Survivability for High Altitude Electromagnetic Pulse (HEMP) and Total Ionizing Dose at White Sands Missile Range (WSMR).

Follow-on test development will assess the neutron and gamma component in the nuclear environment for CBRN survivability. Test development and execution will utilize organic and contractor agencies.

INE SLEP plans for a three phase reliability assessment with comprehensive plan to address short and long term supportability. Phase 1 - Short-term parts shortage mitigation analyses with Tomahawk Reference Measuring Unit and Computer

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>	
Phase 2 - Definition of scope of efforts and establishing the manufacturing methodology Phase 3 - Delivery of working engineering samples, certification of production, and production of INE's equal to the function and reliability of 'like new' devices		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101122F / Air-Launched Cruise Missile (ALCM)	Project (Number/Name) 674797 / ALCM Upgrades
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
INE LRU Sustainment Assessment	TBD	NG : UT	-	2.840	Jun 2019	1.057	Jan 2020	-		-		-	Continuing	Continuing	-
CBRN Test Plan Development & Evaluation	Various	WSMR, Boeing : NV	-	0.867	Feb 2019	0.810	Dec 2019	1.413	Feb 2021	-		1.413	Continuing	Continuing	-
Subtotal			-	3.707		1.867		1.413		-		1.413	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management and Engineering Services for research, development, test and evaluation on ALCM	C/CPAF	Not specified. : TBD	-	2.014		8.330		-		-		-	Continuing	Continuing	-
PMA - Government Costs	Various	Various : Various	-	0.020		0.020		0.020		-		0.020	Continuing	Continuing	-
Subtotal			-	2.034		8.350		0.020		-		0.020	Continuing	Continuing	N/A

Remarks
Test Development and Evaluation PMA is for Supplies and Travel in support of project number 674797

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals		-	5.741	10.217	1.433	-	1.433	Continuing	Continuing

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101122F / Air-Launched Cruise Missile (ALCM)	Project (Number/Name) 674797 / ALCM Upgrades

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

INE Sustainment	
INE Line Replaceable Unit Assessment	
CBRN Test	
CBRN Test Plan Development	
CBRN Test Execution	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>	Project (Number/Name) 674797 / <i>ALCM Upgrades</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>INE Sustainment</i>				
INE Line Replaceable Unit Assessment	2	2019	4	2022
<i>CBRN Test</i>				
CBRN Test Plan Development	1	2019	4	2025
CBRN Test Execution	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / <i>B-1B Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	58.175	1.000	15.766	0.000	15.766	29.954	12.482	0.000	0.000	0.000	117.377
675344: <i>B-1B Modernization</i>	-	58.175	1.000	15.766	0.000	15.766	29.954	12.482	0.000	0.000	0.000	117.377
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The B-1B Lancer is a swing-wing, supersonic, long-range conventional bomber. It carries the largest payload of both guided and unguided weapons in the AF inventory. The multi-mission B-1B is the backbone of America's long-range conventional bomber force and can rapidly deliver massive quantities of precision (and non-precision) weapons against any adversary, anywhere in the world, at any time.

The B-1B modernization projects alleviate aircraft obsolescence issues due to Diminishing Manufacturing Sources (DMS) while at the same time providing improved capabilities to the B-1B weapon system that require significant hardware and software development and testing.

The Fiscal Year 2021 President's Budget retires 17 B-1 aircraft, bringing the total aircraft inventory to 45.

FULLY INTEGRATED TARGETING POD (FITP)- (Air Force terminated program 2QFY20)

The Fully Integrated Targeting Pod (FITP) modification permanently integrates the Advanced Targeting Pod (ATP) capability into the B-1B's avionics flight software architecture and replaces the B-1B's Temporary T-1 Beyond Line of Sight (BLOS) / Laptop Controlled Targeting Pod (LCTP) system with a digital, high-definition video-streaming targeting pod. This will provide increased B-1B aircrew situational awareness, weapons de-confliction, and Intelligence, Surveillance and Reconnaissance (ISR) within the Combat Air Forces (CAF). FITP will provide robust combat targeting processing power, computing speed and throughput for aircrew mission planning, and a permanent sustainment support structure. It will provide all four crew members access to targeting pod information displayed on digital-quality video using the Integrated Battle Station (IBS), Multi-Function Displays (MFDs), and the cursor controller. FITP will address the aircrew ergonomic issues caused by the current system configuration, allowing more rapid prosecution of targets through improved integration with Avionics Flight Software (AFS) capabilities. In addition, FITP will provide growth capability for implementation and interaction with follow-on systems to augment targeting pod use. Furthermore, the FITP removes the need for an Interim Contractor Support (ICS) sustainment support structure, which will resolve DMS issues.

MODE 5/S

B-1B Identification Friend or Foe (IFF) Mode 5/S is the replacement for the B-1B Mark XII IFF Mode 4. Mode 5, which will replace Mode 4, will provide secure target identification and will be a response system for combat identification. Mode Select (Mode S), replacing Mode C, provides timely aircraft position and flight path prediction to receiver units for aircraft, Air Traffic Control, and the Air Defense System. The IFF Mode 5 upgrade uses an automated system that responds to interrogations to avoid the loss of B-1B aircraft through fratricide. Mode S provides accuracy required in International Civil Aviation Organization (ICAO) airspace. Mode 5 is a Joint Requirements Oversight Council (JROC) 2020 mandate. Funds are included to accommodate the DoD mandate as outlined in previous AF and DoD budget exhibits.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / <i>B-1B Squadrons</i>	
<p>RADIO CRYPTO COMPLIANCE The B-1B Radio Crypto Compliance requirements originated to meet DoD mandates by a classified need date. If the requirements are not met, the B-1B is at risk of losing secure Line of Sight (LOS) and BLOS communication with ground and air forces. The program replaces the existing radios with crypto-compliant radios providing BLOS communications. Funds are included to accommodate the DoD mandate as outlined in previous AF and DoD budget exhibits.</p> <p>MULTIFUNCTIONAL INFORMATION DISTRIBUTION SYSTEM (MIDS) - JOINT TACTICAL RADIO SYSTEMS (JTRS) The B-1B Multifunctional Information Distribution System (MIDS) - Joint Tactical Radio System (JTRS) replaces the existing MIDS Low Volume Terminal (LVT) 1 Link 16 terminal to meet National Security Agency (NSA) Crypto Modernization (CM) Device Cease Key and FAA/NTIA Frequency Remap mandates. Current systems become non-compliant in 2025. MIDS-JTRS resolves all LVT 1 deficiencies and adds substantial combat capability enhancements to Link 16 Enhanced Throughput (LET) and Concurrent Multi-Netting (CMN-4) with Concurrent Retention Receive (CRR). MIDS-JTRS also provides multi-datalink capability, improving situational awareness and allowing rapid in-flight re-targeting in a cooperative combat environment. Funds are included to accommodate DoT/DoD-approved Frequency Remap and Crypto Modernization Device Cease mandates as outlined in previous AF and DoD budget exhibits.</p> <p>BOMB RACK UNIT 56 (BRU-56) The Bomb Rack Unit 56 (BRU-56) upgrade will mitigate a safety risk present within the legacy BRU-56 ejector rack. The upgrade will alleviate the deficiency within the current ejector rack as well as add increased carriage capability. Prolonged use has resulted in a deficiency of the rivets within the linkage of the rack. This deficiency led to multiple failures, to include one Class A mishap in 2003, one Class C mishap in 2010, and multiple ground mishaps. The BRU-56 modification guards against future bomb rack mishaps and the possibility of a catastrophic aircraft loss as well as the loss of life.</p> <p>GAP AND INTEGRATION ANALYSIS Program funds cover engineering/planning studies, related engineering efforts, and the auxiliary equipment needed for development projects that have not yet been fielded. Funds may be used to resolve emerging safety of flight and DMS issues, accommodate technology insertion, and fulfill FAA (or other) mandates necessary to ensure continued aircrew safety and mission effectiveness. Costs includes Program Management Administrative (PMA) costs, total ownership cost, as well as initiatives for anticipated weapon system enhancements, to include efforts for improving weapon system operational capabilities, safety, supportability, maintainability, and reliability. All B-1B development projects support planned requirements for unique identification in their production phases. Funding is also required to ensure test asset availability for testing of aircraft RDT&E efforts.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-1B weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	60.295	1.000	27.315	0.000	27.315
Current President's Budget	58.175	1.000	15.766	0.000	15.766
Total Adjustments	-2.120	0.000	-11.549	0.000	-11.549
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.119	0.000			
• Other Adjustments	-0.001	0.000	-11.549	0.000	-11.549

Change Summary Explanation

FY19: Decrease \$2.120M for Small Business Innovation Research (SBIR).

FY21: Decrease \$11.549M for higher Air Force priorities

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Fully Integrated Targeting Pod	6.177	0.000	0.000	0.000	0.000
Description: The Fully Integrated Targeting Pod (FITP) Modification permanently integrates the Advanced Targeting Pod (ATP) capability into the B-1B's avionics flight software architecture and replaces the B-1B's Temporary T-1 Beyond Line of Sight (BLOS) / Laptop Controlled Targeting Pod (LCTP) system with a digital, high-definition video-streaming targeting pod. This will provide increased B-1B aircrew situational awareness, weapons de-confliction, and Intelligence, Surveillance and Reconnaissance (ISR) within the Combat Air Forces (CAF). FITP will provide robust combat targeting processing power, computing speed and throughput for aircrew mission planning, and a permanent sustainment support structure. It will provide all four crew members access to targeting pod information displayed on digital-quality video using the Integrated Battle Station (IBS), Multi-Function Displays (MFDs), and the cursor controller. FITP will address the aircrew ergonomic issues caused by the current system configuration, allowing more rapid prosecution of targets through improved integration with Avionics Flight Software (AFS) capabilities. In addition, FITP will provide growth capability for implementation and interaction with follow-on systems to augment targeting pod use. Furthermore, the FITP removes the need for an ICS sustainment support structure, which will resolve the DMS issue. Last year of funding was FY19.					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2020 Plans: N/A FY 2021 Base Plans: N/A FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
Title: Mode 5/S Description: B-1B Identification Friend or Foe (IFF) Mode 5/S is the replacement for the B-1B Mark XII IFF Mode 4. Mode 5, which will replace Mode 4, will provide secure target identification and will be a response system for combat identification. Mode Select (Mode S), which will replace Mode C, provides timely aircraft position and flight path prediction to receiver units for aircraft, Air Traffic Control, and the Air Defense System. The IFF Mode 5 upgrade uses an automated system that responds to interrogations to avoid the loss of B-1B aircraft through fratricide. Mode 5 is a Joint Requirements Oversight Council (JROC) 2020 mandate. Mode S is required in International Civil Aviation Organization (ICAO) airspace. Failure to meet these mandates will result in delayed/denied service of controlled airspace within the US and Europe. Program was de-scoped to remove ADS-B requirement based on several factors including Operations and Emission security (OPSEC/EMSEC) concerns. FY 2020 Plans: N/A FY 2021 Base Plans: N/A FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A	17.057	0.000	0.000	0.000	0.000
Title: Radio Crypto Compliance	7.400	0.000	3.370	0.000	3.370

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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Description: The B-1B Radio Crypto Compliance requirements originated to meet DoD mandates by a classified need date. If the requirements are not met, the B-1B is at risk of losing secure Line of Sight (LOS) and BLOS communication with ground and air forces. The Air Force is in the process of negotiating a short-term waiver to the mandate. Without the radio crypto compliance the B-1B will not be able to participate in CONUS/ OCONUS military operations. The program replaces the existing radios with crypto compliant radios providing BLOS communications. Funds are included to accommodate the DoD mandate as outlined in previous AF and DoD budget exhibits.

FY 2020 Plans:
N/A

FY 2021 Base Plans:
Continue Engineering and Manufacturing Development (EMD) efforts.

Major Milestone: PDR

FY 2021 OCO Plans:
N/A

FY 2020 to FY 2021 Increase/Decrease Statement:
N/A

Title: Multifunctional Information Distribution System-Joint Tactical Radio System	6.344	0.000	3.370	0.000	3.370
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Description: The B-1B Multifunctional Information Distribution System (MIDS) - Joint Tactical Radio System (JTRS) replaces the existing MIDS Low Volume Terminal (LVT) 1 Link 16 terminal to meet National Security Agency (NSA) Crypto Modernization (CM) Device Cease Key and FAA/NTIA Frequency Remap mandates; systems become non-compliant in 2025. MIDS-JTRS resolves all LVT 1 deficiencies and adds substantial combat capability enhancements to Link 16 Enhanced Throughput (LET) and Concurrent Multi-Netting (CMN-4) with Concurrent Retention Receive (CRR). MIDS-JTRS also provides multi-datalink capability, improving situational awareness and allowing rapid in-flight retargeting in a cooperative combat environment.

FY 2020 Plans:
N/A

FY 2021 Base Plans:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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Begin Engineering and Manufacturing Development (EMD) Phase Major Milestone: PDR Note: Radio Crypto and MIDS-JTRS modification efforts are concurrent efforts (i.e., same contract and modification schedule). The rationale for "bundling" these efforts is because neither program had adequate 3600 funds; therefore, cost saving initiatives had to be implemented (i.e., paying for one set of test flights as opposed to two, paying for one set of documents to be written/updated, etc.). FY 2021 OCO Plans: Begin Engineering and Manufacturing Development (EMD) Phase Major Milestone: CDR Note: Radio Crypto and MIDS-JTRS modification efforts are concurrent efforts (i.e., same contract and modification schedule). The rationale for "bundling" these efforts is because neither program had adequate 3600 funds; therefore, cost saving initiatives had to be implemented (i.e., paying for one set of test flights as opposed to two, paying for one set of documents to be written/updated, etc.). Also, aircraft will only be down one time vs. two times which will help with aircraft availability. FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
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Title: Bomb Rack Unit - 56 Description: The Bomb Rack Unit 56 (BRU-56) upgrade will mitigate a safety risk present within the legacy BRU-56 ejector rack. The upgrade will alleviate the deficiency within the current ejector rack as well as add increased carriage capability. Prolonged use has resulted in a deficiency of the rivets within the linkage of the rack. This deficiency led to multiple failures, to include one Class A mishap in 2003, one Class C mishap in 2010, and multiple ground mishaps. The BRU-56 modification avoids future bomb rack mishaps and the possibility of a catastrophic aircraft loss as well as the loss of life. FY 2020 Plans:	20.837	1.000	9.026	0.000	9.026
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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Complete a Preliminary Design Review (PDR) in September, Critical Design Review (CDR) in February and Test Readiness Review (TRR) in August. FY 2021 Base Plans: Complete a Production Readiness Review (PRR) in October, a System Verification Review (SVR) in November, Flight Test Readiness Review (FTRR) in January. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase in BRU-56 reviews					
Title: Gap and Integration Analysis Description: Funds will be used for studies to facilitate new capabilities and enhancements to improve operational aircraft safety, supportability, maintainability, reliability and total ownership cost. Conduct engineering studies that will involve a gap and integration analysis to include but not limited for Small Diameter Bomb (SDB) II Integration with Universal Armament Interface (UAI), Guided Bomb Unit (GBU)-56 Integration, Miniature Air Launch Decoy (MALD) Integration (All variants), Conventional Mission Upgrade Program (CMUP) and Helmet Mounted Cueing System. Funding is also required to ensure test asset availability for testing of aircraft RDT&E efforts. Costs include Program Management Administrative (PMA) costs and Acquisition Support costs. FY 2020 Plans: N/A FY 2021 Base Plans: N/A FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A	0.360	0.000	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	58.175	1.000	15.766	0.000	15.766

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item	0.450	0.458	0.041	-	0.041	0.072	0.101	0.494	0.503	0.000	2.119
<i>B01B00: Training Support to Units, Mods PE 0809731F</i>											
• APAF 05 B01B00: B-1B	-	-	3.853	-	3.853	5.086	4.495	-	-	0.000	13.434
• APAF 05 B00100: B-1	39.240	18.453	21.767	-	21.767	33.162	28.974	0.000	0.000	0.000	141.596
• APAF 05 Line Item B01B00	0.000	0.000	0.717	-	0.717	0.855	0.871	0.000	-	0.000	2.443
<i>Spares: B-1B Squadrons, Spares</i>											

Remarks

E. Acquisition Strategy

Mode 5/S acquisition strategy is an Undefined Contracting Action (UCA) definitized on 7 Jan 20 as a Cost Plus Fixed Fee (CPFF) with a 2 year Period of Performance for the initial 18 aircraft. Production will begin in Jan 20 with the procurement of kits for the 10 production aircraft using the contract awarded on 7 Jan 20. There is a one-year lead time for kits. Installation will begin as soon as kits are delivered (one year after order). Projected to have 18 aircraft modified with Mode 5 by March 2021. The remainder of the fleet will be modified using a Firm Fixed Price (FFP) competitively-selected contract.

Radio Crypto and MIDS-JTRS acquisition strategies will be a CPFF sole source contract with a five+ years EMD effort and a Firm Fixed Price (FFP) competitively-selected contract with a two-year Production and Installation effort for increment one (meets mandates).

BRU-56 acquisition strategy is a single award C-type contract that was competed under FAR Part 15 utilizing source selection procedures for the hardware portion of this effort. The software portion of this effort is sole source to Boeing (OEM). EMD will be a two year effort and Production will be a two and a half year effort.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons	Project (Number/Name) 675344 / B-1B Modernization
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fully Integrated Targeting Pod (FITP) (Sub-Contract)	SS/CPFF	Northrop Grumman : Rolling Meadow, IL	-	4.305	Jun 2019	-		-		-		-	0.000	4.305	-
Mode 5 - Accelerated IFF Contract	SS/CPFF	Boeing : OKC, OK	-	5.836	Jan 2020	-		-		-		-	0.000	5.836	-
Mode S Software EA 19-AVSX-11441	SS/CPFF	Boeing : OKC, OK	-	2.000	Dec 2019	-		-		-		-	0.000	2.000	-
Radio Crypto Compliance - ARC - 210 Hardware Buy	SS/FFP	Rockwell Collins : OKC, OK	-	1.947	May 2019	-		-		-		-	0.000	1.947	-
Radio Crypto Compliance	SS/CPFF	Boeing : OKC, OK	-	3.804	Feb 2020	-		3.087	Jan 2021	-		3.087	0.000	6.891	-
Multifunctional Information Distribution System (MIDS) Joint Tactical Radio System (JTRS)	SS/CPFF	Boeing : OKC, OK	-	5.119	Feb 2020	-		3.088	Jan 2021	-		3.088	0.000	8.207	-
Bomb Rack Unit (BRU) 56 - Hardware	C/CPFF	EDO, LLC : Amityville, NY	-	5.375	Apr 2019	0.775	Mar 2020	1.593	May 2021	-		1.593	0.000	7.743	-
Bomb Rack Unit - (BRU) 56 - Software	SS/CPAF	Boeing : OKC, OK	-	1.445	Sep 2019	-		1.865	Nov 2020	-		1.865	0.000	3.310	-
Subtotal			-	29.831		0.775		9.633		-		9.633	0.000	40.239	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Documentation - Technical Support	MIPR	Booz Allen Hamilton : OKC, OK	-	2.138	Sep 2019	-		0.517	Nov 2020	-		0.517	0.000	2.655	-
Acquisition Support	Allot	Not specified. : OKC, OR	-	3.928	Dec 2019	-		-		-		-	0.000	3.928	-
Acquisition Support Additional (BRU-56, FITP, ADS-B, Comm Crypto)	Allot	Not specified. : OKC, OK	-	15.000	Apr 2020	-		-		-		-	0.000	15.000	-
Subtotal			-	21.066		-		0.517		-		0.517	0.000	21.583	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101126F / B-1B Squadrons	Project (Number/Name) 675344 / B-1B Modernization
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
B-1B Modernization																												
Fully Integrated Targeting Pod - TMRR Activities																												
Fully Integrated Targeting Pod PDR																												
Accelerated IFF Mode 5 - UCA Award																												
Accelerated IFF Mode 5 - PDR/CDR																												
Accelerated IFF Mode 5 - EMD																												
Radio Crypto Compliance - EMD Activities																												
MIDS JTRS - EMD Activities																												
BRU-56 EMD																												
BRU-56 Critical Design Review (CDR)																												
BRU-56 DT / OT																												
BRU-56 MS C																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101126F / <i>B-1B Squadrons</i>	Project (Number/Name) 675344 / <i>B-1B Modernization</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-1B Modernization</i>				
Fully Integrated Targeting Pod - TMRR Activities	1	2019	2	2020
Fully Integrated Targeting Pod PDR	1	2020	1	2020
Accelerated IFF Mode 5 - UCA Award	2	2020	2	2020
Accelerated IFF Mode 5 - PDR/CDR	4	2019	4	2019
Accelerated IFF Mode 5 - EMD	4	2019	2	2020
Radio Crypto Compliance - EMD Activities	2	2020	4	2024
MIDS JTRS - EMD Activities	2	2020	4	2024
BRU-56 EMD	3	2019	1	2022
BRU-56 Critical Design Review (CDR)	2	2020	2	2020
BRU-56 DT / OT	4	2021	1	2022
BRU-56 MS C	2	2022	2	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	101.827	93.076	187.399	0.000	187.399	173.200	85.084	13.902	7.228	Continuing	Continuing
675345: <i>B-2 Modernization</i>	0.000	93.076	78.725	172.827	0.000	172.827	158.320	69.937	13.902	7.228	Continuing	Continuing
676021: <i>BASELINE SUPPORT</i>	0.000	8.751	14.351	14.572	0.000	14.572	14.880	15.147	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The B-2 is currently undergoing modernization of avionics/communications systems, engines, armament systems, low observable components, core training system components, aircraft supportability improvements, and support equipment development.

The Air Force will also study multiple structural, avionics, and engine modifications that could improve the performance of the aircraft and engines and reduce maintenance man-hours and the logistics footprint of the fleet. Focus of the studies will be on non-mission capable (maintenance) drivers, safety issues, and obsolescence issues through modernization of key components in the airframe, avionics, and engines resulting in improved aircraft availability of a high demand/low density fleet.

The Adaptive Communication Suite (ACS) is a non-integrated system that provides SATCOM connectivity for Command and Control enroute to the target. A critical capability is the ability to receive Airborne Mission Transfer (AMT) and Beyond Line-of-Sight Situational Awareness. This effort includes improvements to the suite of B-2 ACS UHF communications system in order to become part of the baseline configuration, as well as modernization upgrades to conform to mandates.

B-2 Armament upgrades integrate new and/or advanced weapons on the B-2 to attack a wider array of target sets, to include hardened, deeply buried targets, as well as destroy more targets per sortie. Integration of the Joint Air-to-Surface Missile Extended Range (JASSM-ER) weapon will further enhance the B-2s ability to attack and destroy high value target sets.

The Low Observable Signature and Supportability Modifications (LOSSM) program supports the B-2 ability to penetrate anti-access combat environments, performing missions directed by the National Command Authority while ensuring aircrew survivability. The LOSSM program reduces low observable (LO) maintenance, and stabilizes and improves the combat-ready LO signature for the B-2 fleet.

The B-2 Crash Survivable Memory Unit (CSMU) provides a more capable Flight Data Recorder (FDR) with increased capacity for storing Flight Information Data (FID) for recovery and use in the event of a mishap.

The Radar Aided Targeting System (RATS) is planned to be a software only solution implemented in several B-2 system level Operational Flight Programs (OFPs) to provide radar-aided enhanced targeting capability through weapon hand-off navigational updates for guided nuclear weapons in a non-GPS environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	
<p>The B-2 Identification Friend or Foe (IFF) Mode 5/S modification program replaces the current IFF transponder with a new Mode 5 and Mode S capable transponder ensuring compliance with DoD Combat Identification mandates and global Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements. Mode 5 is the DoD standard for secure combat identification and provides improved discrimination between closely spaced platforms, while reducing interference with civil air traffic control transponders, enabling the B-2 fleet to accomplish its anti-access and global strike mission. Mode 5 replaced the obsolete Mode 4 combat identification. Mode S is a civil air traffic control secondary surveillance radar process that allows selective interrogation of aircraft according to the unique 24-bit address. Mode S provides improved accuracy and altitude resolution and reduced interference from closely spaced aircraft through selective interrogation of assigned transponder addresses.</p> <p>The B-2 Training System upgrades include updates to training device hardware and components, simulation software, courseware and academic materials, instructional system design architectures, engineering drawings, and system documentation that is not driven by a funded aircraft modification.</p> <p>In FY 2020 and prior, the B-2 DMS-M effort is documented in PE 0605931F B-2 DMS, Project 653844 B-2 DMS; beginning in FY 2021, this effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.</p> <p>The FY 2021 budget reflects a significant restructure of the B-2 DMS-M program that reduces the program scope to modernize the B-2 display functionality including the multi-function display units (MDUs) and Advanced Graphics Processor (AGP) of the baselined DMS-M program. The legacy display sub-system lacks the processing power to provide necessary situation awareness. In addition, the legacy MDUs are not supportable due to obsolescence and repair issues which will severely impact future aircraft availability.</p> <p>During B-2 DMS-M Displays development, the engineering baseline will be finalized and production representative kits will be purchased to support software development, platform integration, integrated development/operational test, pre-Milestone C production assessment, and B-2 nuclear certification testing. Diminishing manufacturing sources and materiel shortages for affected components will be addressed to protect the planned production program by mitigating unplanned part redesign and requalification risks. This effort will also require investment in systems engineering and software development to integrate the AGP into the B-2 current architecture that includes the legacy Threat Emitter Locator system and associated displays. The program will ensure the most efficient restructure minimizing rework from the baseline DMS-M program.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-2 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	105.508	97.276	48.827	0.000	48.827
Current President's Budget	101.827	93.076	187.399	0.000	187.399
Total Adjustments	-3.681	-4.200	138.572	0.000	138.572
• Congressional General Reductions	-0.087	0.000			
• Congressional Directed Reductions	0.000	-9.200			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.594	0.000			
• Other Adjustments	0.000	0.000	138.572	0.000	138.572

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 675345: *B-2 Modernization*

Congressional Add: *B-2 Trainers Modernization*

	FY 2019	FY 2020
	-	5.000
Congressional Add Subtotals for Project: 675345	-	5.000
Congressional Add Totals for all Projects	-	5.000

Change Summary Explanation

FY 2019: Reductions for SBIR \$3.594M, MDAP Penalty \$0.032M, and FFRDC \$0.055M.

FY 2020: B-2 IFF Mode 5/S reduction of \$9.2M due to Congressional mark citing Airspace compliance schedule delays; Congressional add of \$5.0M for B-2 Trainers Modernization.

FY 2021: Reduction of \$16.148M for higher Air Force priorities; Increase (\$155M) for restructure of current DMS-M EMD effort to a Multi-Function Display Unit Replacement (MDU-R)/Advanced Graphics Processor (AGP) development effort previously residing in PE 0605931F.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 675345 / B-2 Modernization			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675345: B-2 Modernization	0.000	93.076	78.725	172.827	0.000	172.827	158.320	69.937	13.902	7.228	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The B-2 is currently undergoing modernization of avionics/communications systems, engines, armament systems, low observable components, core training system components, aircraft supportability improvements, and support equipment development.

The Air Force will also study multiple structural, avionics, and engine modifications that could improve the performance of the aircraft and engines and reduce maintenance man-hours and the logistics footprint of the fleet. Focus of the studies will be on non-mission capable (maintenance) drivers, safety issues, and obsolescence issues through modernization of key components in the airframe, avionics, and engines resulting in improved aircraft availability of a high demand/low density fleet.

Modern communications are key enablers for the B-2. The Adaptive Communication Suite (ACS) provides baseline improvements to the B-2 ACS UHF SATCOM communication system in order to modernize the system and increase data throughput to support key mission enablers such as AMT, weather, and intelligence updates.

B-2 Armament upgrades integrate new and/or advanced weapons on the B-2 to attack a wider array of target sets, to include hardened, deeply buried targets, as well as destroy more targets per sortie. Integration of the Joint Air-to-Surface Standoff Missile Extended Range (JASSM-ER) weapon will further enhance the B-2's ability to attack and destroy high value target sets.

The Low Observable Signature and Supportability Modifications (LOSSM) program supports the B-2 ability to penetrate anti-access combat environments, performing missions directed by the National Command Authority while ensuring aircrew survivability. The LOSSM program reduces low observable (LO) maintenance, and stabilizes and improves the combat-ready LO signature for the B-2 fleet. This program encompasses multiple improvement projects including, but not limited to, improved LO materials (electrically conductive materials, adhesives, electrically resistive materials, radar absorbing material, fastener fills, coatings, welds, material removal tools, and improved processes), LO structures (radar radomes, antennas, hot trailing edges and tiles, intermediate section doors, tailpipes, windows, lib bay panels, leading edge, permanent fasteners, exhaust pockets, gust load alleviation system, inlets, radar absorbing structures, overall signature stability, and Alternate High Frequency Material expansion), and radio frequency (RF) diagnostic tools, evaluation systems, and other tools (Tier One Material Inspection System, Signature Diagnostic System, next generation Tier II and Tier III systems, Test Article 0998 optimization, conductivity probes, tailpipe inspection tools, LO-related special test equipment, data archival, and communications tools).

The B-2 Crash Survivable Memory Unit (CSMU) provides a more capable Flight Data Recorder (FDR) with increased capacity for storing Flight Information Data (FID) for recovery and use in the event of a mishap. The initiative includes replacement of the current CSMU with an adapted Commercial Off the Shelf (COTS) replacement, modification of the Flight Data Recorder Processor (FDRP) to provide 28 vdc power to the new CSMU, modification of the FDRP Operational Flight Program (OFP), and addition of a Underwater Locator Beacon (ULB). The current CSMU/FDRP does not meet the minimum requirements specified in the Aircraft Information Program (AIP) reference documents (AFI 63-133 and AFH 63-1402).

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	Project (Number/Name) 675345 / <i>B-2 Modernization</i>

The B-2 Identification Friend or Foe (IFF) Mode 5/S modification replaces the current IFF transponder with a new Mode 5 and Mode S capable transponder ensuring compliance with DoD Combat Identification mandates and global Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements. Mode 5 is the DoD standard for secure combat identification and provides improved discrimination between closely spaced platforms, while reducing interference with civil air traffic control transponders, enabling the B-2 fleet to accomplish its anti-access and global strike mission. Mode 5 replaced the obsolete Mode 4 combat identification. Mode S is a civil air traffic control secondary surveillance radar process that allows selective interrogation of aircraft according to the unique 24-bit address. Mode S provides improved accuracy and altitude resolution and reduced interference from closely spaced aircraft through selective interrogation of assigned transponder addresses.

The B-2 Training System upgrades include updates to training device hardware and components, simulation software, courseware and academic materials, instructional system design architectures, engineering drawings, and system documentation that is not driven by a funded aircraft modification. Upgrades may include Diminishing Manufacturing Sources efforts to include removal of end-of-life software/hardware within simulator systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Additional Training System Upgrades may also include efforts to implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

The Radar Aided Targeting System (RATS) is planned to be a software only solution implemented in several B-2 system level Operational Flight Programs (OFPs) to provide radar-aided enhanced targeting capability through weapon hand-off navigational updates for guided nuclear weapons in a non-GPS environment. Funding supports timely software development, test and roll-out of software into a future B-2 OFP, specifically to support the B61-12 integration.

In FY 2020 and prior, the B-2 DMS-M effort is documented in PE 0605931F B-2 DMS, Project 653844 B-2 DMS; beginning in FY 2021, this effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.

The FY 2021 budget reflects a significant restructure of the B-2 DMS-M program that reduces the program scope to modernize the B-2 display functionality including the multi-function display units (MDUs) and Advanced Graphics Processor (AGP) of the baselined DMS-M program. The legacy display sub-system lacks the processing power to provide necessary situation awareness. In addition, the legacy MDUs are not supportable due to obsolescence and repair issues which will severely impact future aircraft availability.

During B-2 DMS-M Displays development, the engineering baseline will be finalized and production representative kits will be purchased to support software development, platform integration, integrated development/operational test, pre-Milestone C production assessment, and B-2 nuclear certification testing. Diminishing manufacturing sources and materiel shortages for affected components will be addressed to protect the planned production program by mitigating unplanned part redesign and requalification risks. This effort will also require investment in systems engineering and software development to integrate the AGP into the B-2 current architecture that includes the legacy Threat Emitter Locator system and associated displays. The program will ensure the most efficient restructure minimizing rework from the baseline DMS-M program.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
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Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-2 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
<p>Title: Low Observable Signature and Supportability Mods and Trainers</p> <p>Description: B-2 Low Observable Signature and Supportability Modifications (LOSSM) pursues multiple low-cost development efforts for Low Observable (LO) materials, diagnostics and procedures to enhance LO signature and/or improve aircraft supportability, as well as other development or study efforts for training system improvements.</p> <p>FY 2020 Plans: Continue development of on-going LOSSM and Training System core upgrades. Continue development efforts for advanced LO materials, structures, procedures, and other enhanced diagnostics and measurement systems. Continue development efforts for Advanced Signature Reduction efforts, the Next Generation Zonal Radar, an Abrasion Resistant Coating, an upgrade to the Tier One Material Inspection System, Tailpipe Improvement analysis, and Test Article 0998. Complete production qualification of PE-4, a more durable hot trailing edge material. Begin Signature Diagnostic System Spiral 12.</p> <p>FY 2021 Plans: Continue development of on-going LOSSM and Training System core upgrades. Continue development efforts for advanced LO materials, structures, procedures, and other enhanced diagnostics and measurement systems. Continue development efforts for Advanced Signature Reduction efforts, the Next Generation Zonal Radar, an Abrasion Resistant Coating, an upgrade to the Tier One Material Inspection System, Tailpipe Improvement analysis, and Test Article 0998. Continue Signature Diagnostic System Spiral 12.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.</p>	28.406	18.831	10.733
<p>Title: B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration</p> <p>Description: Integrates the Joint Air to Surface Standoff Missile, Extended Range weapon (JASSM-ER) onto the B-2.</p> <p>FY 2020 Plans: Continue executing EMD activities to include CDR as well as conducting Test Readiness Review (TRR) and Flight Readiness Review (FRR). Begin developmental/operational testing (DT/OT).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	10.380	25.316	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.				
<p>Title: B-2 Adaptable Communications Suite (ACS)</p> <p>Description: The Adaptable Communications Suite provides a non-integrated avionics and communications system that allows the B-2 fleet to receive mission data, time sensitive targeting information, intelligence and weather updates, positive command and control procedures, and perform operational reconnaissance.</p> <p>FY 2020 Plans: Continue acquisition planning, risk reduction, and requirements maturation for a modernized ACS system. The modernized system will include new radios with MUOS capability replacing the existing radios and revised software which will integrate a permanent BLOS communications capability to ensure continued UHF connectivity for integrated mission data, time sensitive targeting information, intelligence and weather updates, positive command and control capability, and perform operational reconnaissance.</p> <p>FY 2021 Plans: Continue acquisition planning, risk reduction, and requirements maturation for a modernized ACS system. Begin system development for modernized ACS system (ACS Increment 4.0) and purchase test assets.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>		4.859	0.197	0.200
<p>Title: B-2 Identification Friend or Foe (IFF) Mode 5/S Program</p> <p>Description: The B-2 IFF Mode 5/S replaces the current IFF transponder with a new Mode 5 and Mode S capable IFF transponder ensuring compliance with DoD/NATO Combat Identification mandates (Mode 5) and global Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements (Mode S). Mode 5 provides improved combat identification security and accuracy enabling the B-2 fleet to accomplish its anti-access and global strike mission. Mode S provides improved accuracy, altitude resolution, and reduced interference from closely spaced aircraft through interrogation of assigned transponder addresses.</p> <p>FY 2020 Plans: Execute EMD activities to include System Requirements Review, System Functional Review, Preliminary Design Review, and integration of new transponder hardware into the B-2 Weapon System Support Center (WSSC) for software development.</p> <p>FY 2021 Plans: Execute EMD activities to include Critical Design Review, software integration testing in the WSSC, Test Readiness Review, Flight Readiness Review, and initiation of combined development and operational testing at Whiteman AFB.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		15.651	7.554	6.028

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.				
<p>Title: B-2 Crash Survivable Memory Unit (CSMU)</p> <p>Description: The B-2 Crash Survivable Memory Unit (CSMU) provides a more capable Flight Data Recorder (FDR) with increased capacity for storing Flight Information Data (FID) for recovery and use in the event of a mishap. The initiative includes replacement of the current CSMU with an adapted Commercial Off the Shelf (COTS) replacement, modification of the Flight Data Recorder Processor (FDRP) to provide 28 vdc power to the new CSMU, modification of the FDRP Operational Flight Program (OFP), and addition of a Underwater Locator Beacon (ULB).</p> <p>FY 2020 Plans: Perform Non-recurring Engineering (NRE) to adapt Commercial Off the Shelf (COTS) CSMU to the B-2 Flight Data Recorder (FDR) system, modify the FDRP, and update the FDRP OFP. Three prototype CSMUs will be assembled for integration and flight test, and three FDRPs will be modified to operate with the COTS CSMU design.</p> <p>FY 2021 Plans: Complete Non-recurring Engineering (NRE) to adapt Commercial Off the Shelf (COTS) CSMU to the B-2 Flight Data Recorder (FDR) system, complete modification of the FDRP, and update the FDRP OFP.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.</p>		10.296	1.870	1.098
<p>Title: B-2 Radar Aided Targeting System (RATS)</p> <p>Description: The Radar Aided Targeting System (RATS) is planned to be a software only solution implemented in several B-2 system level Operational Flight Programs (OFPs) to provide radar-aided enhanced targeting capability through weapon hand-off navigational updates for System 2 nuclear weapons in a non-GPS environment.</p> <p>FY 2020 Plans: Execution of remaining EMD activities to include CDR, at which the contractor is expected to demonstrate Display Control Panel Operational Flight Program (DCPOFP) functionality, as well as conducting Test Readiness Review (TRR) and Flight Readiness Review (FRR). DT/OT will be performed at Whiteman AFB and initiated during this time.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.</p>		23.484	18.957	-
<p>Title: B-2 Defensive Management System/Displays</p> <p>Description: B-2 DMS-M Displays program is a modernization of the multi-function display units (MDUs) and Advanced Graphics Processor (AGP). This is not a new start. Prior years DMA efforts were in PE65931F.</p>		-	0.000	154.768

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: N/A - In PE 0605931F</p> <p>FY 2021 Plans: Continue modification of A/C 1087 and development labs to support restructured program. Continue development and software integration of MDUs and AGPs. Continue MDU obsolescence refresh. Conduct appropriate systems engineering and design reviews to support restructured program.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Transitioned to PE 0101127F</p>			
<p>Title: B-2 Expanded Strike</p> <p>Description: The Expanded Strike program adds the Advanced 5,000 pound Joint Direct Attack Munition (A5K JDAM) and Hard Target Void Sensing Fuze (HTVSF) to the B-2 arsenal providing additional armament capability for hardened, deeply buried targets.</p> <p>FY 2020 Plans: Conduct acquisition planning, affordability assessments, and other pre-EMD activities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Expanded Strike program terminated in FY 2021 Budget. No events are planned.</p>	0.000	1.000	-
Accomplishments/Planned Programs Subtotals	93.076	73.725	172.827

	FY 2019	FY 2020
Congressional Add: B-2 Trainers Modernization	-	5.000
FY 2020 Plans: Develop plan to execute FY 2020 Congressional add for B-2 Trainers Modernization efforts.		
Congressional Adds Subtotals	-	5.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Line Item B00200: B-2 LOSSM Mod Funding, PE 0101127F	15.218	0.276	19.851	-	19.851	24.003	26.210	20.991	11.743	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization

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

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• APAF 05 Line Item B00200 (1)...: B-2 CSMU Mod Funding, PE 0101127F	-	-	-	-	-	1.599	1.628	1.657	1.688	Continuing	Continuing
• APAF 05 Line Item B00200 (2)...: B-2 IFF Mode 5/S Mod Funding, PE 0101127F	-	-	-	-	-	15.405	15.873	10.490	-	Continuing	Continuing
• APAF 05 B2DMS0: B-2 DMS	-	-	-	-	-	-	132.069	111.294	27.573	Continuing	Continuing

Remarks

D. Acquisition Strategy

Key elements of the overall acquisition strategy include: use of sole source contract with a prime/integrating contractor (Northrop Grumman), employ the program office as the system integrator when practical, leverage mature technology and systems development investments by other Department of Defense organizations, encourage prime contractor competition of subsystems and key components to reduce risk and cost, use of cost plus incentive fee (CPIF) development contracts, and combine developmental upgrades with software sustainment blocks to minimize the number of software releases, aircraft downtime, and differences in fielded configurations.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Low Observable Signature and Supportability Mods	Various	Various : Various	0.000	25.634	Nov 2018	16.525	Oct 2019	10.101	Oct 2020	-		10.101	Continuing	Continuing	-
B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration	Various	Various : Various	0.000	3.895	Jan 2019	23.993	Oct 2019	-		-		-	0.000	27.888	-
B-2 Adaptable Communications Suite (ACS)	Various	Various : Various	0.000	5.058	Dec 2018	0.167	Dec 2019	0.195	Dec 2020	-		0.195	Continuing	Continuing	-
B-2 IFF Mode 5/S	Various	Various : Various	0.000	16.400	Sep 2019	4.668	Nov 2019	5.606	Nov 2020	-		5.606	Continuing	Continuing	-
B-2 Crash Survivable Memory Unit (CSMU)	Various	Various : Various	0.000	9.503	Jan 2020	1.430	Jun 2020	0.926	Dec 2020	-		0.926	4.713	16.572	-
B-2 RATS	Various	Various : Various	0.000	18.979	Oct 2018	10.845	Oct 2019	-		-		-	0.000	29.824	-
B-2 Defensive Management System	Various	Various : Various	0.000	0.000		-		134.305	Dec 2020	-		134.305	128.685	262.990	-
Aircrew Training	Various	Various : Various	0.000	1.091	Dec 2018	6.318	Dec 2019	-		-		-	Continuing	Continuing	-
Mission Planning	Various	Various : Various	0.000	1.100	Jan 2019	5.272	Jan 2020	-		-		-	Continuing	Continuing	-
Subtotal			0.000	81.660		69.218		151.133		-		151.133	Continuing	Continuing	N/A

Remarks
Northrop-Grumman is the prime contractor and serves as integrator and hence main contractor for many (ie "Various"), but not all, B-2 modernization efforts.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Government Test	MIPR	Various : CA	0.000	3.525	Nov 2018	1.321	Dec 2019	9.377		-		9.377	Continuing	Continuing	-
Subtotal			0.000	3.525		1.321		9.377		-		9.377	Continuing	Continuing	N/A

Remarks
B-2 DMS transitioned to PE 0101127F in FY 2021

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
PMA	Various	Various : TBD	0.000	7.891	Oct 2018	8.186	Oct 2019	12.317	Oct 2020	-		12.317	Continuing	Continuing	-
Subtotal			0.000	7.891		8.186		12.317		-		12.317	Continuing	Continuing	N/A
Project Cost Totals			0.000	93.076		78.725		172.827		-		172.827	Continuing	Continuing	N/A

Remarks
Award dates listed are the first incremental funding opportunity associated with each cost category.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
B-2 Modifications Schedule																												
Low Observable Signature and Supportability Mods and Trainers																												
JASSM-ER Integration Preliminary Design																												
JASSM-ER Integration Milestone B																												
JASSM-ER Integration EMD Phase																												
IFF Mode 5/S Milestone B																												
IFF Mode 5/S EMD Phase																												
IFF Mode 5/S Milestone C / Production and Deployment																												
Crash Survivable Memory Unit Milestone B																												
Crash Survivable Memory Unit EMD Contract																												
Crash Survivable Memory Unit Milestone C / Production and Deployment																												
Radar Aided Targeting System (RATS) Milestone B																												
Radar Aided Targeting System (RATS) Software Development and Fielding																												
B-2 DMS-M Displays Acquisition Planning & Transition																												
B-2 DMS-M Displays EMD Phase																												
B-2 DMS-M Displays Milestone C																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-2 Modifications Schedule</i>				
Low Observable Signature and Supportability Mods and Trainers	1	2019	4	2025
JASSM-ER Integration Preliminary Design	1	2019	4	2019
JASSM-ER Integration Milestone B	4	2019	4	2019
JASSM-ER Integration EMD Phase	4	2019	3	2021
IFF Mode 5/S Milestone B	4	2019	4	2019
IFF Mode 5/S EMD Phase	4	2019	2	2022
IFF Mode 5/S Milestone C / Production and Deployment	2	2022	4	2024
Crash Survivable Memory Unit Milestone B	2	2020	2	2020
Crash Survivable Memory Unit EMD Contract	2	2020	3	2022
Crash Survivable Memory Unit Milestone C / Production and Deployment	3	2022	4	2025
Radar Aided Targeting System (RATS) Milestone B	4	2019	4	2019
Radar Aided Targeting System (RATS) Software Development and Fielding	1	2019	4	2021
B-2 DMS-M Displays Acquisition Planning & Transition	2	2020	1	2021
B-2 DMS-M Displays EMD Phase	1	2021	4	2023
B-2 DMS-M Displays Milestone C	2	2023	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 676021 / BASELINE SUPPORT			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676021: <i>BASELINE SUPPORT</i>	0.000	8.751	14.351	14.572	0.000	14.572	14.880	15.147	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Baseline Support maintains and upgrades the B-2 unique flight test aircraft as well as hardware/software and test equipment to support developmental systems integration, and flight test, reducing the need for additional operational aircraft and accelerating deployment of advanced operational capabilities to the warfighter. Baseline Support also provides for other B-2 unique government costs and includes assorted studies of aircraft performance and cost trades as well as acquisition planning activities, up to and including proposal preparation, for future aircraft, engine, weapon, communication, navigation or other capabilities.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Baseline Support Acq Plan/Studies/Integr Test Support	0.297	0.297	0.297
Description: Baseline Support provides for other B-2 unique government costs, including acquisition planning activities for future capabilities, long range planning, studies, and program integration activities, as well as integration and test support of upgraded crypto components as needed.			
FY 2020 Plans: Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, and program integration activities.			
FY 2021 Plans: Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, and program integration activities.			
Title: Baseline Support Flight Test	8.454	14.054	14.275
Description: Description: Baseline Support Flight Test maintains and upgrades the B-2 unique flight test aircraft as well as hardware/software and test equipment to support developmental systems integration and flight test, reducing the need for additional operational aircraft and accelerating deployment of advanced operational capabilities to the warfighter.			
FY 2020 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676021 / BASELINE SUPPORT
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Continue B-2 Flight Test activities, maintaining and upgrading the B-2 unique flight test aircraft as well as hardware/software and test equipment, to support developmental systems integration and flight test.			
<i>FY 2021 Plans:</i> Continue B-2 Flight Test activities, maintaining and upgrading the B-2 unique flight test aircraft as well as hardware/software and test equipment, to support developmental systems integration and flight test.			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	8.751	14.351	14.572

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

N/A

Remarks

D. Acquisition Strategy

Key elements of the overall acquisition strategy include: use of a sole source contract with a prime/integrating contractor (Northrop Grumman) for most but not all B-2 programs; use of cost plus incentive fee (CPIF) development contracts; and the combination of developmental upgrades with software sustainment blocks to minimize the number of software releases, aircraft downtime, and differences in fielded configurations.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676021 / BASELINE SUPPORT
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	5.562	Oct 2018	10.225	Oct 2019	10.019	Oct 2020	-		10.019	Continuing	Continuing	-
Subtotal			0.000	5.562		10.225		10.019		-		10.019	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Government Test	MIPR	AFTC : CA	0.000	2.026	Oct 2018	2.750	Oct 2019	2.716	Oct 2020	-		2.716	Continuing	Continuing	-
Subtotal			0.000	2.026		2.750		2.716		-		2.716	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
PMA	Various	Various : TBD	0.000	1.163	Oct 2018	1.376	Oct 2019	1.837	Oct 2020	-		1.837	Continuing	Continuing	-
Subtotal			0.000	1.163		1.376		1.837		-		1.837	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		0.000	8.751	14.351	14.572	14.572	Continuing	Continuing	N/A

Remarks
Award dates listed are the first incremental funding opportunity associated with each cost category.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676021 / BASELINE SUPPORT
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

B-2 Baseline Support																																												
FY19 Flight Test Core Support Contract Award	■																																											
FY20 Flight Test Core Support Contract Award					■																																							
FY21 Flight Test Core Support Contract Award									■																																			
FY22 Flight Test Core Support Contract Award													■																															
FY23 Flight Test Core Support Contract Award																	■																											
FY24 Flight Test Core Support Contract Award																					■																							
FY25 Flight Test Core Support Contract Award																									■																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676021 / BASELINE SUPPORT
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-2 Baseline Support</i>				
FY19 Flight Test Core Support Contract Award	1	2019	1	2019
FY20 Flight Test Core Support Contract Award	1	2020	1	2020
FY21 Flight Test Core Support Contract Award	1	2021	1	2021
FY22 Flight Test Core Support Contract Award	1	2022	1	2022
FY23 Flight Test Core Support Contract Award	1	2023	1	2023
FY24 Flight Test Core Support Contract Award	1	2024	1	2024
FY25 Flight Test Core Support Contract Award	1	2025	1	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	156.800	185.640	104.219	116.569	0.000	116.569	116.618	23.854	0.000	0.000	Continuing	Continuing
672983: <i>MM Ground and Comm Equipment</i>	0.000	63.388	69.251	15.879	0.000	15.879	18.609	4.387	0.000	0.000	Continuing	Continuing
672984: <i>MM III Baseline Support</i>	0.000	90.606	14.816	96.246	0.000	96.246	94.265	13.153	0.000	0.000	Continuing	Continuing
672985: <i>MM Support Equip</i>	0.000	11.160	6.859	0.000	0.000	0.000	0.000	3.196	0.000	0.000	Continuing	Continuing
672986: <i>MM Crypto Mods</i>	156.800	20.486	13.293	4.444	0.000	4.444	3.744	3.118	0.000	0.000	0.000	201.885

Note

This program, BA 7, PE 0101213F, project 672983, LGM-30G Airborne Procedures Trainer Replacement (APT-R), is a new start.

In FY 2019, Project 672983, MM Ground and Comm Equipment - LGM-30G Air Launch Control System Replacement (ALCS-R) was terminated and efforts were transferred to Program 0605230F, Ground Based Strategic Deterrent, and LGM-30G Automatic Switching Unit (ASU) was completed.

In FY 2020, Project 672983, MM Ground and Comm Equipment - LGM-30G Launch Control Center Break-In-Kit (LCCB), LGM-30G Launch Control Center Block Upgrade (LCCBU), and LGM-30G Remove Visual Assessment Phase II (RVA II) were completed.

In FY 2019, Project 672985, MM Support Equip - LGM-30G Transporter Erector Replacement Program (TERP), LGM-30G Payload Transporter Replacement (PTR), and LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) were completed.

A. Mission Description and Budget Item Justification

The MM Ground and Comm Equipment program replaces obsolete/unsupportable ground-based weapon system equipment located at Launch Control Centers (LCCs) and Launch Facilities (LFs) necessary to continue Minuteman III (MM III) operations through 2030. Current efforts include development, qualification, integration, and testing of replacement equipment such as the LGM-30G Automatic Switching Unit (ASU), LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP), LGM-30G Launch Control Center Break-In-Kit (LCCB), LGM-30G Launch Control Center Block Upgrade (LCCBU), and LGM-30G Remote Visual Assessment II (RVA II), and LGM-30G Airborne Procedures Trainer Replacement (APT-R).

MM III Baseline Support program replaces or upgrades obsolete/unsupportable flight test unique equipment installed on the missile during flight test, used to test MM III systems on the ground, or located at test facilities to collect, process, and analyze test data. Flight test equipment supports test and evaluation of MM III capabilities, and MM III Operational Test Launches (OTLs) to determine ICBM force readiness, reliability and capability shortfalls. Efforts include development, qualification, integration and testing of replacement equipment such as LGM-30G Arm/Disarm Switch Replacement (ADSR) and LGM-30G Flight Test Telemetry and Termination System (FT3). These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to GBSD. As other similar equipment is identified for replacement, it will be added to this program. MM III Baseline Support also provides for other MM III unique government costs, studies of system performance, contract closeout costs, cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. Efforts also include any minor needs required to prepare for full acquisition purposes.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>
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MM Support Equipment program designs, develops, and tests replacement of obsolete/non-serviceable weapon system support equipment. These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to Ground Based Strategic Deterrent (GBSD). Current efforts include design, development, and testing of support equipment such as LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT), LGM-30G Transporter Erector Replacement Program (TERP), LGM-30G Payload Transporter Replacement (PTR), LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU), and LGM-30G Pendulous Integrating Gyroscopic Accelerometer/G6B4 Build Equipment Replacement (PIGA/G6B4 BER). Programs may execute DMS/PMA support through the ISC 2.0 contract established to support the ICBM enterprise through the life of MMIII.

MM Crypto Mods executes USSTRATCOM, Air Force Global Strike Command, and Air Force Safety Center requirements by implementing the KS-60 capabilities in LGM-30G ICBM Cryptography Upgrade II (ICU II) of remote key/code change and irreversible transformation as mandated in the approved Capabilities Development Document (dated 4 Jan 05) and addresses Nuclear Weapon System Safety Group Operational Safety Review requirements 98-2, 00-1 and 02-2. It also incorporates continuous signal lockout capabilities to prevent the widespread loss of status monitoring. These features will greatly increase security during code changes by reducing the frequency of open sites 75 days annually and will reduce associated resource costs for 450 Launch Facilities (LFs) and 45 Launch Control Centers (LCCs).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Minuteman Squadrons nuclear weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F or 0605833F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	154.733	128.961	133.978	0.000	133.978
Current President's Budget	185.640	104.219	116.569	0.000	116.569
Total Adjustments	30.907	-24.742	-17.409	0.000	-17.409
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-2.720			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-22.022			
• Reprogrammings	35.986	0.000			
• SBIR/STTR Transfer	-5.041	0.000			
• Other Adjustments	-0.038	0.000	-17.409	0.000	-17.409

Change Summary Explanation

FY2019 funding reflects a Congressionally-approved reprogramming of \$26.460 million and a below threshold reprogramming of \$9.526 million for Flight Test Telemetry and Termination.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	
<p>FY2019 funding reflects a Small Business Innovation Research (SBIR) adjustment of \$5.041 million. FY2020 funding reflects a Congressional directed reduction of \$2.720 million for "Maintain program affordability: Launch Control Center Block Upgrade excess to need" and a \$22.022 million Congressional Directed Transfer to Ground Based Strategic Deterrent (Program Element 0605230F). FY2021 adjustments due to higher AF Nuclear priorities.</p>		

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672983 / MM Ground and Comm Equipment			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
672983: MM Ground and Comm Equipment	0.000	63.388	69.251	15.879	0.000	15.879	18.609	4.387	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 7, PE 0101213F, project 672983, LGM-30G Airborne Procedures Trainer Replacement (APT-R), is a new start.

In FY 2019, Project 672983, MM Ground and Comm Equipment - LGM-30G Air Launch Control System Replacement (ALCS-R) was terminated and efforts were transferred to Program 0605230F, Ground Based Strategic Deterrent, and LGM-30G Automatic Switching Unit (ASU) was completed.

In FY 2020, Project 672983, MM Ground and Comm Equipment - LGM-30G Launch Control Center Break-In-Kit (LCCB), LGM-30G Launch Control Center Block Upgrade (LCCBU), and LGM-30G Remove Visual Assessment II (RVA II) were completed.

A. Mission Description and Budget Item Justification

The MM Ground and Comm Equipment program replaces obsolete/unsupportable ground-based weapon system equipment located at Launch Control Centers (LCCs) and Launch Facilities (LFs) necessary to continue MM III operations through 2030. Current efforts include development, qualification, integration, and testing of replacement equipment such as the LGM-30G Automatic Switching Unit (ASU), LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP), LGM-30G Launch Control Center Break-In-Kit (LCCB), LGM-30G Launch Control Center Block Upgrade (LCCBU), LGM-30G Remote Visual Assessment II (RVA II), and LGM-30G Airborne Procedures Trainer Replacement (APT-R).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: LGM-30G Air Launch Control System Replacement (ALCS-R)	43.677	64.595	0.000
<p>Description: In FY 2019, Project 672983, MM Ground and Comm Equipment - Air Launch Control System Replacement (ALCS-R) was terminated. The requirement for air-based, survivable launch capability will be fulfilled through an alternative path: a dual-capable Secondary Launch Platform - Airborne, under the Ground Based Strategic Deterrent (GBSD) program. The GBSD program is budgeted in PE 0605230F, Ground Based Strategic Deterrent.</p> <p>The purpose of the ALCS-R program was to design, develop, produce and deploy a replacement for the legacy nuclear command and control system that provides the capability to launch Intercontinental Ballistic Missiles from an airborne platform, currently the Navy E-6B, as well as consider future alternate launch requirements. The legacy system consists of a nuclear hardened radio and MM III interface at each Launch Facility, and a suite of launch and cryptographic equipment that generates and transmits commands from the E-6B. ALCS dependent on the Strategic Air Command Code Processing System for codes data supplied to airborne equipment, and the Navy E-6B radio Command, Control, and Communication data path to transmit signals to the Launch Facilities.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p><i>FY 2020 Plans:</i></p> <ul style="list-style-type: none"> • Complete ALCS-R program termination and transition of the requirement for an air-based, survivable launch capability to the GBSD program. <p><i>FY 2021 Plans:</i></p> <ul style="list-style-type: none"> • N/A - Program Terminated <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding decreased due to program termination and transition of the requirement to GBSD program.</p>			
<p><i>Title:</i> LGM-30G Automatic Switching Unit (ASU)</p> <p><i>Description:</i> The ASU program will replace the current Minuteman ASU, Diesel Electric Unit (DEU) and Minuteman Power Processor (MPP). The ASU is controlled by the MPP, which contains software and electronics to measure incoming and standby power characteristics. The DEU provides standby power in the event of a loss of the primary power source. Current equipment and lack of repair/reprogram capability causes inadvertent source transfers by the MPP. Technical data does not exist for repair or reprogramming of the MPP making it unsupportable. The ASU contacts have exceeded their service life, and unnecessary source transfers stress mission critical components. The increased power transfers have increased the use and accelerated the wear on the DEU.</p> <p><i>FY 2020 Plans:</i> N/A</p> <p><i>FY 2021 Plans:</i> N/A</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A</p>	2.691	0.000	0.000
<p><i>Title:</i> LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP)</p> <p><i>Description:</i> The Fast Rising B-Plug (FRBP) provides security functions for the Personnel Access System (PAS) of the Launch Facilities (LFs). It is a 14,000 pound cylinder with 12 locking pins used to deny/delay access to intruders during LF maintenance activities.</p> <p>This effort includes critical hardware and software modifications to address high obsolescence risk and reliability issues affecting the operational wings.</p> <p><i>FY 2020 Plans:</i></p>	0.000	4.656	12.455

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Release Requests For Proposal • Perform Source Selection • Award Engineering Manufacturing Development and Independent Verification & Validation contracts • Complete system functional and requirements reviews • Test and Evaluations Planning <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Preliminary Design Review • Critical Design Review • Test & Evaluation execution <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due ramp up in EMD activities.</p>				
<p>Title: LGM-30G Launch Control Center Break-In-Kit (LCCB)</p> <p>Description: The LCCB program developed a kit that enables personnel to extract incapacitated missile combat crew members in the event the LCC crew becomes unresponsive and cannot open the LCC Blast Door. The LCCB is a new capability and has not been previously fielded.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>		0.830	0.000	0.000
<p>Title: Launch Control Center (LCC) Block Upgrade (LCCBU)</p> <p>Description: The LCCBU program addressed several elements within the LCC experiencing supportability issues. Each component will be procured once development has been completed and installed at each LCC based on availability. It consists of a Journal Memory Loader (JML), Flash Data Drive (FDD), Weapon System Control Console (WSSC) Printer, Oxygen Regeneration Unit (ORU), and associated Trainers and Support Equipment.</p> <p>All LCCBU efforts support 45 operational LCCs, 12 trainers, 2 Integration Facilities, 2 Test Launch Facilities, and additional support and test equipment for maintenance locations.</p> <p>FY 2020 Plans:</p>		9.887	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
N/A				
FY 2021 Plans: N/A				
FY 2020 to FY 2021 Increase/Decrease Statement: N/A				
Title: LGM-30G Remote Visual Assessment II (RVA II)		6.303	0.000	0.000
Description: RVA II provides enhanced situational awareness by providing the current remote camera feed to responding security vehicles and helicopters. RVA II also increases backup power to current remote visual equipment, increases video archival storage, and implements auto-activation of outer and inner zone alarms. RVA II also implements changes required to meet DoD CyberSecurity requirements.				
FY 2020 Plans: N/A				
FY 2021 Plans: N/A				
FY 2020 to FY 2021 Increase/Decrease Statement: N/A				
Title: LGM-30G Airborne Procedures Trainer Replacement (APT-R)		-	0.000	3.424
Description: The Airborne Procedures Trainer- Replacement (APT-R) will replace a one-of-a-kind simulator located at Offutt AFB NE that was destroyed by the March 2019 flood. APT-R program will design, develop, produce, and deploy a trainer used to certify the Airborne Launch Control System (ALCS) crews on missile launch procedures, emergencies, malfunctions, and in-flight operations as well as Nuclear Certification training.				
APT-R program will use spiral development off of the temporary training solution Virtual APT, which was awarded in October 2019. The development effort will upgrade the temporary solution to a certified system with an improved realistic training environment. The increased capability will include configuring APT-R as a Class 1 training device, incorporating tactile functionality, designing realistic E-6B Mercury aircraft enclosure, developing audio buffer, and augmentation of the instructor touch panel.				
FY 2020 Plans:				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
N/A			
<i>FY 2021 Plans:</i>			
• Enter acquisition process			
• Release Request for Proposals			
• Mature APT-R trainer solution			
• Develop test plan			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>			
Funding increased due to start of development efforts.			
Accomplishments/Planned Programs Subtotals	63.388	69.251	15.879

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 Line Item M30MLG: <i>Minuteman III Modifications BP21</i>	38.290	21.060	53.274	-	53.274	81.393	78.542	28.037	18.000	Continuing	Continuing
• MPAF 01 Ballistic Missiles/ BSA 3...: <i>Minuteman III</i> <i>Replacement Eq-Ballistic BP22</i>	0.000	0.100	0.000	-	0.000	0.000	0.000	0.000	-	Continuing	Continuing
• MPAF 04 Line Item 000999: <i>Replen Spares/</i> <i>Repair Parts BP25/26</i>	0.000	0.000	17.843	-	17.843	18.013	13.900	10.707	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

Ground and Communication equipment replacement efforts are reviewed to determine the best method for execution, including vendor qualification and procurement with no development required, develop and/or modification with organic depot capabilities or development with industry. Industry development for Ground and Communication equipment efforts will be executed through contracts available under the Future ICBM Sustainment and Acquisition Construct (FISAC) or competitive source selections. Nuclear Surety Cross Check Analysis (NSCCA) and Independent Verification and Validation (IV&V) efforts are contracted separately. Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Airborne Launch Control System Replacement (ALCS-R) TMRR Contractor A	C/FPIF	Lockheed Martin : Littleton, CO	0.000	17.088	Oct 2018	24.212	Dec 2019	-		-		-	0.000	41.300	-
LGM-30G Airborne Launch Control System Replacement (ALCS-R) TMRR Contractor B	C/FPIF	Rockwell Collins : Cedar Rapids, IA	0.000	13.260	Oct 2018	26.766	Dec 2019	-		-		-	0.000	40.026	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) SIL	MIPR	Aerospace : El Segundo, CA	0.000	-		0.100	May 2020	-		-		-	0.000	0.100	0.000
LGM-30G Automatic Switching Unit (ASU) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	2.251	Dec 2018	-		-		-		-	0.000	2.251	14.411
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	0.000		3.270	May 2020	9.992	May 2021	-		9.992	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit EMD	MIPR	Navy Crane : Crane, IN	0.000	0.300	Apr 2019	-		-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	7.658	Oct 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD	C/CPFF	Sentry View Systems : Melbourne, FL	0.000	4.044	Jan 2019	-		-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD Other Development	Various	Various : Various	0.000	0.755	Jan 2019	-		-		-		-	Continuing	Continuing	0.000
LGM-30G Airborne Procedures Trainer Replacement (APT-R)	TBD	Various : Various	0.000	-		-		3.000	Jan 2021	-		3.000	Continuing	Continuing	-
Subtotal			0.000	45.356		54.348		12.992		-		12.992	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Airborne Launch Control System Replacement (ALCS-R) MITRE	MIPR	MITRE : Bedford, MA	0.000	2.742	Oct 2018	-		-		-		-	0.000	2.742	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Aerospace	MIPR	Aerospace Corporation : El Segundo, CA	0.000	2.568	Oct 2018	-		-		-		-	0.000	2.568	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Navy Crane	MIPR	Naval Surface War Ctr : Crane, IN	0.000	0.002	Feb 2019	-		-		-		-	0.000	0.002	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Design Support	Various	Various : Various	0.000	1.656	Oct 2018	-		-		-		-	0.000	1.656	0.000
LGM-30G Launch Control Center Break-In-Kit Test Support	Various	Various : Various	0.000	0.018	Sep 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	6.986		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Testing	Various	Various : Various	0.000	0.552	Dec 2018	1.546	Dec 2019	-		-		-	0.000	2.098	0.000
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) Test & Evaluation	Various	Various : Various	0.000	-		0.182	Oct 2019	0.608	Oct 2020	-		0.608	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Launch Control Center Break-In-Kit Test Repair	PO	Naval Surface Warfare Ctr : Crane, IN	0.000	0.174	Apr 2019	-		-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade Test & Evaluation	Various	Various : Various	0.000	1.366	Oct 2018	-		-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment II (RVA II) Test & Evaluation	Various	Various : Various	0.000	-		-		-		-		-	Continuing	Continuing	0.000
Subtotal			0.000	2.092		1.728		0.608		-		0.608	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Integration Support Contract	C/FP	BAE : Layton, UT	0.000	3.661	Oct 2018	4.414	Oct 2019	-		-		-	0.000	8.075	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) A&AS	C/FPIF	Peerless Technologies : Fairborn, OH	0.000	0.705	Oct 2018	2.214	Oct 2019	-		-		-	0.000	2.919	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) PMA	Various	Various : Various	0.000	1.443	Oct 2018	5.343	Oct 2019	-		-		-	0.000	6.786	0.000
LGM-30G Automatic Switching Unit (ASU) PMA	Various	Various : Various	0.000	0.028	Oct 2018	-		-		-		-	0.000	0.028	0.000
LGM-30G Automatic Switching Unit (ASU) A&AS	C/FP	BAE : Layton, UT	0.000	0.412	Oct 2018	-		-		-		-	0.000	0.412	0.000

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Launch Control Center Break-In-Kit PMA	Various	Various : Various	0.000	0.149	Feb 2019	-		-		-		-	Continuing	Continuing	0.000
LGM-30G Launch Control Center Break-In-Kit A&AS	C/FP	BAE : Layton, UT	0.000	0.189	Nov 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade PMA	Various	Various : Various	0.000	0.015	Jul 2019	-		-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade A&AS	C/FP	BAE : Layton, UT	0.000	0.848	Nov 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) A&AS	C/FP	BAE : Layton, UT	0.000	-		0.654	Feb 2020	0.736	Feb 2021	-		0.736	Continuing	Continuing	0.000
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) PMA	Various	Various : Various	0.000	-		0.550	Dec 2019	1.119	Dec 2020	-		1.119	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) PMA	Various	Various : Various	0.000	0.071	Oct 2018	-		-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment Phase II (RVA II) A&AS	C/FP	BAE : Layton, UT	0.000	1.433	Oct 2018	-		-		-		-	Continuing	Continuing	0.000
LGM-30G Airborne Procedures Trainer Replacement (APT-R) PMA	TBD	Various : Various	0.000	-		-		0.424	Jan 2021	-		0.424	Continuing	Continuing	-
Subtotal			0.000	8.954		13.175		2.279		-		2.279	Continuing	Continuing	N/A
Project Cost Totals			0.000	63.388		69.251		15.879		-		15.879	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Remarks									

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MM Ground and Comm Equipment																												
ALCS-R Technology Maturation and Risk Reduction Phase	■	■	■																									
ASU Engineering and Manufacturing Development Phase	■	■																										
ASU Milestone C (May 2019)			■																									
ASU Production and Deployment Phase										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
ASU RAA (Sep 2024)																										■		
FRBP SLEP Milestone B (Feb 2020)							■																					
FRBP SLEP Engineering & Manufacturing Development Phase										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
FRBP SLEP Milestone C (Aug 2022)																											■	
FRBP SLEP Production & Deployment Phase																											■	
FRBP SLEP RAA (Dec 2023)																											■	
LCCB Engineering and Manufacturing Development Phase	■	■	■																									
LCCB Milestone C (Feb 2019)			■																									
LCCB Production and Deployment Phase										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
LCCB RAA (Mar 2020)								■																				
LCCBU Engineering and Manufacturing Development Phase	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
LCCBU Milestone C (Feb 2020)										■																		
LCCBU Production and Deployment Phase																											■	
LCCBU RAA (July 2022)																											■	
RVA II Engineering and Manufacturing Development Phase II	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
RVA II CDR (Feb 2019)			■																									

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM Ground and Comm Equipment</i>				
ALCS-R Technology Maturation and Risk Reduction Phase	1	2019	3	2019
ASU Engineering and Manufacturing Development Phase	1	2019	2	2019
ASU Milestone C (May 2019)	3	2019	3	2019
ASU Production and Deployment Phase	2	2021	4	2024
ASU RAA (Sep 2024)	4	2024	4	2024
FRBP SLEP Milestone B (Feb 2020)	2	2020	2	2020
FRBP SLEP Engineering & Manufacturing Development Phase	3	2020	4	2022
FRBP SLEP Milestone C (Aug 2022)	4	2022	4	2022
FRBP SLEP Production & Deployment Phase	1	2023	4	2025
FRBP SLEP RAA (Dec 2023)	1	2024	1	2024
LCCB Engineering and Manufacturing Development Phase	1	2019	2	2019
LCCB Milestone C (Feb 2019)	2	2019	2	2019
LCCB Production and Deployment Phase	2	2019	2	2020
LCCB RAA (Mar 2020)	2	2020	2	2020
LCCBU Engineering and Manufacturing Development Phase	1	2019	4	2020
LCCBU Milestone C (Feb 2020)	2	2020	2	2020
LCCBU Production and Deployment Phase	2	2020	4	2023
LCCBU RAA (July 2022)	4	2022	4	2022
RVA II Engineering and Manufacturing Development Phase II	1	2019	4	2019
RVA II CDR (Feb 2019)	2	2019	2	2019
RVA II Milestone C (Dec 2019)	1	2020	1	2020
RVA II Production and Deployment Phase	2	2020	4	2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
RVA II IOC (Aug 2021)	4	2021	4	2021
RVA II FOC (Jul 2023)	3	2023	3	2023
APT-R Engineering and Manufacturing Development Phase	2	2021	2	2022

Note
 ASU Engineering and Manufacturing Development Phase started 3QFY17.
 LCCB Engineering and Manufacturing Development Phase started 2QFY17.
 LCCBU Engineering and Manufacturing Development Phase started 3QFY17.
 RVA II Engineering and Manufacturing Development Phase I started 2QFY17.
 APT-R Engineering and Manufacturing Development Phase started 2QFY21.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>				Project (Number/Name) 672984 / <i>MM III Baseline Support</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
672984: <i>MM III Baseline Support</i>	0.000	90.606	14.816	96.246	0.000	96.246	94.265	13.153	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MM III Baseline Support program replaces or upgrades obsolete/unsupportable flight test unique equipment installed on the missile during flight test, used to test MM III systems on the ground, or located at test facilities to collect, process, and analyze test data. Flight test equipment supports test and evaluation of MM III capabilities, and MM III Operational Test Launches (OTLs) to determine ICBM force readiness, reliability and capability shortfalls. Efforts include development, qualification, integration and testing of replacement equipment such as LGM-30G Arm Disarm Switch Replacement (ADSR) and LGM-30G Flight Test Telemetry and Termination System (FT3). These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to Ground Based Strategic Deterrent (GBSD). As other similar equipment is identified for replacement, it will be added to this program. MM III Baseline Support also provides for other MM III unique government costs, studies of system performance, contract closeout costs, cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: LGM-30G Arm Disarm Switch Replacement (ADSR)	0.273	2.820	4.274
<p>Description: The ADSR program designs, develops, fabricates and tests replacements for the aging Arm/Disarm (A/D) switches currently on the MM III Missile fleet. The A/D switch is responsible for completing or interrupting ordnance electrical circuits. A/D switches are placed at five key locations in the system: Interstage I-II, Stage II Liquid Injection Thrust Vector Control (LITVC) and Roll Control, Interstage II-III, PSRE Staging, and PSRE Isolation Valves. Aging and surveillance is an ongoing study to generate a trade-off curve between reliability/availability and cost.</p> <p>Reliability/availability are monitored by periodic testing to discover unforeseen issues. Because not all existing A/D switches can be repaired/refurbished, the number in inventory will eventually be inadequate to meet the need of the PDM cycle. Supply is estimated to deplete by approximately FY24 with repair/refurbish mitigation. Repair/refurbish is a reliable mitigation plan to meet the ongoing needs of the fleet while a manufacturer is selected and the manufacturing system is selected to develop a replacement A/D switch that meets requirements and production quantities through 2036.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> • Conduct System Requirement Review/System Functional Review • Complete Integrated Baseline Review • Complete Preliminary Design Review • Complete Critical Design Review <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Conduct qualification testing on A/D designs 			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Conclude qualification activities • Conclude milestone C <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to qualification testing.</p> <p>Title: LGM-30G Flight Test Telemetry and Termination System (FT3)</p> <p>Description: The FT3 Program replaces the Mod 7 Instrumentation Wafer (Mod 7) and associated Signal Conditioner Monitor Group, and All Ordnance Destruct System (AODS) with a flight test kit. In addition, a replacement of the Launch Support System (LSS) is required to deploy the flight test kit. The flight test kit which consists of the Flight Destruct System (FDS) and a wafer-less Integrated Instrumentation System (IIS), along with an upgraded LSS, will meet 30th Space Wing Range Safety and Air Force Global Strike Command (AFGSC) requirements and resolve obsolescence concerns/issues.</p> <p>The AODS, Mod 7 Instrumentation Wafer, and LSS include many components that are not economically available, are no longer compliant with applicable Range Safety requirements, or are in need of technical modernization. Replacement of the Vandenberg Air Force Base flight test unique equipment is necessary to sustain future AFGSC Operational Test Launches (OTL), supporting USSTRATCOM requirements starting in FY22.</p> <p>The OTLs are critical to validating the continued accuracy and reliability of the MM III ICBM Weapon System until Ground Based Strategic Deterrent (GBSD) is fielded by providing valuable data to ensure a safe, secure, and effective nuclear deterrent. The FT3 System of Systems (SoS) will perform the same function as the existing systems with upgraded design features in order to comply with Air Force Space Command Manual (AFSPCMAN) 91-710, Range Safety User Requirements, Range Commander's Council 319, Flight Termination Systems Commonality Standard, and RCC-324, Global Positioning and Inertial Measurements Range Safety Tracking Systems' Commonality Standard.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> • Due to FY19 funding shortfalls, program slowed down in December 2018. Program has initiated an approximate 7-month ramp-up to include restarting sub-tier vendor tasks and increasing contractor staffing. • Replan program and conduct Integrated Baseline Review once sufficient Earned Value Management (EVM) data can be assessed. • Complete Flight Termination Receiver 2.0 prototype assembly. • Initiate engineering development unit and qualification unit builds. • Continue with 33 additional component-level qualification tests. • Begin System Verification Review (SVR) activities. <p>FY 2021 Plans:</p>		88.186	9.996	91.841

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Conclude the remainder of 33 component-level qualification tests. • Continue SVR activities. • Begin SoS Test Readiness Review (TRR) activities. • Begin Production Readiness Review (PRR) activities. <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase due to re-phasing of testing/evaluation and readiness review activities.</p>			
<p>Title: LGM-30G Baseline Support</p> <p>Description: This program provides for other MM III unique government costs, studies of system performance, contract closeout costs, cost trades, and acquisition planning activities, up to and including proposal preparation, for future capabilities.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> • Conduct studies of system performance. • Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Conduct studies of system performance. • Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to higher priority programs.</p>	2.147	2.000	0.131
Accomplishments/Planned Programs Subtotals	90.606	14.816	96.246

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 M30MLG: <i>Minuteman III Modifications BP21</i>	0.000	0.000	0.000	-	0.000	4.534	4.469	0.000	0.000	Continuing	Continuing
• MPAF 01 00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• MPAF 04 M09HA1: <i>BP25</i>	0.000	20.333	1.990	-	1.990	23.983	27.280	27.282	59.597	Continuing	Continuing
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>
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D. Acquisition Strategy

Baseline Support equipment replacement efforts are reviewed to determine the best method for execution, including vendor qualification and procurement with no development required, develop and/or modification with organic depot capabilities or development with industry. Industry development for Baseline Support equipment efforts will be executed through contracts available under competitive source selections. Nuclear Surety Cross Check Analysis (NSCCA) and Independent Verification and Validation (IV&V) efforts are contracted separately. Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672984 / MM III Baseline Support
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Arm Disarm Switch Replacement (ADSR)	C/CPFF	TBD : TBD	0.000	0.000		1.793	Jan 2020	2.975	Oct 2020	-		2.975	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) TMRR/EMD	C/PIIF	Boeing : Clearfield, UT	0.000	73.779	Oct 2018	8.013	Jan 2020	79.864	Dec 2020	-		79.864	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) MOTP	C/PIIF	Northrop Grumman : Clearfield, UT	0.000	4.910	Aug 2019	0.998	Aug 2020	1.811	Oct 2020	-		1.811	Continuing	Continuing	-
Subtotal			0.000	78.689		10.804		84.650		-		84.650	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Arm Disarm Switch Replacement (ADSR) Support	TBD	TBD : TBD	0.000	-		0.139	Jan 2020	0.211	Jan 2021	-		0.211	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) Support	C/Variou	Various : Clearfield, UT	0.000	2.221	Oct 2018	0.306	Jan 2020	5.527	Oct 2020	-		5.527	Continuing	Continuing	-
LGM-30G Baseline Support	C/Variou	Various : Various	0.000	2.147	Mar 2019	2.000	Mar 2020	0.131	Mar 2021	-		0.131	Continuing	Continuing	-
Subtotal			0.000	4.368		2.445		5.869		-		5.869	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Flight Test Telemetry and Termination System (FT3) NSCCA-PATE	C/Variou	Northrop Grumman : Clearfield, UT	0.000	0.848	Jun 2019	0.060	Jun 2020	-		-		-	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672984 / MM III Baseline Support
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Flight Test Telemetry and Termination System (FT3) Lead Developmental Test Organization	MIPR	AEDC/TST : AAFB, TN	0.000	0.483	Jan 2019	0.066	Jan 2020	0.878	Dec 2020	-		0.878	Continuing	Continuing	-
LGM-30G Arm Disarm Switch Replacement (ADSR) Lead Developmental Test Organization	MIPR	AEDC : HAFB, UT	0.000	0.131	May 2019	0.028	Jun 2020	0.100	Oct 2020	-		0.100	Continuing	Continuing	-
Subtotal			0.000	1.462		0.154		0.978		-		0.978	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Arm Disarm Switch Replacement (ADSR)	C/CPFF	Various : Various	0.000	0.000		0.000		-		-		-	Continuing	Continuing	-
LGM-30G Arm Disarm Switch Replacement (ADSR) PMA	Various	Various : Various	0.000	0.142	May 2019	0.860	Jan 2020	0.988	Jan 2021	-		0.988	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) PMA	Various	Various : Various	0.000	2.200	Apr 2019	0.553	Jan 2020	1.592	Oct 2020	-		1.592	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) A&AS	C/FFP	BAE : Clearfield, UT	0.000	3.745	Sep 2019	-		2.169	Oct 2020	-		2.169	Continuing	Continuing	-
Subtotal			0.000	6.087		1.413		4.749		-		4.749	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		0.000	90.606	14.816	96.246	-	96.246	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>
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Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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Remarks								

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672984 / MM III Baseline Support
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MM III Baseline Support																												
ADSR Milestone B (Jun 2019)			■																									
ADSR Engineering and Manufacturing Development Phase			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
ADSR PDR (Jan 2020)						■																						
ADSR CDR (Apr 2020)							■																					
ADSR Milestone C (Sep 2021)											■																	
ADSR Production and Deployment Phase													■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
FT3 Engineering and Manufacturing Development Phase		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
FT3 CDR (Dec 2018)	■																											
FT3 PRR (Jul 2022)															■													
FT3 Milestone C (Jul 2022)															■													
FT3 Production and Deployment Phase															■	■	■	■	■	■	■	■	■	■	■	■	■	
FT3 RAA (Apr 2023)																	■											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM III Baseline Support</i>				
ADSR Milestone B (Jun 2019)	3	2019	3	2019
ADSR Engineering and Manufacturing Development Phase	3	2019	1	2022
ADSR PDR (Jan 2020)	2	2020	2	2020
ADSR CDR (Apr 2020)	3	2020	3	2020
ADSR Milestone C (Sep 2021)	4	2021	4	2021
ADSR Production and Deployment Phase	1	2022	4	2023
FT3 Engineering and Manufacturing Development Phase	1	2019	2	2023
FT3 CDR (Dec 2018)	1	2019	1	2019
FT3 PRR (Jul 2022)	4	2022	4	2022
FT3 Milestone C (Jul 2022)	4	2022	4	2022
FT3 Production and Deployment Phase	4	2022	4	2025
FT3 RAA (Apr 2023)	3	2023	3	2023

Note

FT3--In order to preserve Program schedule, the Program intends to request permission from the MDA to execute Limited Deployment of the LSS and assembly of the first two Flight Test Kits ahead of PRR and Milestone C.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>				Project (Number/Name) 672985 / <i>MM Support Equip</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
672985: <i>MM Support Equip</i>	0.000	11.160	6.859	0.000	0.000	0.000	0.000	3.196	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019, Project 672985, MM Support Equip - LGM-30G Transporter Erector Replacement Program (TERP), LGM-30G Payload Transporter Replacement (PTR), and LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) were completed.

A. Mission Description and Budget Item Justification

MM Support Equipment program designs, develops, and tests replacement of obsolete/non-serviceable weapon system support equipment. These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to Ground Based Strategic Deterrent (GBSD). Current efforts include design, development, and testing of support equipment such as LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT), LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU), LGM-30G Pendulous Integrating Gyroscopic Accelerometer/G6B4 Build Equipment Replacement (PIGA/G6B4 BER), LGM-30G Payload Transporter Replacement (PTR), and LGM-30G Transporter Erector Replacement Program (TERP).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: LGM-30G Pendulous Integrated Gyroscopic Accelerometer/G6B4 Build Equipment Replacement (PIGA/G6B4 BER)	2.470	4.118	0.000
Description: The Missile Guidance Set (MGS) repair is dependent on the proper functioning of the PIGA build equipment. The PIGA build and test equipment used at the repair facility is well over twenty years old and is becoming unsustainable due to obsolescence issues. This program will modify or replace the Digital Pickoff Alignment station, Electrical Alignment stations, Alignment Test stations, a Torque Test station, a Temperature Probe Calibration station, Fluid Fill stations and a Slip Ring/Module Test station.			
The G6B4 BER impacts three stations: the G6B4 Rotor Balance Test Station, the G6B4 Hydrogen Fill Station, and the Gyro F-coefficient Station (GFS). The G6B4 Rotor Balance Test Station (S-133-18024) is used to determine radial and dynamic balance of the G6B4 gyro rotor after repair, and it needs to have the obsolete Schenk balancer and console replaced. The G6B4 Hydrogen Fill Station (S-133-132-4-384) is used to fill the G6B4 with hydrogen gas following repairs, and it needs to have obsolete and failing gauges, plumbing and valves replaced. The Gyro F-coefficient Station (GFS) (S-133-18038) is used to calibrate the F-coefficient of the G6B4 gyro after repairs are complete; it needs its obsolete hydraulic and electrical power systems replaced.			
FY 2020 Plans:			
<ul style="list-style-type: none"> • Obtain Milestone B approval • Conduct Engineering, Manufacturing, & Development (EMD) Phase • Prepare and conduct Critical Design Review (CDR) • Prepare and conduct Test Readiness Review (TRR) 			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Prepare for Product Readiness Review (PRR) • Perform FCA/PCA • Complete test stand development • Conduct MS C <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to program transition to Production and Deployment.</p>				
<p>Title: LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT)</p> <p>Description: CMPT replaces the classroom trainer supporting start-up and shut-down of the MM III LF and missile, computer memory loading operations, and maintenance procedures. The program will update software, outdated operating systems, and obsolete/unsupportable hardware (desktop computers, motherboards, simulated programmer group, drivers, simulated cable sets, tape sets, and other miscellaneous parts) located at each Missile Wing and Vandenberg AFB necessary to continue the training capability of the CMPTs through 2030.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> • Conduct Test Readiness Review • Prepare and conduct Functional and Physical Configuration Audit • Prepare and conduct MS C • Begin Production and Deployment phase <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to completion of Milestone C and start of production and deployment phase.</p>		2.814	2.741	0.000
<p>Title: LGM-30G Transporter Erector Replacement Program (TERP)</p> <p>Description: Design and develop the capabilities necessary to replace the current Transporter Erector (TE). The TE is used to emplace, extract and transport Minuteman III boosters to and from the launch facilities. TERP will update existing drawings, specifications and technical orders to eliminate parts obsolescence and address intended usage through 2030 and will qualify the new system prior to production.</p> <p>FY 2020 Plans:</p>		1.626	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
N/A				
FY 2021 Plans: N/A				
FY 2020 to FY 2021 Increase/Decrease Statement: N/A				
Title: LGM-30G Payload Transporter Replacement (PTR)		3.573	0.000	0.000
Description: Designs and develops the capabilities necessary to replace the current Payload Transporter tractor and trailer, mitigating emerging threat technologies and methods. The PTR replaces, extracts, and transports the MM III reentry system, propulsion system rocket engine, and missile guidance set. The new PTR design increases safety and security during transport activities and improves maintenance operations.				
FY 2020 Plans: N/A				
FY 2021 Plans: N/A				
FY 2020 to FY 2021 Increase/Decrease Statement: N/A				
Title: LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU)		0.677	0.000	0.000
Description: The current Communications Equipment Interface Unit (CEIU) is used to transmit MM III Inertial Measurement Unit (IMU) Performance Data (IPD) from MM III LCC to the Performance Assessment Data System (PADS) at the support base via telephone lines. The CEIU is unclassified equipment but interfaces with both classified and unclassified systems. The update will utilize more secure and reliable internet protocol transmission methods. The update effort consists of rewriting the CEIU imbedded software language using secure coding practices and changes the CEIU design from telephony to internet protocol. In addition, the PADS interfacing system is to be updated to interface with the updated CEIU design. EMD effort completed/Milestone C achieved March 2019.				
FY 2020 Plans: N/A				
FY 2021 Plans: N/A				
FY 2020 to FY 2021 Increase/Decrease Statement:				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
N/A			
Accomplishments/Planned Programs Subtotals	11.160	6.859	0.000

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

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• MPAF 03 Line Item M30MLG: <i>MM III Modifications BP21</i>	0.000	0.859	0.129	-	0.129	0.000	0.000	0.000	0.000	Continuing	Continuing
• MPAF 01 Line Item 00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	0.000	55.683	72.627	-	72.627	46.600	45.430	33.569	0.492	Continuing	Continuing
• MPAF 04 Line Item 000999: <i>Replen Spares/ Repair Parts BP25/26</i>	0.000	0.410	24.100	-	24.100	11.516	13.717	19.092	45.459	Continuing	Continuing

Remarks

D. Acquisition Strategy

Support and test equipment replacement efforts are reviewed to determine the best method for execution including vendor qualification and procurement with no development required, develop and/or modification with organic depot capabilities or development with industry. Industry development efforts for support equipment will be executed through contracts available under the Future ICBM Sustainment and Acquisition Construct (FISAC) or competitive source selections. Nuclear Surety Cross Check Analysis (NSCCA) and Independent Verification and Validation (IV&V) efforts are contracted separately. Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672985 / MM Support Equip
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Pendulous Integrating Gyroscopic Accelerometer/G6B4 Build Equipment Replacement (PIGA/G6B4 BER)	SS/FPIF	Boeing : Layton, UT	0.000	2.470	Dec 2018	3.518	May 2020	-		-		-	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) EMD	PO	309th SMXG : Hill AFB, UT	0.000	1.972	Dec 2018	2.265	Dec 2019	-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) EMD	C/FPIF	DRS Environmental Systems : Cincinnati, OH	0.000	0.537	Dec 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	1.942	Oct 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) Interim EMD	C/CPFF	ArmorWorks : Chandler, AZ	0.000	1.245	Jan 2019	-		-		-		-	0.000	1.245	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) Software Development	SS/CPIF	Boeing : Layton, UT	0.000	0.671	Dec 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	8.837		5.783		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) Support	Various	Various : Various	0.000	0.006	Mar 2019	-		-		-		-	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672985 / MM Support Equip
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Transporter Erector Replacement Program (TERP) EMD	RO	Depot Support 309th : Hill AFB, UT	0.000	0.256	Sep 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	0.262		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Transporter Erector Replacement Program (TERP) Test and Evaluation	Various	Various : Various	0.000	0.129	May 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	0.129		-		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G Pendulous Integrating Gyroscopic Accelerometer/G6B4 Build Equipment Replacement (PIGA/G6B4 BER) PMA	Various	Various : Various	0.000	0.000		0.600	Jun 2020	-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) PMA	Various	Various : Various	0.000	0.200	Apr 2019	-		-		-		-	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) PMA	Various	Various : Various	0.000	0.842	Jan 2019	0.291	Jan 2020	-		-		-	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) A&AS	C/FFP	BAE : Clearfield, UT	0.000	-		0.185	Dec 2019	-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672985 / MM Support Equip
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MM Support Equipment																												
PIGA/G6B4 BER TMRR Phase																												
PIGA/G6B4 BER Milestone B (May 2020)																												
PIGA/G6B4 BER Engineering and Manufacturing Development Phase																												
PIGA/G6B4 BER CDR (Jun 2020)																												
PIGA/G6B4 BER TRR (Aug 2020)																												
PIGA/G6B4 BER Milestone C (May 2021)																												
PIGA/G6B4 BER Production and Deployment Phase																												
PIGA/G6B4 BER RAA (Jun 2022)																												
CMPT Engineering and Manufacturing Development Phase																												
CMPT CDR (Dec 2018)																												
CMPT Milestone C (Jun 2020)																												
CMPT Production and Deployment Phase																												
CMPT RAA (Oct 2020)																												
PTR Engineering and Manufacturing Development Phase																												
PTR Milestone C (Apr 2019)																												
PTR Production and Deployment Phase																												
PTR RAA (Aug 2025)																												
TERP Engineering and Manufacturing Development Phase																												
TERP Milestone C (Jun 2019)																												
TERP Production and Deployment Phase																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

TERP RAA (Sep 2022)	█																											
PADS CEIU Engineering and Manufacturing Development Phase	█																											
PADS CEIU Milestone C (Mar 2019)	█																											
PADS CEIU Production and Deployment Phase	█																											
PADS CEIU RAA (Sep 2023)	█																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MM Support Equipment				
PIGA/G6B4 BER TMRR Phase	1	2019	2	2020
PIGA/G6B4 BER Milestone B (May 2020)	3	2020	3	2020
PIGA/G6B4 BER Engineering and Manufacturing Development Phase	3	2020	3	2021
PIGA/G6B4 BER CDR (Jun 2020)	3	2020	3	2020
PIGA/G6B4 BER TRR (Aug 2020)	3	2020	3	2020
PIGA/G6B4 BER Milestone C (May 2021)	3	2021	3	2021
PIGA/G6B4 BER Production and Deployment Phase	3	2021	3	2022
PIGA/G6B4 BER RAA (Jun 2022)	3	2022	3	2022
CMPT Engineering and Manufacturing Development Phase	1	2019	3	2020
CMPT CDR (Dec 2018)	1	2019	1	2019
CMPT Milestone C (Jun 2020)	3	2020	3	2020
CMPT Production and Deployment Phase	3	2020	1	2021
CMPT RAA (Oct 2020)	1	2021	1	2021
PTR Engineering and Manufacturing Development Phase	1	2019	3	2019
PTR Milestone C (Apr 2019)	3	2019	3	2019
PTR Production and Deployment Phase	3	2019	4	2025
PTR RAA (Aug 2025)	4	2025	4	2025
TERP Engineering and Manufacturing Development Phase	1	2019	3	2019
TERP Milestone C (Jun 2019)	3	2019	3	2019
TERP Production and Deployment Phase	3	2019	4	2022
TERP RAA (Sep 2022)	4	2022	4	2022
PADS CEIU Engineering and Manufacturing Development Phase	1	2019	2	2019

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
PADS CEIU Milestone C (Mar 2019)	2	2019	2	2019
PADS CEIU Production and Deployment Phase	2	2022	4	2024
PADS CEIU RAA (Sep 2023)	4	2023	4	2023

Note
 PIGA/G6B4 BER Engineering and Manufacturing Development Phase started 4QFY18.
 PTR Engineering and Manufacturing Development Phase started 4QFY12.
 TERP Engineering and Manufacturing Development Phase started 3QFY13.
 PADS CEIU Engineering and Manufacturing Development Phase started 1QFY18.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>				Project (Number/Name) 672986 / <i>MM Crypto Mods</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
672986: <i>MM Crypto Mods</i>	156.800	20.486	13.293	4.444	0.000	4.444	3.744	3.118	0.000	0.000	0.000	201.885
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Management Services

LGM-30G ICBM Cryptography Upgrade II PMA FY 2021 Base (BY) Cost: FY21 PMA requires same level of support as FY19-20 due to GMLEC developmental effort in support of ICU II's RAA-FOC.

A. Mission Description and Budget Item Justification

MM Crypto Mods executes USSTRATCOM, Air Force Global Strike Command, and Air Force Safety Center requirements by implementing the KS-60 capabilities in LGM-30G ICBM Cryptography Upgrade II (ICU II) of Remote Key/Code Change and Irreversible Transformation as mandated in the approved Capabilities Development Document (dated 4 Jan 05) and addresses Nuclear Weapon System Safety Group Operational Safety Review requirements 98-2, 00-1 and 02-2. It also incorporates Continuous Signal Lockout capabilities to prevent the widespread loss of status monitoring. These features will greatly increase security during code changes by reducing the frequency of open sites 75 days annually and will reduce associated resource costs for 450 Launch Facilities (LFs) and 45 Launch Control Centers (LCCs).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: LGM-30G ICBM Cryptography Upgrade II (ICU II)	20.486	13.293	4.444
Description: ICU II completes design and development, implements KS-60 remote key/code change, irreversible transformation capabilities, and prevents continuous signal lockout.			
FY 2020 Plans:			
• Continue Depot Support Equipment (DSE) development			
• Conclude Independent Validation & Verification (IV&V)			
• Develop Guided Missile Launcher Electronic Circuit (GMLEC) interface modification			
FY 2021 Plans:			
• Continue Guided Missile Launcher Electronic Circuit (GMLEC) interface modification			
• Conclude Depot Support Equipment (DSE) development			
FY 2020 to FY 2021 Increase/Decrease Statement:			
Funding decreased due to ramp down of Depot Support Equipment development and IV&V activities			
Accomplishments/Planned Programs Subtotals	20.486	13.293	4.444

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672986 / <i>MM Crypto Mods</i>

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

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• MPAF 03 Line Item M30MLG: <i>MM III Modifications BP21</i>	50.591	37.329	31.907	-	31.907	7.812	9.839	0.000	0.000	Continuing	Continuing
• MPAF 04 Line Item <i>000999: Replen Spares/ Repair Parts BP25/26</i>	5.609	0.000	12.170	-	12.170	5.449	2.166	0.000	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

LGM-30G ICBM Cryptography Upgrade II (ICU II) program utilizes the ICBM Prime Integration Contract (IPIC) services of Northrop Grumman (NG), which were competitively awarded for the design and development of the ICU II capability. The contract type of the ICU II Engineering and Manufacturing Development (EMD) contract is Cost Plus Incentive Fee. Also, ICU II EMD uses a separate contract for Nuclear Safety Cross Check Analysis/Performance Analysis and Technical Evaluation (NSCCA/PATE) Independent Validation & Verification (IV&V). This contract is driven by critical nuclear safety requirements to perform an independent assessment of all modifications to nuclear-certified software. The Support Equipment effort includes EMD development of Depot Support Equipment, Guided Missile Launch Electronic Circuit (GMLEC) interface modification, and Acoustic Microscope System. Nuclear Safety and Vulnerability analysis requirements are covered in the Acquisition Strategy.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672986 / MM Crypto Mods
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G ICBM Cryptography Upgrade II EMD	C/CPIF	Northrop Grumman : Clearfield, UT	156.800	3.600	Feb 2019	0.600	Oct 2019	-		-		-	0.000	161.000	160.400
LGM-30G ICBM Cryptography Upgrade II Support Equipment development	C/CPFF	Northrop Grumman : Clearfield, UT	0.000	11.799	Oct 2018	7.400	Oct 2019	1.543	Oct 2020	-		1.543	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Support GMLEEC	C/CPFF	Northrop Grumman : Clearfield, UT	0.000	-		1.600	Apr 2020	1.683	Oct 2020	-		1.683	Continuing	Continuing	-
Subtotal			156.800	15.399		9.600		3.226		-		3.226	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G ICBM Cryptography Upgrade II Nuclear Safety Support (NSCCA/IV&V)	C/CPFF	Northrop Grumman : Clearfield, UT	0.000	2.822	Oct 2018	1.000	Oct 2019	-		-		-	Continuing	Continuing	-
Subtotal			0.000	2.822		1.000		-		-		-	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LGM-30G ICBM Cryptography Upgrade II Hardware, Software, and components testing	Various	TBD : TBD	0.000	-		1.200	Dec 2019	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II LDTO	PO	AEDC/TSTS : Arnold AFB, TN	0.000	0.072	Oct 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	0.072		1.200		-		-		-	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672986 / <i>MM Crypto Mods</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>MM Crypto Mods</i>	
ICU II Engineering and Manufacturing Development Phase	
ICU II Engineering and Manufacturing Development Phase (GMLEC)	
ICU II Production and Deployment Phase	
ICU II Initial Operational Capability (Jun 2022)	
ICU II Full Operational Capability (Jan 2024)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672986 / <i>MM Crypto Mods</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM Crypto Mods</i>				
ICU II Engineering and Manufacturing Development Phase	1	2019	2	2020
ICU II Engineering and Manufacturing Development Phase (GMLEC)	3	2020	3	2023
ICU II Production and Deployment Phase	1	2019	4	2024
ICU II Initial Operational Capability (Jun 2022)	3	2022	3	2022
ICU II Full Operational Capability (Jan 2024)	2	2024	2	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	17.767	26.177	27.235	0.000	27.235	15.430	2.497	2.542	2.589	Continuing	Continuing
671820: <i>Strategic Automated Command and Control System</i>	-	17.767	26.177	27.235	0.000	27.235	15.430	2.497	2.542	2.589	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Worldwide Joint Strategic Communication efforts include Nuclear Command, Control, and Communications (NC3) systems to include the Defense Injection Reception Emergency Action Message (EAM) C2 Terminals (DIRECT), Aircrew Alerting Communications Electromagnetic Pulse (AACE), the Strategic Emergency Action Transmission System (SEATS), the Defense Red Switch Network (DRSN), and the Strategic Automated Command and Control System (SACCS). Funding may be used to modernize these, and other, NC3 systems. Funding may also be used for research, testing, validation, certification, configuration management, and assessment of the Air Force NC3 Weapon System.

SACCS is a dedicated, high speed, multi-level secure, data transmission, processing, and display system. SACCS provides the primary non-survivable command and control capability for receiving and disseminating secure Emergency Action Messages (EAM), Force Direction Messages (FDM), Force Status Reporting (FSR), and exchanging information type messages from USSTRATCOM. SACCS provides messages for effective deployment of strategic bombers, reconnaissance aircraft, mobilization aircraft, tanker support aircraft, and the Intercontinental Ballistic Missile (ICBM) force.

SACCS has equipment that has reached its end of life and is no longer repairable due to diminished manufacturing sources and parts obsolescence. This jeopardizes Air Force Global Strike Command's (AFGSC) ability to meet mission requirements as required by Chairman Joint Chief of Staff Nuclear Technical Performance Criteria and Operational Standards (CJCSI 6811.01). In order to mitigate the risk of SACCS inability to operate once the current spares are completely diminished, and ensure the system remains secure against modern/future threats, the Air Force is developing a replacement system.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NC3 Development capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	18.442	18.177	27.284	0.000	27.284
Current President's Budget	17.767	26.177	27.235	0.000	27.235
Total Adjustments	-0.675	8.000	-0.049	0.000	-0.049
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	8.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.675	0.000	-0.049	0.000	-0.049

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 671820: *Strategic Automated Command and Control System*

Congressional Add: *NC3 Architecture*

	FY 2019	FY 2020
Congressional Add Subtotals for Project: 671820	7.707	8.000
Congressional Add Totals for all Projects	7.707	8.000

Change Summary Explanation

FY20 Congressional Add for NC3 architecture development

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: SACCS Replacement	10.060	18.177	27.235
Description: Design and develop replacement Strategic Automated Command Control System (SACCS). Transition architecture from Time Division Multiplexing to Internet Protocol (TDM-IP). Replace legacy components with supportable networking and information system hardware. The new system will mitigate cybersecurity risks, improves Mean Time Between Failure rates, reliability, availability, improves user interface, decreases annual sustainment costs, addresses Diminishing Manufacturing Sources and Material Shortages and obsolescence challenges, and meets Chairman Joint Chiefs of Staff Nuclear Technical Performance Criteria and Operational Standards (CJCSI 6811.01).			
FY 2020 Plans: -Award contract for TMD-IP effort			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>-Continue Technology Maturation and Risk Reduction efforts to include a temporary modification to address near-term obsolescence issues.</p> <p>-Initiate transition of TDM circuits to IP circuits through DISA process for establishing new circuits. Order circuits through DISA Storefront.</p> <p>-Develop interim system and network architecture to replace obsolete Promina networking equipment and OMNI cryptographic devices. Order HAIPES, serial to IP adaptors, routers, and associated networking equipment.</p> <p>-Develop Risk Management Framework implementations for temporary modifications and full SACCS-R implementation.</p> <p>-Conduct Test Readiness Review (TRR). Initiate testing of interim IP solution to address Promina/OMNI obsolescence issues-</p> <p>Develop requirements specifications for implementation of a Network Operations Center/Security Operations Center (NOC/SOC) to support monitoring and protection of the IP network and components.</p> <p>-Initiate system solution to address multi-level security requirement.</p> <p>-Develop an updated interface to the Navy Modernized Hybrid Solution (NMHS).</p> <p>-Purchase new port expansions processors to support TDM-IP effort</p> <p><i>FY 2021 Plans:</i></p> <p>-Continue Technology Maturation and Risk Reduction efforts to include a temporary modification to address near-term obsolescence issues.</p> <p>-Conduct site modification of SACCS desktop terminals to implement the IP transition.</p> <p>-Conduct testing on the temporary modification and transition existing SACCS desktop and portable terminals to an IP network.</p> <p>-Continue development of NOC/SOC and initiate testing of TDM-IP systems with the NOC/SOC</p> <p>-Continue development of the system solution to address the multi-level security requirement.</p> <p>-Initiate development of modifications to the HAC/RMPE, and the Launch Control Center (LCC) end user terminal to support SACCS-R implementation.</p> <p>-Start design of updated NMHS interface changes.</p> <p>-Initiate preliminary design for the modifications to the Missile Procedure Trainer (MPT) to support SACCS-R implementation at the LCCs.</p> <p>-Initiate purchases of development hardware to support replacement of obsolescent equipment at the SACCS Operation Center.</p> <p>-Initiate software development effort for modernization of SACCS terminals and SACCS Operations Center</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></p> <p>FY21 increase due to accelerated efforts to implement temporary modification to support interim TDM-IP transition/OMNI replacement to include site modifications, the NOC/SOC, restart of HAC/RMPE design efforts, continuing multi-level security efforts, increased effort on NMHS interface, and MPT design. DoD CIO mandate has compressed work schedule to mitigate</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
operational risk on the system. Failure to execute work within the new timeline will result in 5-to-1 cost increase in sustainment costs.			
Accomplishments/Planned Programs Subtotals	10.060	18.177	27.235

	FY 2019	FY 2020
Congressional Add: NC3 Architecture	7.707	8.000
FY 2019 Accomplishments: - Provided AFGSC innovation and analysis capability through Modeling and Simulation activities, Airman development, leadership development, and Concept for Force Development activities - Provided analysis capability to fund access to FFRDCs and UARCs for AFGSC Decision Support - Developed NC3 200/300 courseware for Airman		
FY 2020 Plans: - Provided AFGSC innovation and analysis capability through Modeling and Simulation activities, Airman development, leadership development, and Concept for Force Development activities - Provided analysis capability to fund access to FFRDCs and UARCs for AFGSC Decision Support - Continued development of NC3 200/300 courseware for Airman - Standing up StrikeWERX node (innovation center) at the Cyber Innovation Facility (CIC) complex		
Congressional Adds Subtotals	7.707	8.000

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 PE 0101316F: <i>Strategic Command and Control (833140)</i>	2.979	0.300	24.520	-	24.520	31.895	0.258	0.263	0.268	Continuing	Continuing

Remarks

E. Acquisition Strategy
 Programmed funds continue to support TMRR efforts including a temporary modification to address near-term obsolescence issues (TDM-IP). The program is using a task order under the ICBM Ground Subsystems Support Contract and organic support from the 595 SCS and the 309 SWEG to conduct TMRR efforts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	Project (Number/Name) 671820 / <i>Strategic Automated Command and Control System</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
SACCS-R TMRR	SS/CPFF	Northrop Grumman : Layton, UT	-	4.445	Jan 2019	12.482	Nov 2019	16.998	Nov 2020	-		16.998	Continuing	Continuing	-
SACCS-R TMRR Organic	PO	OO-ALC : Hill AFB, UT	-	1.422	Jan 2019	-		-		-		-	Continuing	Continuing	-
SACCS-R EMD Organic	PO	OO-ALC : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-
Subtotal			-	5.867		12.482		16.998		-		16.998	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
SACCS-R Engineering Development	Various	Various : Various	-	1.244	Oct 2018	1.681	Nov 2019	1.576	Nov 2020	-		1.576	Continuing	Continuing	-
NC3 Architecture Development	Various	Various : Various	-	7.707	Feb 2019	8.000		-		-		-	Continuing	Continuing	-
Subtotal			-	8.951		9.681		1.576		-		1.576	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
SACCS-R Development Test & Evaluation	Various	Various : Various	-	0.689	Jan 2019	0.796	Nov 2019	4.102	Nov 2020	-		4.102	Continuing	Continuing	-
Subtotal			-	0.689		0.796		4.102		-		4.102	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	Project (Number/Name) 671820 / <i>Strategic Automated Command and Control System</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
SACCS-R Program Management Administration	Various	Various : Various	-	1.284	Nov 2018	1.752	Jan 2020	3.419	Jan 2021	-		3.419	Continuing	Continuing	-
SACCS-R Integration Support	C/FFP	BAE Systems, Inc. : Hill AFB, UT	-	0.976	Jan 2019	1.466	Jan 2020	1.140	Jan 2021	-		1.140	Continuing	Continuing	-
Subtotal			-	2.260		3.218		4.559		-		4.559	Continuing	Continuing	N/A

Remarks
Costs and services in support of program office management and administration processes such as: program oversight, resource justification, budget and programming, milestone and scheduling--PMA costs.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	17.767	26.177	27.235	-	27.235	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	Project (Number/Name) 671820 / <i>Strategic Automated Command and Control System</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategic Automated Command and Control System																												
SACCS-R Technology Maturation/Risk Reduction																												
SACCS-R TDM-IP 1.1																												
SACCS-R TDM-IP 1.1 Decision to Retain																												
SACCS-R TDM-IP 1.2																												
SACCS-R TDM-IP 1.2 Decision to Retain																												
SACCS-R ARES 2.0																												
SACCS-R PDR (3Qtr FY24)																												
SACCS-R Milestone B (3Qtr FY24)																												
SACCS-R Engineering and Manufacturing Development (4Qtr FY24 through1Qtr FY27)																												
SACCS-R CDR (3Qtr FY25)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	Project (Number/Name) 671820 / <i>Strategic Automated Command and Control System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Strategic Automated Command and Control System</i>				
SACCS-R Technology Maturation/Risk Reduction	1	2019	3	2024
SACCS-R TDM-IP 1.1	1	2019	1	2022
SACCS-R TDM-IP 1.1 Decision to Retain	1	2022	1	2022
SACCS-R TDM-IP 1.2	2	2022	3	2023
SACCS-R TDM-IP 1.2 Decision to Retain	3	2023	3	2023
SACCS-R ARES 2.0	4	2023	3	2024
SACCS-R PDR (3Qtr FY24)	3	2024	3	2024
SACCS-R Milestone B (3Qtr FY24)	3	2024	3	2024
SACCS-R Engineering and Manufacturing Development (4Qtr FY24 through1Qtr FY27)	4	2024	4	2025
SACCS-R CDR (3Qtr FY25)	3	2025	3	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101324F / <i>Integrated Strategic Planning & Analysis Network</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	22.231	24.261	24.227	0.000	24.227	24.942	22.699	5.592	9.415	0.000	133.367
675029: <i>ISPAN Increment 5</i>	-	22.231	24.261	24.227	0.000	24.227	24.942	22.699	5.592	9.415	0.000	133.367
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

INTEGRATED STRATEGIC PLANNING AND ANALYSIS NETWORK (ISPAN): The mission of USSTRATCOM is to conduct global operations in coordination with other Combatant Commands, Services, and appropriate U.S. Government agencies to deter and detect strategic attacks against the U.S. and its allies. It provides full-spectrum global strike, and coordinated space, missile defense, and information operations capabilities to meet both deterrent and decisive national security objectives. USSTRATCOM will also provide operational space support, integrated missile defense, global command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), and specialized planning expertise to the joint warfighter. ISPAN enables USSTRATCOM to carry out these missions. It is one of DoD's most complex classified computer systems and the only national force level planning system.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ISPAN Increment 5 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY18, PE 11313F (ISPAN Inc. 4) efforts were transferred to PE 11324F (ISPAN Inc. 5) as an evolution to ISPAN Inc. 4 baseline system.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	22.833	24.261	25.807	0.000	25.807
Current President's Budget	22.231	24.261	24.227	0.000	24.227
Total Adjustments	-0.602	0.000	-1.580	0.000	-1.580
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.602	0.000	-1.580	0.000	-1.580

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101324F / <i>Integrated Strategic Planning & Analysis Network</i>
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Change Summary Explanation

\$1.535M reduction accounts for prior year funds that are currently available to execute in this funding period.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: ISPAN Increment 5	22.231	24.261	24.227
Description: ISPAN Increment 5 will modernize the Mission Planning and Analysis System (MPAS) that develops Joint Staff Level I through Level IV nuclear and conventional attack options for national and theater requirements.			
FY 2020 Plans: Funding was used for EMD activities to develop the hardware and software architecture for MPAS Increment 5 modernization.			
FY 2021 Plans: Funds will be used for Section 804 Beta Phase development and fielding activities to develop the hardware and software architecture for MPAS Increment 5 modernization.			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to program acceleration.			
Accomplishments/Planned Programs Subtotals	22.231	24.261	24.227

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

Procurement funds (3080) required starting in FY24.

E. Acquisition Strategy

Assistant Secretary of the Air Force (Acquisition, Technology & Logistics) (SAF/AQ) designated ISPAN Inc 5 as a FY 2016 NDAA Section 804 Rapid Fielding program and delegated Milestone Decision Authority (MDA) to the Air Force Program Executive Officer (AFPEO) Digital.

Increment 5 will develop and modernize software for the combatant commanders using an Agile DevOps Continuous Delivery / Continuous Integration (CD/CI) acquisition strategy with development contracts that are negotiated and awarded in a competitive environment. The program will consider the best contract options to implement the Agile DevOps CD/CI strategy. Other program management activities will be accomplished via Fixed Price (FP) contracts. Other activities are also accomplished through the use of various contracting vehicles such as Military Interdepartmental Purchase Requests (MIPRs). Funds agile software development activities and a secure software development environment, located in existing space at Offutt AFB. Software development environment will meet classification/security regulations/criteria, which will promote competition.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101324F / <i>Integrated Strategic Planning & Analysis Network</i>	
<p>The PEO is the AF PEO Digital. Air Force Life Cycle Management Center at Hanscom AFB (AFLCMC/HB) and the 55 CONS at Offutt AFB are the contracting authorities for ISPAN and provide contracts, legal, and financial management support.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101324F / <i>Integrated Strategic Planning & Analysis Network</i>	Project (Number/Name) 675029 / <i>ISPAN Increment 5</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Pre-Milestone B Risk Reduction	Various	Offutt AFB : Offutt AFB, NE	-	-		-		-		-		-	0.000	0.000	-
ISPAN Inc 5 EMD	Various	Offutt AFB : Offutt AFB, NE	-	15.100	Jan 2019	16.297	Jan 2020	15.764	Jan 2021	-		15.764	0.000	47.161	-
Subtotal			-	15.100		16.297		15.764		-		15.764	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Engineering and Technical DMS	C/CPAF	Not specified. : TBD	-	3.731	Nov 2018	4.463	Nov 2019	4.747	Nov 2020	-		4.747	0.000	12.941	-
Subtotal			-	3.731		4.463		4.747		-		4.747	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Test and Evaluation Item	Various	Not specified. : TBD	-	0.319	Nov 2018	0.329	Nov 2019	0.350	Nov 2020	-		0.350	0.000	0.998	-
Subtotal			-	0.319		0.329		0.350		-		0.350	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101324F / <i>Integrated Strategic Planning & Analysis Network</i>	Project (Number/Name) 675029 / <i>ISPAN Increment 5</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

ISPAN Increment 5	
ISPAN Inc 5 section 804 "Beta" Development phase	[REDACTED]
Interim Progress Review	[REDACTED]
Quarterly Software Releases	[REDACTED]
Sustainment Decision IPR (Full Deployment Milestone)	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101324F / <i>Integrated Strategic Planning & Analysis Network</i>	Project (Number/Name) 675029 / <i>ISPAN Increment 5</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>ISPAN Increment 5</i>				
ISPAN Inc 5 section 804 "Beta" Development phase	1	2019	1	2024
Interim Progress Review	4	2022	4	2022
Quarterly Software Releases	1	2020	1	2024
Sustainment Decision IPR (Full Deployment Milestone)	1	2024	1	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101328F / ICBM Reentry Vehicles
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	13.747	65.671	112.753	0.000	112.753	74.755	81.756	225.602	252.142	2,193.374	3,019.800
674920: W87-1/Mk21A	0.000	13.747	65.671	112.753	0.000	112.753	74.755	81.756	225.602	252.142	2,193.374	3,019.800
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 576

A. Mission Description and Budget Item Justification

The Mk21A Reentry Vehicle (RV) program will design, develop, produce and deploy an integrated RV capable of delivering the W87-1 Warhead when released from the Ground Based Strategic Deterrent (GBSD) Intercontinental Ballistic Missile (ICBM). The Mk21A will provide needed performance and security enhancements over the Mk21 reentry vehicle to meet the upgraded requirements for the Department of Energy W87-1 warhead. The Mk21A will also meet the requirements laid out in the Ground Based Strategic Deterrent (GBSD) Capability Development Document (CDD) as directed by Air Force Global Strike Command.

The major activities in the Technology Maturation and Risk Reduction (TMRR) phase of the Mk21A RV program include: (1) Trade Studies, (2) Prototype designs, (3) Government systems engineering, analytics, and test capability development, (4) RV Risk Reduction, and (5) Weapon System (WS) Integration Risk Reduction. Reentry vehicle components include: high velocity nose tip, high impulse transducer, fuze, aeroshell forward section, body section and rear cover, radio frequency subsystem with antennas, RV spin-up system, inflight disconnect cable and other electrical cables. The Mk21A program will include prime contractor development of applicable support equipment, data, flight test hardware, infrastructure, and training materials while examining and mitigating weapon system integration risks, and nuclear surety, hardness and certification and system vulnerability assessments.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Mk21A RV weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101328F / ICBM Reentry Vehicles
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	14.167	75.571	112.959	0.000	112.959
Current President's Budget	13.747	65.671	112.753	0.000	112.753
Total Adjustments	-0.420	-9.900	-0.206	0.000	-0.206
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-9.900			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.420	0.000			
• Other Adjustments	0.000	0.000	-0.206	0.000	-0.206

Change Summary Explanation

FY2019 funding reflects a Small Business Innovation Research (SBIR) adjustment of \$0.420 million.

FY2020 funding reflects a Congressional directed reduction of \$9.900 million for "Program delay."

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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Title: Mk21A Technology Maturation Risk Reduction	13.747	65.671	112.753
Description: The objectives of TMRR for Mk21A are as follows: (1) Deliver one preliminary design and two prototypes for flight testing to inform National Nuclear Security Administration/ Department of Energy designs and further technology maturation (2) Incorporate a modular, open systems architecture (3) Implement Model Based System Engineering (MBSE) enabling the government to Own the Technical Baseline (OTTB) (4) Demonstrate performance of weapon system capabilities through prototyping, modeling, simulation, and testing (5) Conduct flight test of 2 prototype RVs in ICBM-like environment			
FY 2020 Plans:			
<ul style="list-style-type: none"> • Award one TMRR contract • Modify, modernize, and expand the analytic environment and labs to support TMRR activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. • Initiate RV preliminary design in order to reduce integration risk by conducting trade studies, system engineering, test activities, and system modeling and simulation. 			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101328F / <i>ICBM Reentry Vehicles</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Develop ground and flight test plans for prototypes • Further develop analytical, information technology, and data management capabilities to ensure weapon system design information dissemination. • Initiate development of demonstration flight reentry vehicle • Develop and execute a unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. • Expand and develop analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. <p><i>FY 2021 Plans:</i></p> <ul style="list-style-type: none"> • Continue TMRR contract efforts • Continue to modify, modernize, and expand the analytic environment and labs in ongoing TMRR support and the anticipated transition to Engineering and Manufacturing Development (EMD) activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. • Continue to mature the weapon system RV preliminary design and reduce integration risk by initiating/conducting trade studies, system engineering, test activities, and system modeling and simulation. • Continue development of demonstration flight reentry vehicle • Continue to develop and execute a unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. • Initiate prototype reentry vehicle flight tests • Continue to expand and develop analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. • Plan, prepare for, and successfully complete Preliminary Design Review. <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding increased due to continued aeroshell, nose-tip, and fuze design efforts; preparation for Preliminary Design Review; and preparation for initial flight tests of two prototype reentry vehicles.</p>			
Accomplishments/Planned Programs Subtotals	13.747	65.671	112.753

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 0605230F/641025: <i>Ground Based Strategic Deterrent</i>	401.244	557.495	1,524.759	-	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,486.560

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101328F / <i>ICBM Reentry Vehicles</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 0604933F/655082: <i>Fuze Modernization</i>	124.457	161.199	167.099	-	167.099	104.657	20.503	2.067	2.105	0.000	582.087
• RDTE 04 060351F/641022: <i>Dem/Val - RVAP</i>	16.052	18.148	22.397	-	22.397	40.126	40.481	0.000	0.000	Continuing	Continuing

Remarks

E. Acquisition Strategy

The Mk21A RV program acquisition strategy is to deliver an integrated RV capable of delivering the W87-1 Warhead to target beginning in FY30. For the TMRR phase, the Program Office competitively awarded one cost plus fixed fee contract in October 2019. The Air Force is responsible for developing, producing, and maintaining the RV. The NNSA develops/modifies the nuclear weapon inside the RV, including the Weapon Electrical System, which is the firing set that interfaces with the DoD fuze.

The objectives of TMRR for Mk21A are as follows: (1) deliver one preliminary design and two prototypes; (2) incorporate a modular, open systems architecture; (3) implement Model Based System Engineering enabling the government to own the Technical Baseline; (4) demonstrate performance of weapon system capabilities through prototyping, modeling, simulation, and testing; (5) conduct test flight of two prototype RVs in ICBM-like environment.

The TMRR phase will include a System Requirements Review, System Functional Review, Preliminary Design Review, and prototype RV flight tests. The contractor may elect to perform additional risk reduction testing on select components to further evolve the design during TMRR, to lower component integration risk during the EMD phase. The reference design for the Mk21A includes use of Mk21 Mod 6 aeroshells. Because Mk21 aeroshells were originally developed as test vehicles for the legacy Peacekeeper ICBM, they must be modified for use as war reserve. All RV subsystems must also be procured, including the high impulse transducer, radio frequency subsystem, antennas, spin generators, and cables.

The TMRR contract is a three year based contract plus a one year option potentially extending TMRR and test related activities through 4QFY23. After Milestone B approval, the EMD contract will be awarded as early as 1QFY24.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / ICBM Reentry Vehicles	Project (Number/Name) 674920 / W87-1/Mk21A
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mk21A TMRR Contractor	C/CPFF	Lockheed Martin : King of Prussia, PA	0.000	8.034	Oct 2019	29.970	Jan 2020	35.806	Nov 2020	-		35.806	108.322	182.132	-
Mk21A EMD Contracts	Various	TBD : TBD	0.000	-		-		-		-		-	1,043.018	1,043.018	-
Subtotal			0.000	8.034		29.970		35.806		-		35.806	1,151.340	1,225.150	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mk21A Fuze Trade Study (TMRR)	MIPR	Sandia National Lab : Albuquerque, NM	0.000	0.618	Jul 2019	2.500	Nov 2019	6.400	Nov 2020	-		6.400	2.840	12.358	-
Mk21A TMRR Support: PMA (TMRR)	Various	Various : Various	0.000	0.013	Jan 2019	0.497	Nov 2019	0.565	Nov 2020	-		0.565	27.630	28.705	-
Mk21A Integration Support: BAE (TMRR)	C/FP	BAE : Hill AFB, UT	0.000	1.828	Jan 2019	3.380	Oct 2019	2.778	Oct 2020	-		2.778	21.243	29.229	-
Mk21A Integration Support: Aerospace (TMRR)	MIPR	Aerospace : Hill AFB, UT	0.000	0.987	Feb 2019	-		2.070	Nov 2020	-		2.070	16.429	19.486	-
Mk21A EMD Support	Various	TBD : TBD	0.000	-		-		-		-		-	662.567	662.567	-
Mk21A Civilian Manpower	Various	US Gov Civilians : Hill AFB	0.000	0.397	Jan 2019	5.040	Oct 2019	3.699	Oct 2020	-		3.699	35.936	45.072	-
Subtotal			0.000	3.843		11.417		15.512		-		15.512	766.645	797.417	N/A

Remarks

- Aerospace costs in FY20 were included in Mk21A PMA costs, but has been broken out separately beginning in FY21 due to program growth. This was initially thought to be part of PMA but based on the nature of the work it has been determined as support costs.
- Civilian manpower increase supports ramp up of Program Office. Thirteen additional personnel were added in FY20 (all 13 positions were allocated to the program office). The cost decrease from FY20 to FY21 can be attributed to last year's estimate; the program estimated 25 additional personnel but requirements dictated that only 13 were necessary.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / ICBM Reentry Vehicles	Project (Number/Name) 674920 / W87-1/Mk21A
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mk21A Test & Evaluation (TMRR)	Various	Various : Various	0.000	-		22.170	Dec 2019	54.078	Nov 2020	-		54.078	31.498	107.746	-
Mk21A Test & Evaluation: Air Force and NNSA Demonstrator Initiative (ANDI) (TMRR)	MIPR	Various : SNL & LLNL, CA	0.000	-		-		2.500	Oct 2020	-		2.500	2.926	5.426	-
Mk21A EMD Test Support	Various	TBD : TBD	0.000	-		-		-		-		-	835.402	835.402	-
Subtotal			0.000	-		22.170		56.578		-		56.578	869.826	948.574	N/A

Remarks

- TMRR flight tests require incremental funding up to two years prior to flight tests. Funds allow contracts to be established for support and the build-up of flight test vehicles in order to meet the scheduled tests.
- FY21 Test & Evaluation support includes developing ground test plans and flight test plans to support development of prototype test vehicles. These tests will provide detailed, reliable data to inform EMD and to inform the Mk21A development and risk reduction and NNSA of the W87-1 development. The ANDI effort is expected to span over FY20, FY21, and FY22 and will provide critical information for EMD.
- Mk21 Test & Evaluation: Air Force and NNSA Demonstrator Initiative (ANDI) is a former ICBM Demonstration/Validation study that was transitioned to the Mk21A program office beginning in FY21.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mk21A PMA	C/Various	Various : Various	0.000	1.870	Jan 2019	2.114	Nov 2019	4.857	Nov 2020	-		4.857	39.818	48.659	-
Subtotal			0.000	1.870		2.114		4.857		-		4.857	39.818	48.659	N/A

Remarks

- Civilian Manpower allocation moved to Support Category. DCA positions were determined to be support costs rather than management services.
- Mk21A PMA increase required to support program growth as TMRR ramps up.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	13.747	65.671	112.753	-	112.753	2,827.629	3,019.800	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101328F / <i>ICBM Reentry Vehicles</i>	Project (Number/Name) 674920 / <i>W87-1/Mk21A</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Mk21A Reentry Vehicle (RV)</i>				
Milestone A (Sept 2019)	4	2019	4	2019
TMRR Phase	1	2020	4	2023
Preliminary Design Review (Mar 2021)	2	2021	2	2021
Prototype RV flight tests	4	2021	2	2022
Milestone B (Oct 2023)	1	2024	1	2024
EMD Phase	1	2024	4	2025

Note

- EMD Phase continues beyond FY2025 to FY2027

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102110F / <i>UH-1N Replacement Program</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	191.551	190.523	170.975	44.464	0.000	44.464	16.375	4.293	0.399	0.000	0.000	618.580
672021: <i>UH-1N Replacement Program</i>	191.551	190.523	170.975	44.464	0.000	44.464	16.375	4.293	0.399	0.000	0.000	618.580
Quantity of RDT&E Articles	4	-	2	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 562

A. Mission Description and Budget Item Justification

The MH-139 program will replace the Air Force fleet of UH-1N aircraft with modern helicopters that will close significant mission capability gaps associated with the current fleet of UH-1N aircraft. The replacement aircraft will provide vertical airlift and support the requirements of four Air Force major commands and operating agencies: Air Force Global Strike Command (AFGSC), Air Force District of Washington (AFDW), Air Education and Training Command (AETC), and Air Force Material Command (AFMC). AFGSC is the Air Force lead command and operational capability requirements sponsor. This program is an element of the Air Force's nuclear enterprise reform initiatives.

Program includes, but is not limited to, continued funding for four test aircraft and two System Demonstration Test Article (SDTA) aircraft, support equipment, Interim Contractor Support (ICS), training system air vehicles and devices, Type I training and courseware, non-developmental item (NDI) integration, cyber test articles, associated Government support activities, and permits the initiation of activities to support rapid requirement development.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MH-139 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102110F / <i>UH-1N Replacement Program</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	258.022	170.975	44.544	0.000	44.544
Current President's Budget	190.523	170.975	44.464	0.000	44.464
Total Adjustments	-67.499	0.000	-0.080	0.000	-0.080
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-59.000	0.000			
• SBIR/STTR Transfer	-8.499	0.000			
• Other Adjustments	0.000	0.000	-0.080	0.000	-0.080

Change Summary Explanation

FY 2019 funding decreased due to \$8.499M for Small Business Innovative Research and \$59M decrease for reprogramming actions.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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Title: MH-139	182.145	158.307	32.566
Description: Development of MH-139 helicopter and integration of non-developmental item (NDI) hardware, software, and other capabilities into aircraft system, training systems, support elements and technical/manufacturing baselines to achieve MH-139 operational capability requirements.			
FY 2020 Plans: Continued systems engineering efforts for NDI integration onto an airworthiness-certified aircraft to achieve operational capability requirements, including associated mission planning and training systems, and procurement of test articles. Includes government oversight of contractor design reviews toward finalizing changes from the airworthiness-certified baseline aircraft specifications. Other contractor and government systems engineering tasks include associated testing and certifications. Management services include miscellaneous program office support, travel, office supplies, and service contracts. Includes incremental funding of four aircraft for test and two SDTA aircraft.			
FY 2021 Plans: Continue systems engineering efforts, government oversight, contractor and government systems engineering tasks and management services.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102110F / <i>UH-1N Replacement Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding decreased due to the completed purchase of 4 RDT&E aircraft.			
Title: MH-139 Government Test and Evaluation	8.378	12.668	11.898
Description: System and subsystem test and evaluation of the MH-139 solution.			
FY 2020 Plans: Continued Live Fire Test & Evaluation (LFT&E), Development Test (DT) and Operational Assessment (OA), and begin Operational Test (OT) support execution. Conduct technical reviews of the MH-139 contractor's non-developmental item (NDI) integration onto an airworthiness-certified baseline aircraft system.			
FY 2021 Plans: Continue LFT&E, DT and OA, and OT support execution.			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to phasing of LFT&E, DT/OA and OT support.			
Accomplishments/Planned Programs Subtotals	190.523	170.975	44.464

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 04 Line Item H0106O: <i>UH-1N Replacement</i>	0.000	0.000	194.016	-	194.016	279.604	339.501	520.883	527.781	890.400	2,752.185
• APAF 06 Line Item H0106O: <i>UH-1N Replacement Initial Spares/Repair Parts</i>	0.000	0.000	18.389	-	18.389	18.045	7.660	22.948	17.985	65.400	150.427
• MILCON 0: <i>UH-1N Replacement - Primary Facility</i>	66.000	46.000	0.000	-	0.000	38.000	0.000	0.000	0.000	0.000	150.000

Remarks

E. Acquisition Strategy
 The Air Force intends to procure an airworthiness-certified baseline helicopter that requires non-developmental item integration (e.g. Electro-Optical/Infrared Sensor, personnel recovery hoists, cockpit/cabin armor, etc.) and training systems to meet all operational capability requirements. Specific acquisition and contracting strategies for RDT&E funded integration tasks and the test and evaluation program will be determined as part of the overall program strategy.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102110F / UH-1N Replacement Program	Project (Number/Name) 672021 / UH-1N Replacement Program
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MH-139 weapon system integration and type/airworthiness certification	C/FFP	Boeing : Philadelphia, PA	180.745	169.344	Jan 2019	133.163	Dec 2019	11.657	Dec 2020	-		11.657	17.129	512.038	-
Subtotal			180.745	169.344		133.163		11.657		-		11.657	17.129	512.038	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MH-139 other government costs and civilian pay	C/Various	Various : TBD	0.510	4.934	Jan 2019	15.372	Jan 2020	8.659		-		8.659	2.175	31.650	-
Subtotal			0.510	4.934		15.372		8.659		-		8.659	2.175	31.650	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MH-139 live fire, developmental, and operational test and evaluation, planning and technical support	Various	Various : TBD	3.210	8.378	May 2019	12.668	Dec 2019	11.898		-		11.898	1.763	37.917	-
Subtotal			3.210	8.378		12.668		11.898		-		11.898	1.763	37.917	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MH-139 Program Management Administration	Various	Various : TBD	0.972	1.159	Dec 2018	1.772	Dec 2019	1.250		-		1.250	0.000	5.153	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020				
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0102110F / UH-1N Replacement Program			Project (Number/Name) 672021 / UH-1N Replacement Program		

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MH-139 Program	
MH-139 NDI Contract	
Test and Evaluation	
System/Subsystem Test and Integration	
Weapon System Integration	
Milestone C	
Required Assets Available for Initial Operational Capability	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102110F / UH-1N Replacement Program	Project (Number/Name) 672021 / UH-1N Replacement Program

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MH-139 Program</i>				
MH-139 NDI Contract	4	2019	4	2021
Test and Evaluation	1	2019	3	2022
System/Subsystem Test and Integration	1	2019	1	2022
Weapon System Integration	1	2019	4	2022
Milestone C	4	2021	4	2021
Required Assets Available for Initial Operational Capability	4	2023	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	5.904	0.000	5.929	0.000	5.929	0.782	0.796	0.810	0.825	Continuing	Continuing
674592: <i>R/SAOC MODERNIZATION</i>	-	5.904	0.000	5.929	0.000	5.929	0.782	0.796	0.810	0.825	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Regional/Sector Operation Center Modernization program supports the NORAD/NORTHCOM homeland defense and air sovereignty mission for fixed Air Defense Sectors.

BATTLE CONTROL SYSTEM-FIXED (BCS-F): BCS-F is a bi-national development program with Canada. The BCS-F Program is an AF Homeland Defense battle management command and control system with the capability to integrate data from existing and future civil and military defense surveillance systems into a comprehensive air picture. BCS-F provides tactical communications and data link capabilities with other military and civil systems responsible for planning, directing, coordinating and controlling forces for air surveillance, air defense, and control of sovereign US air space. This integrated air picture enhances the capability to conduct peacetime air sovereignty operations and transition to active air defense operations in the event of aggression.

BATTLE CONTROL SYSTEM-FIXED MODIFICATION ONE (BCS-F Modification 1): BCS-F Modification 1 effort will support the implementation of Automatic Dependent Surveillance-Broadcast (ADS-B) data feeds and Earth Center Earth Fixed (ECEF). The BCS-F Modification 1 effort will be executed as a Cooperative Development Program between the US and Canada.

BATTLE CONTROL SYSTEM-FIXED MODERNIZATION: BCS-F Modernization will support sensor integration, Agile development, Combat ID, and system virtualization for the BCS-F system.

NATIONAL CAPITAL REGION-INTEGRATED AIR DEFENSE SYSTEM (NCR-IADS): NCR-IADS is a post-September 11, 2001 rapidly fielded capability that improves low altitude detection capability in order to prosecute airborne threats to the NCR. NCR-IADS provides ground-based air defense of the National Capitol Region airspace, and provides an integrated air picture, ground air defense weapons, enhanced regional situational awareness and forensic data collection capabilities for the warfighter mission to protect the NCR. Efforts may include but are not limited to, studies, system engineering, development, integration, and test & evaluation required to prevent system obsolescence and evolving cyber security requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BCS-F capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>
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This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	6.112	0.000	6.427	0.000	6.427
Current President's Budget	5.904	0.000	5.929	0.000	5.929
Total Adjustments	-0.208	0.000	-0.498	0.000	-0.498
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.208	0.000			
• Other Adjustments	0.000	0.000	-0.498	0.000	-0.498

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Battle Control Systems-Fixed Modification 1</p> <p>Description: Continue systems engineering, development, risk reduction, integration, test & evaluation and fielding of the BCS-F Modification 1 effort. The BCS-F Modification 1 effort will be executed as a Cooperative Program between the US and Canada.</p> <p>FY 2020 Plans: Activities include, but are not limited to: - Continue BCS-F Modification 1 ADS-B and ECEF integration, test and evaluation, documentation, and fielding. - There is no funding in FY20 and will be treated as a skip year.</p> <p>FY 2021 Plans: Activities include, but are not limited to: - Continue BCS-F Modification 1 ADS-B and ECEF integration, test and evaluation, documentation, and fielding.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY20 has no funding and FY21 will continue BCS-F Modification 1 ADS-B and ECEF integration, test and evaluation, documentation, and fielding.</p>	5.904	0.000	5.482
Title: Battle Control Systems-Fixed Modernization	0.000	0.000	0.447

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Description: BCS-F Modernization will support sensor integration, Agile development, Combat ID, and system virtualization for the BCS-F system.</p> <p>FY 2020 Plans: There is no funding in FY20 and will be treated as a skip year.</p> <p>FY 2021 Plans: Activities include but are not limited to: - Implementation of Air Combat Command's Combat Identification capability - Integration of new sensors into BCS-F to improve Air Defense Sector situational awareness and ability to respond to emerging threats. - Support user feedback for improvement of the BCS-F user interfaces. - Studies to support implementation of machine learning, artificial intelligence, cloud-based operations into BCS-F weapon system to better support emerging threats. - NCR-IADS studies, system engineering, development, integration, and test & evaluation.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY20 has no funding and will be treated as a skip year. FY21 will continue sensor integration, Agile development, Combat ID, and system virtualization.</p>			
Accomplishments/Planned Programs Subtotals	5.904	0.000	5.929

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
			Base	OCO	Total						
• OPAF 03 080330: <i>Battle Control System - Fixed</i>	2.849	3.063	3.118	-	3.118	3.175	3.231	3.290	3.351	0.000	22.077

Remarks

E. Acquisition Strategy
Acquisition Strategy: The Program Management Office (PMO) completed a full and open competition for BCS-F Modification 1 efforts. The BCS-F PMO has finalized a Project Arrangement (PA) to establish a cooperative development program with Canada. These efforts will conclude with development and a single release to the Air Defense Sectors.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>	
<p>Management Strategy: Efforts will be managed by BCS-F PMO in conjunction with Canada PMO and are under the purview of the Air Force Program Executive Officer for Battle Management (AFPEO BM). Air Force Life Cycle Management Center (AFLCMC) is the Contracting Authority.</p> <p>Contracting Strategy: The BCS-F PMO utilized a full and open competition to complete the development and integration of these capabilities. Cost Plus contract with some Fixed Price and Time & Material CLINs will be utilized where possible and appropriate.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102326F / Region/Sector Operation Control Center Modernization Program	Project (Number/Name) 674592 / R/SAOC MODERNIZATION
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
BCS-F Modification 1	Various	Various : Various	-	4.075	Apr 2019	-		3.000	Jan 2021	-		3.000	Continuing	Continuing	0.000
BCS-F Modernization	Various	Various : Various	-	-		-		0.447	Jun 2021	-		0.447	Continuing	Continuing	-
Subtotal			-	4.075		-		3.447		-		3.447	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
46th Test Wing/Other Test Act	Various	Various : Various	-	0.163	Mar 2020	-		0.751	Jan 2021	-		0.751	Continuing	Continuing	0.000
Subtotal			-	0.163		-		0.751		-		0.751	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA - A&AS	Various	Various : Hanscom AFB, MA	-	0.745	Jul 2020	-		0.766	Jul 2021	-		0.766	Continuing	Continuing	-
PMA - FRDC	Various	Various : Hanscom AFB, MA	-	0.511	Oct 2019	-		0.515	Oct 2020	-		0.515	Continuing	Continuing	-
PMA - Other	Various	Various : Hanscom AFB, MA	-	0.410	May 2020	-		0.450	May 2021	-		0.450	Continuing	Continuing	-
Subtotal			-	1.666		-		1.731		-		1.731	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	5.904	0.000	5.929	-	5.929	Continuing	Continuing	N/A

Remarks
FY20 has no funding and will be treated as a skip year.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>	Project (Number/Name) 674592 / <i>R/SAOC MODERNIZATION</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Battle Control System Fixed Modification 1</i>																												
Complete Development	██████████																											
System Acceptance Test (SAT)								██████																				
Developmental Test (DT)												████████																
AF System Interoperability Test (AFSIT)																												
<i>Battle Control System Fixed Modernization Efforts</i>																												
Agile Capabilities Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>	Project (Number/Name) 674592 / <i>R/SAOC MODERNIZATION</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Battle Control System Fixed Modification 1</i>				
Complete Development	1	2019	4	2020
System Acceptance Test (SAT)	4	2020	1	2021
Developmental Test (DT)	2	2021	4	2021
AF System Interoperability Test (AFSIT)	4	2021	1	2022
<i>Battle Control System Fixed Modernization Efforts</i>				
Agile Capabilities Development	3	2021	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0102412F / <i>North Warning System (NWS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	0.100	0.000	0.100	0.100	0.100	0.100	0.100	Continuing	Continuing
674592: <i>Region/Sector Operations Modernization Center (R/SAOC)</i>	-	0.000	0.000	0.100	0.000	0.100	0.100	0.100	0.100	0.100	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The details of this requirement are classified. Additional information is available upon request.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	0.100	0.000	0.100
Total Adjustments	0.000	0.000	0.100	0.000	0.100
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.100	0.000	0.100

C. Accomplishments/Planned Programs (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>
Title: North Warning System (NWS)	-	0.000	0.100
Description: The details of this program are classified. Details are available upon request.			
FY 2020 Plans: N/A			
FY 2021 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0102412F / <i>North Warning System (NWS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
N/A				
FY 2020 to FY 2021 Increase/Decrease Statement:				
N/A				
Accomplishments/Planned Programs Subtotals		-	0.000	0.100
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
E. Acquisition Strategy				
N/A				

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102412F / North Warning System (NWS)	Project (Number/Name) 674592 / Region/Sector Operations Modernization Center (R/SAOC)

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0102412F / North Warning System (NWS)	Project (Number/Name) 674592 / Region/Sector Operations Modernization Center (R/SAOC)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2021	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	105.088	127.296	162.080	0.000	162.080	168.160	171.688	42.917	43.706	1,116.995	1,937.930
675212: <i>MQ-9 SLAM</i>	0.000	0.000	6.290	71.802	0.000	71.802	76.714	119.463	8.771	8.932	194.031	486.003
675246: <i>MQ-9 Development and Fielding</i>	0.000	28.244	50.931	32.334	0.000	32.334	32.956	33.546	34.146	34.774	0.000	246.931
675247: <i>Squadron Operations Centers (SOC)</i>	0.000	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.752
675249: <i>MQ-9 Upgrade</i>	0.000	71.092	70.075	57.944	0.000	57.944	58.490	18.679	0.000	0.000	922.964	1,199.244

Program MDAP/MAIS Code: 424

A. Mission Description and Budget Item Justification

The basic MQ-9 Reaper system consists of the aircraft, sensors, Ground Control Station (GCS), communications equipment, weapon kits, support equipment, simulator and training devices, Readiness Spares Packages (RSP), technical data/training, and personnel required to operate, maintain, and sustain the system. The system is designed to be modular and open-ended. Mission-specific equipment is employed in a plug-and-play mission kit concept allowing specific aircraft and GCS configurations to be tailored to fit mission needs.

The MQ-9 Reaper system has four separate development programs. This PE includes:

1. MQ-9 System Lifecycle Agile Modernization (SLAM). This effort is to develop improvements for existing systems and to field new capabilities for the baseline MQ-9 fleet using an Agile Acquisition Strategy to include concept exploration for an MQ-9 follow-on.
2. MQ-9 Development and Fielding. This effort is for development and fielding of the baseline MQ-9 aircraft and GCSs and associated communications systems, sensors, payloads, simulators, support equipment, and resolving Diminishing Manufacturing Sources (DMS) issues.
3. Squadron Operations Centers (SOC). This effort is for development and fielding of standardized operations centers. SOC's contain the equipment necessary for remote split operations, to provide mission data and tasking information to aircrew, and to disseminate and/or exchange mission data with decision-makers and the intelligence community.
4. MQ-9 Upgrade. This effort is to develop improvements for existing systems and to field new capabilities for the baseline MQ-9 fleet using an Agile Acquisition Strategy.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	108.845	154.996	236.000	0.000	236.000
Current President's Budget	105.088	127.296	162.080	0.000	162.080
Total Adjustments	-3.757	-27.700	-73.920	0.000	-73.920
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-3.757	-27.700	-73.920	0.000	-73.920

Change Summary Explanation

FY20 Base

- \$27.7M reduction identified by FY20 Appropriations Bill Line 176, Page 290 as "Upgrade program excess to need."

FY21 Base

- \$73.920M reduction accounts for prior year funds that are currently available to execute in this funding period.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV				Project (Number/Name) 675212 / MQ-9 SLAM			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675212: MQ-9 SLAM	0.000	0.000	6.290	71.802	0.000	71.802	76.714	119.463	8.771	8.932	194.031	486.003
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-9 System Lifecycle Agile Modernization (SLAM) Program develops and integrates improvements for existing systems and fields new capabilities for the MQ-9 fleet through an Agile Acquisition Strategy to meet evolving mission needs. SLAM includes concept exploration for MQ-9 follow-on effort.

The objective is to enable rapid fielding of new software, hardware, and sustainability for integration into the MQ-9 fleet with requirements from the Candidate Capability List (CCL) that may include, but are not limited to, efforts to reduce system configurations; perform technology upgrades; increase pilot awareness and usability; improve reconnaissance targeting and exploitation; expand weapons system selection and lethality; enlarge suitability to varying operational theaters; improve security and self-protection; reduce logistics footprint; train the warfighter, and prototype.

Activities also include, but are not limited to, studies, analysis, simulations, demonstrations, prototyping and testing, use of subject matter experts agencies to develop and test MQ-9 system capabilities and follow-on which include, but are not limited to System Integration Laboratory (SIL)/ Hardware in the Loop Laboratory (HILL) and Detachment 3 (Det 3) improvements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Funding may be used to address Diminishing Manufacturing Source (DMS) and Non-Recurring Engineering issues.

Where appropriate, the MQ-9 Program of Record (PoR) and Air Force Special Operations Command (AFSOC) will cost share on joint efforts that are required by both programs to support new capabilities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: MQ-9 SLAM	0.000	6.191	67.987
Description: Develops and integrates upgrade capabilities to support of the MQ-9 modernization strategy. Development combines the rigor of an event driven development process (referred to as Technology Maturation Effort (TME)) with the expedited delivery of a schedule driven integration and fielding process. New capabilities include, but are not be limited to, upgrades of existing aircraft, Ground Control Station (GCS), communication, payload systems, and software updates. MQ-9 SLAM also addresses and resolves Diminishing Manufacturing Sources (DMS) issues.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675212 / MQ-9 SLAM		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Candidate Capabilities are determined by Major Commands (ACC, AFSOC) direction and inputs that included Joint Urgent Operational Need (JUON) and Urgent Operational Need (UON) requests. Approval of software/hardware content was established in FY 2018 based on current operational priorities.</p> <p>Activities also include, but are not limited to, operator simulators, reliability and maintainability, test support, communications, and urgent services.</p> <p>During development MQ-9 PoR and AFSOC will cost share on joint efforts that are required by both programs to support the new capabilities.</p> <p>FY 2020 Plans: Begin TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to:</p> <ul style="list-style-type: none"> • Weapons usability improvements • Unified Tactical Situational Awareness • Mode 5 • Ku or Global Positioning System (GPS) jamming; data encryption, Identification Friend or Foe (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability, (e.g.,developmental testing, software updates, documentation and training) <p>FY 2021 Plans: Continue TME developing upgrade capabilities in conjunction with the CCL to include, but are not limited to:</p> <ul style="list-style-type: none"> • Weapons usability improvements • Unified Tactical Situational Awareness • Mode 5 • Ku or Global Positioning System (GPS) jamming; data encryption, Identification Friend or Foe (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability, (e.g.,developmental testing, software updates, documentation and training) <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased as MQ-9 SLAM continues to ramp up.</p>				
<p>Title: Reliability and Maintainability</p> <p>Description: Develops MQ-9 Reliability and Maintainability (R&M) improvements for aircraft and ground base infrastructure. Includes engineering change orders, studies, and general research. Addresses and resolves DMS issues.</p> <p>Funding was approved for this R&M effort in the FY20 appropriation--this effort is not a New Start.</p>		0.000	0.000	1.763

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675212 / MQ-9 SLAM
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: Begin development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs. Includes addressing and resolving DMS issues.</p> <p>FY 2021 Plans: Continue development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs. Includes addressing and resolving DMS issues.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased as MQ-9 SLAM Reliability and Maintainability continues to ramp up.</p>			
<p>Title: Test Support</p> <p>Description: Provides support for, but is not limited to, activities for MQ-9 testing of weapon system hardware/software testing in accordance with (IAW) contract standards, developmental testing of new capabilities, and R&M upgrades.</p> <p>FY 2020 Plans: Provides government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware/software IAW with contract standards, developmental testing of new capabilities, and R&M improvements.</p> <p>FY 2021 Plans: Continues to provide government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware/software IAW with contract standards, developmental testing of new capabilities, and R&M improvements.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to MQ-9 SLAM continuing to ramp up weapon system hardware/software testing.</p>	0.000	0.088	1.298
<p>Title: Communications</p> <p>Description: Develops MQ-9 communications capabilities such as, but not limited to, network systems managers, SATCOM, and relay site capability upgrades. Includes drafting technical orders and support documentation, training materials, production drawings, and retrofit acceptance plans (e.g., Bandwidth Efficient Common Data Link (BE-CDL) Secure Voice Multi Level Security (MLS), ARC-210 Guard Squelch and Secure Communications).</p> <p>FY 2020 Plans: Develops communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM, integrate IP-based network interfaces, primary data links, network system managers, operational durability, remote split operations, support equipment. Also includes associated technical orders and flight manuals.</p> <p>FY 2021 Plans:</p>	0.000	0.011	0.502

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675212 / MQ-9 SLAM

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Continue to develop communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM usage, integrate IP-based network interfaces, primary data links, network system managers, operational durability, remote split operations, support equipment. Also includes associated technical orders and flight manuals FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased as MQ-9 SLAM Communications continues to ramp up.			
Title: Concept Exploration for follow-on to MQ-9 Description: Includes but is not limited to, program planning for the follow-on MQ-9 effort which explores capabilities in a contested environment. FY 2021 Plans: Development activities, which include but are not limited to, studies, analysis, and prototyping RPA operations in a contested environment. FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 due to MQ-9 SLAM concept exploration for MQ-9 follow-on effort in first year of execution in FY 2021.	-	-	0.252
Accomplishments/Planned Programs Subtotals	0.000	6.290	71.802

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 06 PRDTB1: MQ-9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• APAF 05 PRDTB2: MQ-9 Mods	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Remarks
PMA costs are included in Other Government Costs.

D. Acquisition Strategy
Acquisition of MQ-9 SLAM is accomplished via sole-source contracts with General Atomics-ASI, Raytheon, and L-3 Communications, prime contractors, and United States Government (USG) Labs. Management of development and fielding of new capabilities will be through an Agile Acquisition Strategy that combines the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expedited delivery of a schedule driven integration and fielding process. This will allow continued baseline improvements while rapidly integrating limited urgent needs.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675212 / MQ-9 SLAM
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not Specified: TBD : TBD	0.000	-		-		-		-		-	0.000	0.000	-
MQ-9 SLAM	SS/CPAF	GA-ASI : Poway, CA	0.000	-		5.972	Jul 2020	65.961	Nov 2020	-		65.961	179.783	251.716	-
Reliability and Maintainability	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		1.763	Apr 2021	-		1.763	5.719	7.482	-
Communications	SS/CPAF	GA-ASI : Poway, CA	0.000	-		0.011	Jul 2020	0.502	Jan 2021	-		0.502	1.629	2.142	-
Concept Exploration for follow-on to MQ-9	Various	Various : Various	0.000	-		-		0.252	Jul 2021	-		0.252	0.267	0.519	-
Subtotal			0.000	-		5.983		68.478		-		68.478	187.398	261.859	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Test Support	Various	Various : Various	0.000	-		0.088	Jul 2020	1.298	Nov 2020	-		1.298	2.742	4.128	-
Subtotal			0.000	-		0.088		1.298		-		1.298	2.742	4.128	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	-		0.219	Jul 2020	2.026	Apr 2021	-		2.026	11.135	13.380	-
Subtotal			0.000	-		0.219		2.026		-		2.026	11.135	13.380	N/A

Project Cost Totals	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	0.000	-	6.290	71.802	-	71.802	201.275	279.367	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675212 / MQ-9 SLAM
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MQ-9 SLAM																												
MQ-9 SLAM																												
Reliability and Maintainability																												
Communications																												
Test Support																												
Concept Exploration for follow-on to MQ-9																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675212 / MQ-9 SLAM
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MQ-9 SLAM				
MQ-9 SLAM	4	2020	2	2025
Reliability and Maintainability	4	2020	2	2025
Communications	4	2020	2	2025
Test Support	4	2020	2	2025
Concept Exploration for follow-on to MQ-9	4	2021	2	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675246: MQ-9 Development and Fielding	0.000	28.244	50.931	32.334	0.000	32.334	32.956	33.546	34.146	34.774	0.000	246.931
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Quantity of RDT&E Articles refers only to test aircraft.

A. Mission Description and Budget Item Justification

The basic MQ-9 Reaper system consists of the aircraft, sensors, Ground Control Station (GCS), communications equipment, weapon kits, support equipment, simulator and training devices, Readiness Spares Packages (RSP), technical data/training, and personnel required to operate, maintain, and sustain the system. The system is designed to be modular and open-ended. Mission-specific equipment is employed in a plug-and-play mission kit concept allowing specific aircraft and GCS configurations to be tailored to fit mission needs.

The MQ-9 Reaper aircraft is a single-engine, turbo-prop Remotely Piloted Aircraft (RPA) designed to operate over-the-horizon at medium-to-high altitude for long endurance sorties. The aircraft is designed to primarily prosecute critical emerging Time-Sensitive-Targets (TSTs) using a Synthetic Aperture Radar (SAR), Electro-optical/Infrared (EO/IR), and laser designator-based attack asset with on-board hard-kill weapon capability (hunter-killer). It also performs Intelligence, Surveillance, Reconnaissance, and Target Acquisition (ISR TA).

The MQ-9 system is continuing to develop and field capabilities to meet evolving mission needs through incremental upgrades, including but not limited to, increasing the maximum gross takeoff and landing weight; increasing operational range and endurance; propulsion system improvements; integrated redundant avionics; incorporating provisions for a Foreign Military Sales (FMS) exportable version of the weapon system; communications upgrades to include but not limited to datalink encryption, Internet Protocol (IP) networking, secure voice and data communications; navigation system upgrades; electrical system upgrades; sensor/stores management computer improvement; MIL STD-1760 advanced weapons data bus; advanced sensor and weapon payloads; improved human-machine interface (HMI); software updates needed to support new configurations and development; integrating additional precision weapons; and hardware and software upgrades to the GCS. The program will also complete airworthiness and weapon system certification and accreditation; produce applicable training for payloads funded in other program elements (e.g. SIGINT, communications, Wide Area Motion Imagery (WAMI), Near Vertical Direction Finding (NVDF), Gorgon Stare Quick Reaction Capability, advanced Counter-Improvised Explosive Device (C-IED), missile defense, hyperspectral, and other sensors and weapons). Development efforts will address reliability, maintainability, sustainability, Diminishing Manufacturing Sources (DMS), and safety issues. Activities also include, but are not limited to, trade studies, analyses, preliminary systems engineering, system and subsystem level testing in accordance with DoD and military standards, and specification development in support of both current program planning and execution, and studies supporting analysis and investment in future MQ-9 program planning.

The GCS functions as the aircraft cockpit and can control the aircraft either within Line-of-Sight (LOS) or Beyond Line-of-Sight (BLOS) via a combination of satellite relay and terrestrial communication architectures. The GCS is either mobile to support forward operating locations or fixed at a facility to support reach back Remote Split Operations (RSO). The GCS has the capability to perform mission planning; provide a means for manual control; and enable personnel to launch, recover, and monitor

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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aircraft, payloads, and system communications status. It incorporates secure data links to send aircraft and payload commands and receive system telemetry and payload data; monitors threats to the aircraft; displays the common operational picture; and provides support functions. Launch and Recovery GCS (LRGCS) is used for servicing, systems checks, maintenance, launch and recovery of aircraft under LOS control for hand-off to a mobile or fixed facility GCS, and conducting operations within LOS range of the LRGCS. GCS upgrades will be developed and fielded in coordination with improvements to other MQ-9 system capabilities and in response to evolving operational and information assurance/certification and accreditation requirements.

This project will also increase interoperability among developed systems by developing common standards and tools.

MQ-9 Program of Record (PoR) and Air Force Special Operations Command (AFSOC) will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.

Funding may be used to address DMS and Non-Recurring Engineering (NRE) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
<p>Title: Ground Control Station (GCS) Development</p> <p>Description: Develop GCS capabilities. Major capabilities include, but are not limited to, flight payload separation, open system architecture, processors, multi-level security, ergonomic cockpit design, single seat operations, reducing or eliminating known deficiencies in legacy GCS, and updates to facilitate single software.</p> <p>FY 2020 Plans: Will continue GCS design/development, manufacturing and testing to include, but not limited to:</p> <ul style="list-style-type: none"> • Hardware/Software Development • Integration and test • Continue GCS Development Test assets • Continue Contractor test build • Maintenance evaluation team event • Military Flight Release • Resolution of DMS issues • Field Service Representative (FSR) support during IOT&E • Block 30 Articulating Arm 	14.181	21.755	4.234

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Block 30 Monitor • Processor(s) <p>FY 2021 Plans: Will continue GCS design/development, manufacturing and testing to include, but not limited to:</p> <ul style="list-style-type: none"> • Hardware/Software Development • Integration and test • Continue GCS Development Test assets • Continue Contractor test build • Maintenance evaluation team event • Military Flight Release • Resolution of DMS issues • Field Service Representative (FSR) support during IOT&E • Block 30 Articulating Arm • Block 30 Monitor • Processor(s) <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to support the Block 30 monitor, articulating arm, and Linux processor hardware, GCS development efforts, and software updates ramp up.</p>			
<p>Title: Operator Simulator</p> <p>Description: Develop Operator Simulators for training, updates to keep Operator Simulators concurrent with the aircraft and GCS to include Joint Urgent Operational Need (JUON) support emerging AFSOC configurations. MQ-9 PoR and AFSOC will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.</p> <p>FY 2020 Plans: Will continue to implement updates which will keep the Operator Simulator current with the aircraft and GCS including, but not limited to:</p> <ul style="list-style-type: none"> • Sensors • Databases • Weapons upgrades • Resolution of DMS issues <p>FY 2021 Plans: Will continue to implement updates which will keep the Operator Simulator current with the aircraft and GCS including, but not limited to:</p>	1.436	1.925	1.459

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Sensors • Databases • Weapons upgrades • Resolution of DMS issues <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased as the Operator Simulator development efforts continue under the MQ-9 ACATII programs.</p>				
<p>Title: Release 1 and Release 2</p> <p>Description: Release 1 and Release 2 continue execution of a subset of work previously performed under the System Development and Demonstration (SDD) effort, while rapidly integrating upgrades or improvements (including limited urgent needs) fleet-wide. Development will combine the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expeditious delivery of a schedule driven integration and fielding process (referred to as a Release). These efforts may include, but are not limited to: Cryptographic Core Module (CCM), MTS-B Integration, Ground Control Station (GCS), Internet Protocol (IP) Migration, Synthetic Aperture Radar (SAR) Development, Extended Range, Station 1 & 7, Enablers Development, Multi Transit Ops, weapons integration, and testing on MQ-9 platform for capabilities such as rockets, missiles, bombs, guns and direct energy weapons, as well as software development required to support new capabilities. MQ-9 PoR and AFSOC will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.</p> <p>FY 2020 Plans: Develop and integrate the software and data to update the MQ-9 Block 5 UAS capabilities including, but not limited to:</p> <ul style="list-style-type: none"> • Resolution of DMS issues • Cryptographic Core Module (CCM) • KU Ground Data Terminals (KU GDT) • KU Line of Sight Operating System (KLOSOS) • System supportability analysis • Evaluation of design code software <p>FY 2021 Plans: Continue developing and integrating the software and data to update the MQ-9 Block 5 UAS capabilities including, but not limited to:</p> <ul style="list-style-type: none"> • Resolution of DMS issues • Cryptographic Core Module (CCM) • KU Ground Data Terminals (KU GDT) 		-	8.166	9.786

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • KU Line of Sight Operating System (KLOSOS) • System supportability analysis • Evaluation of design code software <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase to support Cryptographic Core Module (CCM), KU Ground Data Terminals (KU GDT), and KU Line of Sight Operating System (KLOSOS)</p>				
<p>Title: Test Support</p> <p>Description: Provides Other Government Agency support for MQ-9 testing to include, but not limited to, continued acceptance testing of weapon system hardware and software in accordance with contract standards, developmental testing of new capabilities, and Reliability and Maintainability (R&M) upgrades. MQ-9 PoR and Air Force Special Operations Command (AFSOC) will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.</p> <p>FY 2020 Plans: Will continue test support.</p> <p>FY 2021 Plans: Will continue test support.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased as the Test Support development efforts continue to support GCS and software updates to include but not limited to LoS data links, ATLC, and open system architecture.</p>		0.143	0.137	0.316
<p>Title: Communications</p> <p>Description: Develop MQ-9 communications capabilities including, but not limited to, encrypted and improved LoS data links to ROVER/Video Data Link terminals (VORTEX/Airborne Platform Video Data Link), Bandwidth Efficient (BE) Common Data Link (CDL) for Command and Control (C2) and ISR transmission to GCS, improved (including BE) Beyond LOS (BLOS) military Satellite Communications (SATCOM) usage, control module, and secure triple link modem. Development and integration of an IP-based remote split operations (RSO) network/infrastructure to include: Improvements to Ground Data Terminals (GDT), Design, development, and test of IP-based network interfaces, Improved Predator Primary Data Link (PPDL) capabilities, reduction of legacy C-band signal blockages, network systems managers, SATCOM and relay site capabilities upgrades, drafting Technical Orders (TOs) and support documentation, training materials, production drawings, and retrofit acceptance plans. MQ-9 PoR and AFSOC will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.</p> <p>FY 2020 Plans:</p>		0.000	3.300	4.064

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Continue to develop and enhance MQ-9 communications capabilities, to include but not limited to, solutions of various DMS issues. FY 2021 Plans: Continue to develop and enhance MQ-9 communications capabilities, to include but not limited to, solutions of various DMS issues. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased as communications development ramps up.			
Title: MQ-9 Technology Insertion Description: Develop program protection Technology Insertion capabilities and functionality for the MQ-9 Weapon System. MQ-9 PoR and AFSOC will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. FY 2020 Plans: MQ-9 Technology Insertion efforts will continue during FY20. FY 2021 Plans: MQ-9 Technology Insertion efforts will continue during FY20. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased as Communications security control module effort ramps down.	12.484	15.648	12.475
Accomplishments/Planned Programs Subtotals	28.244	50.931	32.334

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 04 Line Item PRDTB1: MQ-9	401.603	468.600	171.899	0.000	171.899	65.052	65.565	0.000	0.000	0.000	1,172.719
• APAF 06 Line Item PRDTB1: MQ-9 Spares	46.522	55.943	33.128	0.000	33.128	35.142	27.652	0.000	0.000	0.000	198.387
• APAF 05 Line Item PRDTB2: MQ-9 Mods	167.307	90.211	58.630	0.000	58.630	30.140	11.740	11.882	12.099	0.000	382.009
• APAF 07 Line Item PRDTB1: MQ-9	15.291	22.107	26.585	0.000	26.585	27.127	27.612	0.000	0.000	0.000	118.722

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

PMA cost are included in Other Government Costs

D. Acquisition Strategy

The MQ-9 Reaper system will be acquired via sole-source contracts with General Atomics Aeronautical Systems Inc. (GA-ASI), L3Comm, and Raytheon as the prime contractors. GA-ASI is the prime contractor for aircraft and ground control stations. GA-Mission Systems (GA-MS) is the prime contractor for Lynx SAR. L3Comm is the prime contractor for the Predator Satellite Link. Raytheon is the prime contractor for the MTS-B EO/IR sensor system. Management of development and fielding of new capabilities will be through an acquisition strategy that combines the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expeditious delivery of a schedule driven integration and fielding process. This will allow continued baseline improvements while rapidly integrating limited urgent needs fleet-wide.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Ground Control Station (GCS) Development	SS/CPFF	GA-ASI : Poway, CA	0.000	25.594	Oct 2018	31.533	Mar 2020	13.990	Mar 2021	-		13.990	83.345	154.462	349.818
Multi-Spectral Targeting System (MTS)-B EO/IR Sensor	SS/CPFF	Raytheon : McKinney, TX	0.000	-		-		-		-		-	0.000	0.000	112.944
Operator Simulator	TBD	TBD : TBD	0.000	1.436	Mar 2019	1.925	Mar 2020	1.459	Mar 2021	-		1.459	3.141	7.961	56.512
Release1 and Release 2	SS/CPFF	GA-ASI : Poway, CA	0.000	0.000	Feb 2019	8.166	Feb 2020	9.786	Mar 2021	-		9.786	0.000	17.952	161.096
Communications	SS/CPFF	GA-ASI : Poway, CA	0.000	-		3.300	Nov 2019	4.064	Nov 2020	-		4.064	3.030	10.394	17.336
MQ-9 Program Protection Technology Insertion	SS/CPFF	GA-ASI : Poway, CA	0.000	0.000	Apr 2019	2.830	Apr 2020	-		-		-	0.000	2.830	58.239
Completed Efforts	SS/ Various	Various : Various	0.000	-		-		-		-		-	0.000	0.000	77.805
Subtotal			0.000	27.030		47.754		29.299		-		29.299	89.516	193.599	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Test Support	Various	Various : Various, CA	0.000	0.143	May 2019	0.137	Oct 2019	0.316	Oct 2020	-		0.316	5.843	6.439	22.665
Subtotal			0.000	0.143		0.137		0.316		-		0.316	5.843	6.439	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	1.071	May 2019	3.040	May 2020	2.719		-		2.719	5.446	12.276	119.924
Subtotal			0.000	1.071		3.040		2.719		-		2.719	5.446	12.276	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	28.244	50.931	32.334	-	32.334	100.805	212.314	N/A

Remarks
PMA costs are included in Other Government Costs.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MQ-9 ACAT IC Development																												
Ground Control Station (GCS) Development																												
MTS-B Updates (Electro-Optical/Infrared (EO/IR) Sensor)																												
Operator Simulator																												
Release 1 & Release 2																												
Test Support																												
Communications																												
MQ-9 Technology Insertion																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675246 / MQ-9 Development and Fielding
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MQ-9 ACAT IC Development</i>				
Ground Control Station (GCS) Development	1	2019	2	2025
MTS-B Updates (Electro-Optical/Infrared (EO/IR) Sensor)	1	2019	1	2020
Operator Simulator	1	2019	2	2025
Release 1 & Release 2	1	2019	4	2021
Test Support	1	2019	2	2025
Communications	1	2019	2	2022
MQ-9 Technology Insertion	1	2019	4	2022

Note

PMA costs are included in Other Government Costs.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV				Project (Number/Name) 675247 / Squadron Operations Centers (SOC)			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675247: Squadron Operations Centers (SOC)	0.000	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.752
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The SOC is required to employ Remote Split Operations (RSO). It provides the communications, network, aircraft control and sensor distribution circuits to effectively execute RSO missions. The SOC provides CONUS-based aircrews mission data, tasking, and ability to disseminate and exchange mission data with decision-makers and intelligence entities. This effort defines component standards, develops and stands up a SOC Systems Integration Lab (SIL), and integrates new technologies to maintain currency with technological and platform advancements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Squadron Operations Center	5.752	0.000	0.000
Description: Development of a SOC common to Air Combat Command (ACC), Air Force Special Operations Command (AFSOC), and Air National Guard (ANG). Major capabilities include secure mission communications; data reception, recording, editing, analysis, dissemination, and exchange; mission planning, preparation, and support; mission execution (e.g., updates to threat tracking and targeting, weather tracking, mission status and capability; tactical situational awareness; etc.); and mission reconstruction and debriefing.			
FY 2020 Plans: No Funding			
FY 2021 Plans: No Funding			
Accomplishments/Planned Programs Subtotals	5.752	0.000	0.000

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

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Line Item 837300: Base Communications Infrastructure	87.378	7.898	82.160	0.000	82.160	83.212	53.749	0.000	0.000	0.000	314.397

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675247 / Squadron Operations Centers (SOC)

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks
 Since 2004, MQ-1/MQ-9 squadrons have acquired equipment, on an ad hoc basis, to provide the communications, network, aircraft control, and sensor distribution circuits needed to execute RSO missions. OPAF funding will be used to standardize and modernize existing RPA SOC capability, which is required to reduce security vulnerabilities, as well as address end of life/end of support issues of existing RPA SOC equipment. The Developmental Testing (DT) SOC will be used to further enhance the program's ability to update future RPA-SOC modernization efforts.

D. Acquisition Strategy

AFLCMC/WII manages the SOC Program for ACC, AFSOC, and ANG through organic development at the 402 SMXG, and hardware/software procurement utilizing the Air Force NETCENTS contract vehicle, as well as other Air Force and General Service Administration (GSA) contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020				
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV					Project (Number/Name) 675247 / Squadron Operations Centers (SOC)				

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-	
RPA SOC Development	Various	402nd SMXG : Robins AFB, GA	0.000	5.752	Feb 2020	-		-		-		-	0.000	5.752	-	
Subtotal			0.000	5.752		-		-		-		-	0.000	5.752	N/A	
Project Cost Totals			0.000	5.752		0.000		-		-		-	0.000	5.752	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

RPA SOC SIL	
DT SOC Development, Procurement, and Delivery	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675247 / Squadron Operations Centers (SOC)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
RPA SOC SIL				
DT SOC Development, Procurement, and Delivery	2	2019	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV				Project (Number/Name) 675249 / MQ-9 Upgrade			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675249: MQ-9 Upgrade	0.000	71.092	70.075	57.944	0.000	57.944	58.490	18.679	0.000	0.000	922.964	1,199.244
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-9 Upgrade Program develops and integrates improvements for existing systems and fields new capabilities for the MQ-9 fleet through an Agile Acquisition Strategy to meet evolving mission needs.

The objective is to enable rapid fielding of new software, hardware, and sustainability for integration into the MQ-9 fleet. Per the Candidate Capability List (CCL) signed on 01 November 2019, capabilities may include, but are not limited to, efforts to reduce system configurations; mitigate Diminishing Manufacturing Sources and Material Shortages (DMSMS) through planned tech upgrades; enable airspace integration; increase weather tolerance; train like we fight; enable airborne situational awareness; enable ops in a contested environment; build open architecture, reduce logistics footprint; improve cybersecurity resilience, improve reliability and maintainability, increase lethality, improve human machine interface to enhance user experience; and improve readiness to prepare for tomorrow's war.

Activities also include studies, analysis, simulations, demonstration, prototyping, and testing, use of subject matter experts and agencies in developing and testing MQ-9 system capabilities, to include System Integration Laboratory (SIL)/ Hardware in the Loop Laboratory (HILL) and Detachment 3(Det 3) improvements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F..

Funding may be used to address Diminishing Manufacturing Source (DMS) and Non-Recurring Engineering issues.

MQ-9 Program of Record (PoR) and Air Force Special Operations Command (AFSOC) will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: MQ-9 Upgrade	67.774	61.287	45.816
Description: Develop and integrate upgrade capabilities in support of the MQ-9 Upgrade Strategy. Development will combine the rigor of an event driven development process (referred to as Technology Maturation Effort (TME)) with the expeditious delivery of a schedule driven integration and fielding process. New capabilities include, but are not limited to, upgrades of existing aircraft, Ground Control Station (GCS), communication, payload systems, Multi-Spectral Targeting System (MTS-B) and software updates needed to support new configurations and development, the addition of new capabilities and subsystems, as well as addressing and resolving DMS issues.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675249 / MQ-9 Upgrade

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Candidate capabilities are determined by Major Command (Air Combat Command (ACC), Air Force Special Operations Command (AFSOC)) direction and inputs that included Joint Urgent Operational Need (JUON) and Urgent Operational Need (UON) requests. Approval of software/hardware content was established in FY 2018 based on current operator priorities.</p> <p>Activities also include, but are not limited to, operator simulators, reliability and maintainability, test support, communications, and urgent services.</p> <p>MQ-9 PoR and AFSOC will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.</p> <p>FY 2020 Plans: Continue TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to:</p> <ul style="list-style-type: none"> • Unified Tactical Situational Awareness • Automated Takeoff and Landing Capability (ATLC) • Weapons usability improvements (i.e. auto-lockout, JAGM and four rail) • Reconnaissance, targeting and technology improvements in MTS-B, Synthetic Aperture Radar, sensors, sensor upgrades and GPS • System corrections, technology upgrades within the GCS, Unmanned Aerial Vehicle communications and ground support (i.e. batteries, engine, BE-CDL and Beyond Line of Sight (BLOS)) • Expand theater capabilities with Anti-ice/De-ice, Mode 5, ADS-B • MTS-B High-Definition Short Wave Infrared/Pulse Repetition Frequency, two-color laser system, inertial measurement unit/ autoloader • Secure Communications • Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability • Gorgon Stare <p>FY 2021 Plans: Continue TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to:</p> <ul style="list-style-type: none"> • Unified Tactical Situational Awareness • Design, development and integration of Moving Target Indicator (MTI) capability on medium altitude air vehicles to improve dismount and moving target detection, identification, tracking, and classification • Automated Takeoff and Landing Capability (ATLC) • Weapons usability improvements (i.e. auto-lockout, JAGM and four rail) 			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Reconnaissance, targeting and technology improvements in MTS-B, Synthetic Aperture Radar, sensors, sensor upgrades and GPS • System corrections, technology upgrades within the GCS, Unmanned Aerial Vehicle communications and ground support (i.e. batteries, engine, BE-CDL and Beyond Line of Sight (BLOS)) • Expand theater capabilities with Mode 5 • MTS-B High-Definition Short Wave Infrared/Pulse Repetition Frequency, two-color laser system, inertial measurement unit/ autoloader • Secure Communications • Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability • Gorgon Stare <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased as Upgrade will continue at a decreased level as efforts under MQ-9 SLAM program (BPAC 675212) ramps up.</p>			
<p>Title: Operator Simulator</p> <p>Description: Develop Operator Simulators for training, and perform updates to keep operator simulators concurrent with the aircraft and GCS to include, but not limited to, JUONs, UONs, and support emerging AFSOC configurations.</p> <p>FY 2020 Plans: Continue implementing updates to keep the operator simulator current with the aircraft and GCS.</p> <p>FY 2021 Plans: Continue implementing updates to keep the operator simulator current with the aircraft and GCS.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to MQ-9 Upgrade operator simulators continue to update in order to keep concurrent with aircraft GCS configurations.</p>	2.680	8.000	9.497
<p>Title: Reliability and Maintainability</p> <p>Description: Develop MQ-9 Reliability and Maintainability (R&M) improvements for aircraft and ground base infrastructure. Includes engineering change orders and associated studies, general research, addressing and resolving DMS issues, program office support and other high level initiatives directed by the Air Force.</p> <p>Funding was approved for this R&M effort in the FY20 appropriation--this effort is not a New Start.</p>	0.000	0.000	1.636

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675249 / MQ-9 Upgrade
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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<p>FY 2020 Plans: Continue development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs, to include addressing and resolving DMS issues.</p> <p>FY 2021 Plans: Continue development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs, to include addressing and resolving DMS issues.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to MQ-9 Upgrade continuing to ramp up Reliability and Maintainability.</p>			
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<p>Title: Test Support</p> <p>Description: MQ-9 Upgrade testing provides support including, but not limited to, activities for MQ-9 testing of weapon system hardware and software IAW contract standards, developmental testing of new capabilities, and R&M upgrades.</p> <p>FY 2020 Plans: Continue providing government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware and software IAW with contract standards, developmental testing of new capabilities, and R&M improvements.</p> <p>FY 2021 Plans: Continue providing government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware and software IAW with contract standards, developmental testing of new capabilities, and R&M improvements.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased as MQ-9 Upgrade Test Support will continue at a decreased level as efforts under MQ-9 SLAM (BPAC 675212) ramps up.</p>	0.638	0.620	0.527
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<p>Title: Communications</p> <p>Description: Develop MQ-9 communications capabilities including, but not limited to, network systems managers, SATCOM and relay site capabilities upgrades, drafting technical orders and support documentation, training materials, production drawings, and retrofit acceptance plans (i.e., BE CDL, Secure Voice Multi-Level Security (MLS), ARC-210 Guard Squelch and Secure Communications).</p> <p>FY 2020 Plans: MQ-9 Upgrade communications capabilities development will continue</p> <p>FY 2021 Plans:</p>	0.000	0.168	0.468
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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675249 / MQ-9 Upgrade
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
MQ-9 Upgrade communications capabilities development will continue			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding decreased as MQ-9 Upgrade Communications continuing at a decreased level as efforts under MQ-9 SLAM (BPAC: 675212) ramps up.			
Accomplishments/Planned Programs Subtotals	71.092	70.075	57.944

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 06 PRDTB1: MQ-9 UAV	1.726	54.069	14.268	0.000	14.268	14.070	14.322	0.000	0.000	0.000	98.455
• APAF 05 PRDTB2: MQ-9 Mods	22.641	164.204	129.757	0.000	129.757	130.972	152.655	0.000	0.000	0.000	600.229

Remarks
PMA costs are included in Other Government Costs.

D. Acquisition Strategy
Acquisition of MQ-9 Upgrade is accomplished via sole-source contracts with General Atomics-ASI, Raytheon, and L-3 Communications, prime contractors, and Other Government Agencies. Management of development and fielding of new capabilities will be through an Agile Acquisition Strategy that combines the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expedited delivery of a schedule driven integration and fielding process. This will allow continued baseline improvements while rapidly integrating limited urgent needs fleet-wide.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675249 / MQ-9 Upgrade
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
MQ-9 Upgrade	SS/CPFF	GA-ASI : Poway, CA	0.000	67.382	Mar 2019	57.855	Mar 2020	42.220	Jan 2021	-		42.220	58.461	225.918	-
Operator Simulator	TBD	TBD : TBD	0.000	2.680	Jun 2019	8.000	Mar 2020	9.497	Jan 2021	-		9.497	13.998	34.175	-
Reliability and Maintainability	SS/CPFF	GA-ASI : Poway, CA	0.000	-		-		1.636	Apr 2021	-		1.636	1.348	2.984	-
Communications	SS/CPFF	GA-ASI : Poway, CA	0.000	-		0.168	Oct 2019	0.468	Oct 2020	-		0.468	0.362	0.998	-
Subtotal			0.000	70.062		66.023		53.821		-		53.821	74.169	264.075	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Test Support	Various	Various : Various	0.000	0.638	Nov 2018	0.620	Nov 2019	0.527		-		0.527	0.298	2.083	-
Subtotal			0.000	0.638		0.620		0.527		-		0.527	0.298	2.083	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	0.392	May 2019	3.432	May 2020	3.596	May 2021	-		3.596	2.819	10.239	-
Subtotal			0.000	0.392		3.432		3.596		-		3.596	2.819	10.239	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	71.092	70.075	57.944	-	57.944	77.286	276.397	N/A

Remarks
PMA costs are included in Other Government Costs.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675249 / MQ-9 Upgrade
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MQ-9 ACAT II Development	
MQ-9 Upgrade	
Operator Simulator	
Reliability and Maintainability	
Test Support	
Communications	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / MQ-9 UAV	Project (Number/Name) 675249 / MQ-9 Upgrade
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MQ-9 ACAT II Development</i>				
MQ-9 Upgrade	1	2019	4	2023
Operator Simulator	1	2019	4	2023
Reliability and Maintainability	3	2019	4	2023
Test Support	1	2019	4	2023
Communications	1	2019	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0205671F / <i>Joint Counter RCIED Electronic Warfare</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	4.000	4.000	0.000	4.080	4.080	3.790	3.554	3.217	3.275	0.000	25.916
674518: <i>JCREW VEHICLE INTEGRATION</i>	-	4.000	4.000	0.000	4.080	4.080	3.790	3.554	3.217	3.275	0.000	25.916
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Program funds Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Mounted, Dismounted, and Fixed systems. CREW devices are self-protection systems critical to Mine Resistant, Ambush Protected (MRAP) vehicle mounted, Explosive Ordinance Disposal dismounted and Entry Control Point operations. Includes integration of the devices into currently fielded systems.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	4.000	4.000	4.080	0.000	4.080
Current President's Budget	4.000	4.000	0.000	4.080	4.080
Total Adjustments	0.000	0.000	-4.080	4.080	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-4.080	4.080	0.000

Change Summary Explanation

The funding was changed from Base to OCO funds

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: JCREW Vehicle Integration	4.000	4.000	0.000	4.080	4.080

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0205671F <i>I Joint Counter RCIED Electronic Warfare</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Program funds Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Mounted, Dismounted, and Fixed systems.					
FY 2020 Plans: Program funds Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Mounted, Dismounted, and Fixed systems.					
FY 2021 Base Plans: Program funds Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Mounted, Dismounted, and Fixed systems.					
FY 2021 OCO Plans: Funds changed from Base to OCO					
FY 2020 to FY 2021 Increase/Decrease Statement: Program funds Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Mounted, Dismounted, and Fixed systems.					
Accomplishments/Planned Programs Subtotals	4.000	4.000	0.000	4.080	4.080

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 845100: <i>Engineering and EOD Equipment</i>	0.000	-	-	-	-	-	-	-	-	0.000	0.000

Remarks
 Program funds Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Mounted, Dismounted, and Fixed systems. CREW devices are self-protection systems critical to Mine Resistant, Ambush Protected (MRAP)& Joint Light Tactical Vehicle (JLTV) mounted, Explosive Ordinance Disposal and Tactical Air Control Party dismounted and Entry Control Point operations. Includes software update integration into currently fielded systems.

E. Acquisition Strategy

n/a

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205671F / Joint Counter RCIED Electronic Warfare	Project (Number/Name) 674518 / JCREW VEHICLE INTEGRATION
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Services	C/CPFF	NAVSEA PMS-408 : Washington, DC	-	4.000	Jan 2019	4.000		0.000		4.080	Feb 2021	4.080	Continuing	Continuing	-
Subtotal			-	4.000		4.000		0.000		4.080		4.080	Continuing	Continuing	N/A
Project Cost Totals			-	4.000		4.000		0.000		4.080		4.080	Continuing	Continuing	N/A

Remarks
 Funds Air Force fair share of research and development efforts to update software for fielded CREW systems, supporting EOD, Security Forces, and TACP Airmen. Software updates ensure mounted, dismounted, and fixed site CREW systems remain effective against evolving commercially available technologies.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205671F / <i>Joint Counter RCIED</i> <i>Electronic Warfare</i>	Project (Number/Name) 674518 / <i>JCREW VEHICLE INTEGRATION</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>J CREW Integration</i>	
JCREW Vehicle Integration	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205671F / <i>Joint Counter RCIED Electronic Warfare</i>	Project (Number/Name) 674518 / <i>JCREW VEHICLE INTEGRATION</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>J CREW Integration</i>				
JCREW Vehicle Integration	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	27.537	31.916	24.535	0.000	24.535	104.389	101.333	23.624	39.036	Continuing	Continuing
674809: <i>A-10 Squadrons</i>	-	27.537	31.916	24.535	0.000	24.535	104.389	101.333	23.624	39.036	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A-10 concept of operations requires a flexible, adaptable and survivable weapon system to conduct close air support (CAS), combat search and rescue (CSAR) and special operations missions. The A-10 must conduct around-the-clock air operations under various weather conditions against numerous and varied enemy threats.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill Federal Aviation Administration or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

Operational Flight Program (OFP) development addresses evolving and continuing user requirements that must be incorporated in the aircraft software in order to employ advanced weapons (SMART Triple Ejector Rack (TER), increase situational awareness and enhance targeting capabilities as they become available. The funds budgeted continue regular OFP suite development efforts.

The RDT&E funds provide A-10 Developmental and Operational Testing ensuring all added capability meets safety and airworthiness criteria. FMT's DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver A-10 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	27.738	36.816	24.581	0.000	24.581
Current President's Budget	27.537	31.916	24.535	0.000	24.535
Total Adjustments	-0.201	-4.900	-0.046	0.000	-0.046
• Congressional General Reductions	0.000	-4.900			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.201	0.000	-0.046	0.000	-0.046

Change Summary Explanation

FY20- (\$4.9M) Congressional mark for forward finance

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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<p>Title: SDB-I</p> <p>Description: Funds will be used to purchase support equipment for the use of the Small Diameter Bomb-1 on the A-10 platform. The A-10 Small Diameter Bomb (SDB) 1 program is expected to field with the Suite 11 Operational Flight Program (OFP). In addition to software integration, there is support equipment for maintenance that will need to be purchased. The bomb lift adaptor will be required for loading the weapon on to the aircraft stations. The Combat Munitions BIT Reprogramming Equipment (CMBRE) tester will be required for maintenance back shops. These testers are required for the BRU-61 software checks. Lastly, BRU-61 trainers will be required for qualification training on the maintenance side.</p> <p>FY 2020 Plans: Software and integration of the SDB</p> <p>FY 2021 Plans: Continue integration efforts to complete integration with OFP Software</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Integration of the SDB with OFP software</p>	-	7.000	5.000
Title: OFP Development	13.700	13.800	13.800

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: Updates to the A-10C OFP Suite software to permit timely integration of new precision weapons, updated targeting pods, improved avionics and enhanced electronic warfare capabilities. These upgraded capabilities are in response to evolving operational requirements, including Urgent Operational Needs, generated by the ever-changing operational environment of air combat.</p> <p>This OFP effort also contains Program Management Administration (PMA) support activities to include travel, office supplies, training courses, Video Teleconferencing (VTC) and support contractors.</p> <p>FY 2020 Plans: Continue Suite 10 Software development and integration</p> <p>FY 2021 Plans: Continue Suite 10 Software development and integration for fielding, Start of Suite 11 Software development and integration.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: No change</p>				
<p>Title: ARC-210 Gen 6</p> <p>Description: The ARC-210 Gen 6 will provide the A-10 with numerous needed capabilities. The first of which is NSA crypto mandate compliant secure communications. The second is the Air Force mandate of all aircraft having Mobile User Objective System (MUOS) capability. The SATURN algorithm is also required for continued A-10 Combat Search and Rescue (CSAR) as well as Close Air Support with theater forces. The older Generation 4 radio does not currently have any of these capabilities.</p> <p>FY 2020 Plans: Continue Non-recurring engineering (NRE) for System Integration Laboratory (SIL) Integration and Testing. This will ensure all required equipment and optimal configurations will be tested for fit and function within the A-10 aircraft. In addition, configurations will be flight tested to ensure capabilities are airworthy as well as functional.</p> <p>FY 2021 Plans: Continue Non-recurring engineering (NRE) for System Integration Laboratory (SIL) Integration and Testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: No significant change</p>		4.200	6.116	5.000
<p>Title: A-10 Small Projects</p>		8.637	5.000	0.735

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: RDT&E funds provide updates and incorporation of capabilities for weapons integration, targeting pod updates, and communication/navigation/data link improvements. These funds will ensure concurrency with systems impacted by OFP development, including but not limited to the Full Mission Trainer (FMT), mission planning and support equipment, as well as required upgrades to the Software Integration Laboratory (SIL).</p> <p>FY 2020 Plans: Funding will be used for integration of SDB onto A-10 platform; to include power study, test, labor, materials, etc.</p> <p>FY 2021 Plans: Funding will be used for integration of SDB onto A-10 platform; to include power study, test, labor, materials, etc.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Reducing efforts.</p>				
<p>Title: J-Hook</p> <p>Description: Deployed A-10 units are reporting increased breakage/failure on weapons pylon retention snap hooks (J-Hooks) resulting in damage to the 1760 wiring harness at a rate of 4 to 6 times per week.</p> <p>Breaking J Hooks/damaged 1760 cables were initially identified in 2009 during the PE program. A-10 SPO East contracted Lockheed Martin Owego to develop a solution. The design was successfully put through DT at Eglin AFB. OT was subsequently conducted for 30 days, dropping >100 munitions with no defects noted. A-10 SPO has no documentation from OT. J-Hook T-2 Modification was shut down and the design shelved. This J-Hook modification design is now government property.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>		1.000	0.000	0.000
Accomplishments/Planned Programs Subtotals		27.537	31.916	24.535

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item A01000: <i>A-10 Squadrons, PE 0207131F</i>	168.060	132.069	135.980	-	135.980	128.947	135.002	86.231	-	0.000	786.289

Remarks

E. Acquisition Strategy

A-10 OFP development efforts will be conducted organically by the 309th Software Maintenance Group (309 SMXG) at Ogden Air Logistics Complex, Hill AFB UT. The ADS-B, ARC-210 radio Crypto Mandate, SMART Triple Ejector Rack (TER) development for the Small Diameter Bomb (SDB) missionization efforts will be conducted by contractor and organically by the 309 SMXG. The A-10 FMT simulator OFP is managed by the Simulator Division at Wright-Patterson Air Force Base and is currently contractor-developed and integrated.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons	Project (Number/Name) 674809 / A-10 Squadrons
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
OFP Development 1st Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-
OFP Development 2nd Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-
OFP Development 3rd Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-
OFP Development 4th Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-
OFP Development 1st Qtr FY19 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	2.610	Nov 2018	-		-		-		-	Continuing	Continuing	-
OFP Development 2nd Qtr FY19 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	2.610	Jan 2019	-		-		-		-	Continuing	Continuing	-
OFP Development 3rd Qtr FY19 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	2.610	Apr 2019	-		-		-		-	Continuing	Continuing	-
OFP Development 4th Qtr FY19 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	2.616	Jun 2019	-		-		-		-	Continuing	Continuing	-
OFP Development 1st Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		2.610	Nov 2019	-		-		-	Continuing	Continuing	-
OFP Development 2nd Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		2.610	Jan 2020	-		-		-	Continuing	Continuing	-
OFP Development 3rd Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		2.610	Apr 2020	-		-		-	Continuing	Continuing	-
OFP Development 4th Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		2.610	Jun 2020	-		-		-	Continuing	Continuing	-
OFP Development 1st Qtr FY21 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Nov 2020	-		2.610	Continuing	Continuing	-
OFP Development 2nd Qtr FY21 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Jan 2021	-		2.610	Continuing	Continuing	-
OFP Development 3rd Qtr FY21 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Apr 2021	-		2.610	Continuing	Continuing	-
OFP Development 4th Qtr FY21 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Jun 2021	-		2.610	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 7				PE 0207131F / A-10 Squadrons				674809 / A-10 Squadrons								
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Subtotal			-	10.446		10.440		10.440		-		10.440	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
USAF (Multiple)	Various	Various : Various	-	9.242	Jan 2019	13.426		6.082		-		6.082	Continuing	Continuing	-	
Subtotal			-	9.242		13.426		6.082		-		6.082	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
USAF (OFF)	Various	Various : Various	-	3.049	Sep 2019	3.250	Sep 2019	3.213	Oct 2020	-		3.213	Continuing	Continuing	-	
Subtotal			-	3.049		3.250		3.213		-		3.213	Continuing	Continuing	N/A	
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
PMA	Various	Various : Various	-	4.800	Aug 2019	4.800		4.800		-		4.800	Continuing	Continuing	-	
Subtotal			-	4.800		4.800		4.800		-		4.800	Continuing	Continuing	N/A	
Project Cost Totals			Prior Years	27.537		31.916		24.535		-		24.535	Continuing	Continuing	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons	Project (Number/Name) 674809 / A-10 Squadrons
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons	Project (Number/Name) 674809 / A-10 Squadrons
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
OFP																												
Suite 10 - OFP Fields																												
ARC - 210 Crypto Mandate																												
Suite 11 - OFP System Design, Development and Flight Test																												
Suite 11 - OFP Fields																												
Suite 12 - OFP System Design, Development and Flight Test																												
Suite 12 - OFP Fields																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207131F / A-10 Squadrons	Project (Number/Name) 674809 / A-10 Squadrons
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>OFP</i>				
Suite 10 - OFP Fields	4	2021	4	2021
ARC - 210 Crypto Mandate	2	2019	4	2020
Suite 11 - OFP System Design, Development and Flight Test	2	2021	2	2022
Suite 11 - OFP Fields	2	2021	2	2023
Suite 12 - OFP System Design, Development and Flight Test	2	2022	3	2023
Suite 12 - OFP Fields	3	2023	3	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	182.190	193.013	223.437	0.000	223.437	229.066	157.064	128.717	127.869	Continuing	Continuing
672671: <i>F-16 Squadrons</i>	-	182.190	193.013	223.437	0.000	223.437	229.066	157.064	128.717	127.869	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The F-16 Fighting Falcon is the world's premier fixed-wing, high performance, single engine multi-mission fighter aircraft that comprises 48% of the AF fighter inventory. Operational since 1980, the F-16 has proven itself in combat in a variety of air-to-air and air-to-surface missions, such as, offensive and defensive counter-air, close air support, forward air control, air interdiction (day/night and all-weather) and Suppression of Enemy Air Defenses (SEAD)/destruction of enemy air defenses (DEAD). The F-16 remains the USAF's primary SEAD/DEAD platform. The aircraft has evolved its capabilities by capitalizing upon advancements made in computers, avionics systems, engines, and structures technologies to meet emerging warfighter requirements and combat current and evolving enemy threats. These computer processing and avionics upgrades are critical to building a modernized architecture that promotes current open, agile, and digital concepts to enable future technological growth of the F-16's capabilities well into the 2040s and beyond. Furthermore, the F-16 provides the capacity called for in the NDS by supplying the USAF the highest readiness rates at the lowest operating costs of any US fighter. The F-16 programs listed below also support the NDS's call to strengthen alliances by being the DoD's largest Foreign Military Sales (FMS) program servicing over 26 countries and growing. The funding described in this document directly maps to the NDS as it provides upgrades to the F-16 platform enabling the delivery of joint lethality in contested environments in the coming decades. The specific modification programs listed below directly contribute to accomplishing the mission objectives as described in the NDS.

Modification programs include: Operational Flight Program (OFP) development required to integrate new precision weapons, advanced targeting pods, improved avionics, hardware (HW) and software (SW) mods to meet Home Land Defense (HLD) Mission, DoD mandates, and maintain updates on the respective F-16 training simulators, and other hardware subsystems; EMD Hardware/Advanced capability improvements require funding to develop, test, and qualify, weapon systems, aircraft subsystems replaced or modified due to requirements changes, pre-planned product improvements (P3I), Diminishing Manufacturing Sources (DMS) and parts obsolescence; Modular Mission Computer (MMC) Upgrade/Display Generator Upgrade resolves shortfalls in mission computer memory and throughput brought on by the addition of incremental combat capability addresses cyber-security and includes Non-Recurring Engineering (NRE), design, development, integration, and ground/flight test for fielding; F-16 Training Simulator updates enable the USAF to exercise/train using the most current F-16 OFP available to all block configurations, to include both aircrew and maintenance trainers; Joint Air-to-Surface Standoff Missile-Extended Range (JASSM-ER) on F-16 aircraft, and includes NRE, test assets, SEEK EAGLE, integration, and flight test; Comm Suite Radio Upgrade (CSU) improved satellite communication (SATCOM) radio upgrade with Mobile User Objective System (MUOS) capability to meet next-gen tactical narrow band SATCOM with better crypto capabilities; an Active Electronically Scanned Array (AESA) Radar capable on all blocks that offers enhanced lethality, advanced electronic protection capabilities, as well as, improved reliability and maintainability on F-16 aircraft; Multi-functional Information Distribution System-Joint Tactical Radio System (MIDS-JTRS) provides a real-time, jam resistant and secure information system for the transfer of combat data, voice and navigation information between widely dispersed battle elements; Hybrid Flight Control Computer (HFLCC) Auto Ground Collision Avoidance System (AGCAS) development and integration prevents most controlled flight into terrain (CFIT) accidents using terrain database and prediction algorithms for aircraft trajectory recovery and executes an automated fly-up maneuver to avoid collision; Advanced Identification Friend or Foe (AIFF-Mode5) on F-16 aircraft provides improved

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>
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airspeed and location info to ground stations and other equipped aircraft in vicinity; Digital Radar Warning Receiver (DRWR) improves existing radar warning receiver performance and Electronic Warfare (EW) threat detection range, azimuth, detection time, and allows reduction of radio frequency compatibility (RFC) issues with other on board transmitters.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-16 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2019 Air Force penalty total is \$50.0M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	185.864	193.013	186.850	0.000	186.850
Current President's Budget	182.190	193.013	223.437	0.000	223.437
Total Adjustments	-3.674	0.000	36.587	0.000	36.587
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.674	0.000			
• Other Adjustments	0.000	0.000	36.587	0.000	36.587

Change Summary Explanation

FY19: \$3.674M net decrease, SBIR reduction.

FY21: \$36.587M net increase, including +\$70.376M DRWR, +\$0.171M Comm Suite, -\$9.844M Simulator Training Program Re-Phase, -\$2.247M Flight Test, -\$17.445M AESA Radar, -\$4.263M MMC/PDG, and -\$0.161M OFF.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: OFP Updates on all F-16 aircraft	99.283	86.110	87.858
Description: OFP tapes are updated continually to integrate new weapons, targeting pods, and improved avionics.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Both M-Series and Software Capability Upgrade (SCU) programs enable the design and coding of software for integration efforts. OFPs are required to integrate new precision weapons, advanced targeting pods, improved avionics, and hardware and software modifications to meet DoD mandates and build a modern avionics architecture in order to keep the F-16 current. OFP enhancements enable the F-16's ability to operate in contested environments and defend the homeland, which directly maps to NDS requirements. The OFPs are developed organically by the 309th Software Engineering Group (SWEG) at Hill AFB, UT. Systems Integration Labs (SIL) are required to integrate software into the host hardware and validate user requirements and check out system safety and security prior to release to flight test.</p> <p>The OFP effort also contains Program Management Administration (PMA) support activities to include travel, office supplies, training courses, Video Teleconferencing (VTC) and support contractors.</p> <p>FY 2020 Plans: Per approved OFP Inc I ADM (29 Apr 19), OFPs will be released at a cadence not to exceed 30 months, providing greater flexibility to release on demand working with the customers. With this in place, the following is the projected release schedule for F-16 OFPs. Release M7.2+ to field in early CY2020. Begin M7.3/M8.03 SIL & combined Developmental Flight and Operational Flight test. Continue M8.1 software development. Continue to update M-Series requirements for future OFPs through Warfighter Council. SCU10 will field late CY2020. M/SCU are continuing to pursue Agile Software Development Transformation to improve software delivery to the warfighter.</p> <p>FY 2021 Plans: Field M7.3/M8.0.3 and continue development of M8.1 and SCU 11.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase based on cost estimate/inflation.</p>				
<p>Title: Flight Test</p> <p>Description: Development Test and Evaluation (DT&E) at Edwards AFB and Development Test/Operational Test (DT/OT) at Eglin AFB, Edwards AFB, Nellis AFB, and Air National Guard Air Force Reserve Test Center (AATC), including integration tests of associated subsystems and weapons, as well as, maintain test schedule for F-16 MMC OFPs, weapons integration, Radio Frequency compatibility (RFC), and sub-systems to ensure capabilities meet CAF's fielding schedule.</p> <p>FY 2020 Plans: Increase support of DT&E infrastructure to account for growing test requirements from new modification programs.</p>		16.845	14.613	15.675

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Initiate combined Developmental flight and Operational flight test with M7.3/M8.03 OFP (M7.2+ baseline running on MMCU legacy cards with basic Ethernet load, MIDS-JTRS (if not fielded with M7.2+) and SCU OFP, Correlation (small fixes), and AESA. Phase 3 - Step 1, SATURN and RFC, and support out-of-cycle regression testing.</p> <p>FY 2021 Plans: Increase support of DT&E infrastructure to account for growing test requirements from new modification programs. Initiate combined Developmental flight and Operational flight test with M7.3/M8.03 OFP (M7.2+ baseline running on MMCU legacy cards with basic Ethernet load, MIDS-JTRS (if not fielded with M7.2+) and SCU OFP, Correlation (small fixes), AESA. Phase 3 - Step 1, SATURN and RF Compatibility), and support out-of-cycle regression testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to cost estimate/inflation.</p>				
<p>Title: EMD HW/Advanced Capabilities Improvements</p> <p>Description: Advanced Capability Improvements includes, but not limited to sensor upgrades, Radar updates and other self-protection/electronic protection (EP) enhancements, 4th/5th gen fighter network communications, Radio Frequency (RF) compatibility, requirements analysis and studies analysis, lab and/or on-aircraft evaluation of potential subsystem changes/capability improvements.</p> <p>FY 2020 Plans: Continue support to develop, test, and qualify aircraft weapons systems including F-16 subsystems replaced or modified due to requirements changes, P3I, DMS and/or parts obsolescence. Radio Frequency Compatibility (RFC) development efforts to minimize and understand the EMI on the F-16.</p> <p>FY 2021 Plans: Continue support to develop, test, and qualify aircraft weapons systems including F-16 subsystems replaced or modified due to requirements changes, P3I, DMS and/or parts obsolescence. Radio Frequency Compatibility (RFC) development efforts to minimize and understand the EMI on the F-16.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to re-phasing of requirements.</p>		0.000	0.010	0.200
<p>Title: MMC Upgrade / Display Generator Upgrade on F-16 aircraft</p> <p>Description: The MMC upgrade on the F-16 post-block aircraft, (Blk 40, 42, 50, 52) resolves shortfalls in mission computer memory and throughput. Funding includes NRE, design, development, integration, and ground/flight test for fielding of improved MMC capabilities with the M8.0.3 OFP and fielding of PDG upgrade with the M8.1 OFP. The addition of an Ethernet High Speed</p>		14.298	11.587	5.846

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Data Network (HSDN) facilitates future increments of combat capability with the OFP and system compatibility/interoperability (e.g., digital targeting pod video).</p> <p>The Programmable Display Generator (PDG) upgrade allows a fully integrated multifunction display solution including Hands On Throttle and Stick (HOTAS) integration with Sensor of Interest (SOI), format swapping and high definition video on 4x4 displays; provides improved display formats during dynamic maneuvers; resolves symbol freezing issues due to throughput constraints; and provides a sustainable approach to address growing DMS concerns with the current Programmable Display Generator.</p> <p>Both the MMC and PDG directly map to the NDS as critical enabling technologies required for the F-16 to operate in contested environments and defend the homeland. Additionally, MMC upgrade, PDG upgrade, and High Speed Data Network make up critical elements to building a modern F-16 avionics architecture while promoting current technology concepts of open, agile, and digital.</p> <p>FY 2020 Plans: Continue NRE activities for HSDN, MMC Upgrade and PDG Upgrade for design, development, integration, deliver test assets for SIL and flight test for fielding with the M8.0.3 and 8.1 OFPs.</p> <p>FY 2021 Plans: Continue NRE activities for HSDN, MMC Upgrade and PDG Upgrade for design, development, integration, deliver test assets for SIL and flight test for fielding with the M8.0.3 and 8.1 OFPs.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease based on re-phase of requirements.</p>				
<p>Title: Simulator Trainers Program</p> <p>Description: F-16 Simulator Training Programs (Simulators) supports the development, acquisition, fielding and integration of F-16 Simulators. Enables the USAF to exercise and train using the latest F-16 capabilities available to multiple aircraft configurations, while reducing the overall cost of maintenance and aircrew training. In order to maintain concurrency with the aircraft OFP, this funding support development, test and integration of simulator upgrades. Funds may be used to address emerging and short notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative. This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-16 weapon system capability.</p> <p>FY 2020 Plans:</p>		13.323	9.894	4.469

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Continue contract efforts for managing and maintaining F-16 simulator trainers, to include tech order development. This funding also supports development, test, and integration of simulator upgrades to include new aircraft OFPs. Begin supporting development efforts for the F-16 MTC trainer.</p> <p>FY 2021 Plans: Continue contract efforts for managing and maintaining F-16 simulator trainers, to include tech order development. This funding also supports development test, and integration of simulator upgrades to include new aircraft OFPs. Supporting development efforts for the F-16 STP trainers.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease based on re-phase of requirements.</p>				
<p>Title: AIFF Mode 5</p> <p>Description: Modify Pre-Block F-16's with Advanced Identification Friend or Foe (AIFF) to comply with DOD Mode 5 mandate. AIFF system provides positive identification for Air Traffic Control reporting, combat targeting, and fratricide prevention</p> <p>FY 2020 Plans: Initiate development and testing efforts and contract award for hardware, software, and firmware updates to the Combined Interrogator Transponder (CIT) and GPS card on F-16 aircraft to resolve DMS issues.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease based on phasing of requirements.</p>		-	2.250	0.000
<p>Title: AESA Radar</p> <p>Description: This is a continuation of the Active Electronically Scanned Array (AESA) Radar congressional add funding line in FY16 and FY17. The AESA Program provides an upgrade from the current APG-68 system to an AESA radar that offers advanced electronic protection capabilities as well as improved reliability and maintainability to support the Aerospace Control Alert (ACA) mission for Homeland Defense (HLD) and includes the Phase III development for full capability development document (CDD) implementation, as well as Radio Frequency (RF) compatibility with other systems. This program directly maps to the NDS as it provides the most critical upgrade to the F-16's ability to successfully defend the homeland against attack.</p> <p>FY 2020 Plans:</p>		1.994	59.149	38.842

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Continue Phase I & II JEON fielding; continue Phase III development efforts for full CDD radar capabilities. FY 2021 Plans: Conclude Phase I & II JEON fielding; continue Phase III development efforts for full CDD radar capabilities. (Increase Statement): Increase based on warfighter addition of 150 radars to Phase III plan. FY 2020 to FY 2021 Increase/Decrease Statement: Decrease based on phasing of Phase 3 full CDD development and test asset buy schedule				
Title: Comm Suite Radio Upgrade Aircraft Description: Provides mandatory CJCS updates to the ARC-210 satellite communication (SATCOM) radios on F-16 aircraft including Second Generation Anti-Jam Tactical radio for NATO (SATURN) with Mobile User Objective System (MUOS) and improved crypto capability and the addition of a Cockpit Communication Control Panel (C3PO), and Digital Comm Matrix (DCM). FY 2020 Plans: Continue NRE efforts for integration and Group A development, procure Group B test assets. FY 2021 Plans: Continue NRE efforts, procure Group B test assets. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to cost estimate/program phasing and ramp down of development.		0.000	3.899	0.171
Title: Digital Radar Warning Receiver Description: Digital Radar Warning Receiver improves on existing radar warning receiver performance and improves Electronic Warfare (EW) threat detection range. The DRWR program also facilitates Radio Frequency Compatibility (RFC) with associated systems. This program includes execution of a Section 804 Rapid Prototyping effort to evaluate next-gen electronic warfare options that meet the DRWR requirements as part of a DRWR performance risk mitigation effort. This program is necessary for the F-16 to meet the NDS requirement of operating in current and future contested environments. This digital radar warning receiver upgrade provides improved radio frequency threat situational awareness to aircrew, and increases the performance in dense signal areas of operation as seen within contested environments. FY 2020 Plans: Continue efforts for Digital Radar Warning Receiver, continue NRE efforts for Group A and Group B Hardware for all components of the DRWR which includes millimeter wave (mmW), continue DRWR Software and any associated OFP updates. Seek CDR approval. Prepare for Trial Vehicle Install (TVI) on Blk 50C. Initiate Force Development Evaluation (FDE) Flight testing. Build kits for TVI installs. Expand mission data file (MDF) lab and complete test bench. RFC will have prototype hardware, F-16 SIL		32.719	3.001	70.376

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
testing with DRWR and AESA and Blk 42C aircraft TVI and flight testing. Section 804 will have prototype hardware available to complete Integrated Defense Avionics Laboratory (IDAL) and Electronic Warfare Avionics Integrated Support Facility (EWAISF) demonstrations. FY 2021 Plans: Continue NRE efforts to complete remaining Group A (Blk 40/42C, All D models, Blk 25C & D) designs and finalize Group B Hardware (EMI CE-102 & DMS ECP). DRWR Software and associated OFPs to be released upon successful FDE. Blk 30/32C and Blk 50/52C Kit-proofs. Receive Milestone C approval. Section 804 will have prototype hardware available to complete a Chamber test. FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to cost estimate/rephrase of program requirements.				
Title: Multifunctional Information Distribution System Joint Tactical Radio System (MIDS-JTRS) Description: Multifunctional Information Distribution System Joint Tactical Radio System (MIDS-JTRS) provides real time, jam-resistant and secure information system for the transfer of combat data, voice and navigation information between widely dispersed battle elements. MIDS-JTRS enhances situational awareness by exchanging digital data over a common communication link that is continuously and automatically updated in real time. Additionally MIDS-JTRS's enhanced capabilities provide concurrent multi-netting which enables Link 16 by adding capability to receive four messages in a single time slot and allows for greater network design flexibility along with concurrent contention receive capabilities and J-voice. The F-16 MIDS-JTRS effort is developing Ethernet connectivity within the terminal. This program maps to the NDS by providing crypto modernization for tactical networks and more secure command and control, which enable increased interoperable communications across the joint force. This critical communications capability generates a more lethal force to defeat enemies and achieve sustainable outcomes that protect the American people and vital US interests. FY 2020 Plans: N/A FY 2021 Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to cost estimate/program phasing and completion of development.		3.728	2.500	0.000
Accomplishments/Planned Programs Subtotals		182.190	193.013	223.437

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item F01600: <i>F-16 Aircraft Modifications</i>	267.424	281.476	615.760	-	615.760	625.394	640.375	567.791	636.898	Continuing	Continuing
• APAF 07 Line Item F0160P: <i>F-16 Post Production Support</i>	4.918	11.402	14.163	-	14.163	10.664	9.128	9.611	10.285	Continuing	Continuing
• APAF 06 Line Item <i>F01600: F-16 Initial Spares</i>	11.223	30.463	27.930	-	27.930	41.796	17.534	21.076	21.648	Continuing	Continuing

Remarks

E. Acquisition Strategy

The F-16 Program acquisition strategy is to improve capability, maintenance and safety mods through OFP development/flight test, enhanced weapons integration, structural upgrades, and simulator concurrency.

F-16 OFP SW updates will continually bring new capabilities to the warfighter. OFP SW development effort is now completely developed at Hill AFB (309 SWEG). Numerous Integration contracts (CPFF, FFP) are required to allow for Improved Avionics, Weapon, AIFF Mode 5, MIDS-JTRS integration to successfully field with each OFP.

MMC Upgrade awarded to Raytheon on 22 Nov 2016. PDG Upgrade awarded to General Dynamics Mission Systems on 17 Apr 2017. The EMD HW/Advanced capability improvements will develop, test, and qualify aircraft weapons systems, including subsystems and uses various contract types (Cost Plus and Fixed Price).

The Active Electronically Scanned Array (AESA) Joint Emergent Operational Need (JEON) contract for development and production of the APG-83 radar awarded to Northrop Grumman on 31 May 2017. The US Government is the prime integrator and a separate contract is established for Lockheed Martin to provide integration support.

AIFF Mode 5 program uses numerous contracts for DMS resolution, integration, production, support and installs. Funding will be awarded on the following contracts: Harness IDIQ, Bracket IDIQ, Falcon 2020, Mode 5 IDIQ, and SASSM/EGI IDIQ.

Automatic Ground Collision Avoidance System (AGCAS) development will accomplish test and evaluation of the AGCAS system on F-16 Block 25/30/32 aircraft. Contracts with LM, flight test, and engineering contractor were awarded in 2018.

DRWR is organically being integrated on the F-16 by F-16 System Program Office (AFLCMC/WWM) and the Electronic Warfare and Avionics (EW&A) System Program Office (AFLCMC/ WNY) at Robins AFB, GA. The ALR-69A production contract (managed by AFLCMC/WNY) was awarded on 30 March 2018 to Raytheon, Goleta, CA (CAGE CD 06129).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>	

The ALR-69A software is organically managed by AFLCMC/WNY utilizing the 579 SWES (Software Maintenance) team and the OEM Raytheon, Goleta, CA. The ALR-69A hardware is sustained by the 408 SCMS (Supply Chain) and 402 AMXG (Hardware Maintenance) at Robins AFB, GA.

Flight Test requires both organic test range support and various contract support for integration test of F-16 subsystems to ensure capabilities meet CAF fielding schedule, which includes Radio Frequency Compatibility (RFC).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207133F / F-16 Squadrons	Project (Number/Name) 672671 / F-16 Squadrons
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
OFP Updates on F-16 aircraft	Various	309th SMG : Hill AFB, UT	-	86.221	Oct 2018	73.369	Oct 2019	74.484	Oct 2020	-		74.484	Continuing	Continuing	-
MMC Upgrade / Display Generator Upgrade	Various	Various : Various	-	14.298	Dec 2018	3.837	Nov 2019	5.846	Nov 2020	-		5.846	Continuing	Continuing	-
EMD HW / Advanced Capabilities	Various	Various : Various	-	-		0.200	Aug 2020	0.200	Aug 2021	-		0.200	Continuing	Continuing	-
Simulator Trainers	Various	Various : Various	-	13.323	Jan 2019	14.594	Nov 2019	4.469	Nov 2020	-		4.469	Continuing	Continuing	-
AESA Radars	Various	Various : Various	-	1.994	Feb 2019	65.149	Nov 2019	38.842	Nov 2020	-		38.842	Continuing	Continuing	-
Digital Radar Warning Receiver	Various	Various : Various	-	32.719	Sep 2019	0.001	Mar 2020	70.376	Mar 2021	-		70.376	Continuing	Continuing	-
Comm Suite Radio Upgrade	Various	Various : Various	-	-		5.099	Jan 2020	0.171	Jan 2021	-		0.171	Continuing	Continuing	-
MIDS JTRS	Various	Various : Various	-	3.728	Sep 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	152.283		162.249		194.388		-		194.388	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Flight Tests	Various	Various : Various	-	16.845	Nov 2018	17.613	Jan 2020	15.675	Jan 2021	-		15.675	Continuing	Continuing	-
Subtotal			-	16.845		17.613		15.675		-		15.675	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>	Project (Number/Name) 672671 / <i>F-16 Squadrons</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
<i>F-16 Development Efforts</i>																												
MMC Upgrade Trial Vehicle Install C Model								■																				
M7.2 OFP Field			■	■																								
Communication Suite Upgrade Pre-block Fielding																												
AESA JEON Initial Fielding			■	■																								
Digital Radar Warning Receiver Flt Test Complete								■																				
SCU 11 OFP Fielding			■	■																								
Digital Radar Warning Receiver Fielding Recommendation																■												
M7.3/8.03 OFP Fielding												■																
M8.1 OFP Fielding																												■

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207133F / <i>F-16 Squadrons</i>	Project (Number/Name) 672671 / <i>F-16 Squadrons</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>F-16 Development Efforts</i>				
MMC Upgrade Trial Vehicle Install C Model	3	2020	3	2020
M7.2 OFP Field	3	2019	1	2020
Communication Suite Upgrade Pre-block Fielding	4	2021	4	2025
AESA JEON Initial Fielding	4	2019	4	2021
Digital Radar Warning Receiver Flt Test Complete	3	2020	1	2021
SCU 11 OFP Fielding	1	2020	2	2023
Digital Radar Warning Receiver Fielding Recommendation	2	2022	2	2022
M7.3/8.03 OFP Fielding	3	2021	4	2021
M8.1 OFP Fielding	4	2024	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207134F / <i>F-15E Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	196.035	684.229	298.908	0.000	298.908	243.462	199.320	73.884	2.098	Continuing	Continuing
670131: <i>F-15 Advanced Development</i>	0.000	0.000	67.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	67.400
676020: <i>F-15</i>	0.000	196.035	616.829	298.908	0.000	298.908	243.462	199.320	73.884	2.098	Continuing	Continuing

A. Mission Description and Budget Item Justification

The F-15 is the most versatile fighter in the world today. The F-15C/D continues to provide air superiority with an undefeated and unmatched aerial combat record. The F-15E retains this air superiority capability and adds systems, such as advanced imaging and targeting systems, to meet the requirement for all-weather, deep-penetration, and night/under-the-weather, air-to-surface attack. Configured with conformal fuel tanks (CFTs), the F-15E deploys worldwide with minimal tanker support and arrives combat-ready. A mainstay in operations both domestic and abroad, a refresh of older F-15C/D aircraft with the F-15EX and upgrades to newer F-15C/D aircraft and F-15E aircraft (avionics, armament, airframe, and engines) are critical to maintaining combat viability (lethality, survivability, and supportability) in support of the 2018 National Defense Strategy. Projected to remain in service past 2040, avionics modernization is key to long-term weapon system viability. This modernization is built on a foundation of technical and acquisition support studies (both internal to the Air Force and through outside contractors), forestalling obsolescence, exploiting proven technological advances, and leveraging new technology. Major avionics upgrades center around radar modernization (both hardware and software upgrades) and the exploitation of enhanced capability via precision timing, data delivery and processing technology, precision registration systems, cockpit Heads Up Display (HUD) and Heads Down Display, instrumentation digitization and modernization, central computer processing power increases, digital mission event recording systems and an infrared (IR)-based fire control system. The proliferation of fourth-generation enemy aircraft and sophisticated "double-digit" anti-aircraft missile systems pose a significant threat to F-15 survivability. A fully integrated electronic warfare suite holds the promise of providing survivability as well as expanded electronic attack capability. Nearly all improvements are linked to an aircraft operational flight program update schedule that works to integrate new capabilities with the airframe. These updates are a responsive way to increase the offensive and defensive capability and survivability of the F-15. Incorporation of corresponding spiral and/or phased technology/equipment improvements that include support equipment, mission planning systems, and training device upgrades will improve performance, supportability, and aircrew training. Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion, and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness. This includes technical and acquisition-related studies to ensure F-15 lethality and survivability beyond 2040.

The total F-15EX RTD&E funding for FY20 in the amount of \$431.8M resides in Program 0207134F Project 670131 (\$67.4M) and Project 676020 (\$364.4M). FY21 RDT&E funding resides in Program 0207146F.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-15 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in Program 0605831F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207134F / <i>F-15E Squadrons</i>
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This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	203.183	336.079	382.204	0.000	382.204
Current President's Budget	196.035	684.229	298.908	0.000	298.908
Total Adjustments	-7.148	348.150	-83.296	0.000	-83.296
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-16.250			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	364.400			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-7.139	0.000			
• Other Adjustments	-0.009	0.000	-83.296	0.000	-83.296

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 676020: *F-15*

Congressional Add: *ALQ-128a*

Congressional Add Subtotals for Project: 676020

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	48.243	0.000
	48.243	0.000
	48.243	0.000

Change Summary Explanation

FY20 Congressional Directed Reduction to Mobile User Objective System (MUOS) for unjustified growth. FY20 Congressional Directed Transfer to F-15EX from APAF for two test aircraft and non-recurring engineering. FY21 change due to F-15E Re-phase of -\$41.200M; an increase of \$9.902M for F-15E Large Area Display; -\$51.426 reduction to account for the availability of prior year execution balances; and Inflation Rate adjustment of -\$0.572.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 670131 / F-15 Advanced Development
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
670131: F-15 Advanced Development	0.000	0.000	67.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	67.400
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A refresh of the F-15C/D fleet is critical to maintaining combat viability (lethality, survivability, and supportability) in support of the 2018 National Defense Strategy. Older F-15C/D aircraft will be replaced to maintain a viable mix of 4th and 5th-generation fighters for the next 20+ years. The F-15EX will be based on the 2-seat F-15QA (Qatar) configuration upgraded with USAF only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. With two seats, it will be multirole-capable and operable by one or two aircrew. Many F-15C/Ds are beyond their service life and have SERIOUS structural risks, wire chafing issues, and obsolete parts. Readiness goals are unachievable due to continuous structural inspections, time consuming repairs, and on-going modernization efforts. The average F-15C/D is 36 years old with over 8,400 flight hours; the oldest F-15C was delivered in 1979. Logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

Funds may be used to manufacture aircraft, support equipment, and initial spares to support test activities; integrate hardware and software subsystems; upgrade training systems and systems integration labs; develop training materials and technical manuals; pursue other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities; resolve Diminishing Manufacturing Sources/ Material Shortages (DMSMS) and/or obsolescence issues; fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness; and cover other related requirements to manufacture and sustain the test aircraft.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-15 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2019 Air Force penalty total is \$50.0M. The calculated percentage reduction to each research, development, test and evaluation, and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: F-15EX	-	67.400	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 670131 / F-15 Advanced Development

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Additional F-15EX RDT&E FY20 funding in the amount of \$364.4M resides in Program 0207134F Project 676020. F-15EX will refresh the F-15C/D fleet with new aircraft based on the F-15QA Foreign Military Sales (FMS) configuration being sold to Qatar. The program will also incorporate USAF-only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software.</p> <p>FY 2020 Plans: Manufacture two F-15EX aircraft, support equipment, and initial spares to support test activities. Initiate integration of USAF Suite 9.1 Operational Flight Program (OFP) into F-15QA avionics configuration plus the Eagle Passive Active Warning and Survivability System (EPAWSS). Upgrade training systems and systems integration labs; develop training materials and technical manuals; and pursue other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities.</p> <p>FY 2021 Base Plans: Continue OFP integration efforts, including merging F-15EX-unique software back into the common F-15 OFP in Suite 9.2. Continue upgrading training systems and systems integration labs; developing training materials and technical manuals; and pursuing other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding is located in Program 0207146F Project 670131.</p>					
Accomplishments/Planned Programs Subtotals	-	67.400	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 01 F015E0: F-15EX	-	621.100	-	-	-	-	-	-	-	0.000	621.100
• APAF 01 F015EX: F-15EX	-	-	1,403.347	-	1,403.347	1,346.652	1,502.155	2,217.670	2,226.026	Continuing	Continuing
• RDTE 07 0207146F: F-15EX	-	-	159.761	-	159.761	-	-	-	-	0.000	159.761

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / <i>F-15E Squadrons</i>	Project (Number/Name) 670131 / <i>F-15 Advanced Development</i>
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D. Acquisition Strategy

The F-15EX design will be based on the F-15QA (Qatar) configuration upgraded with USAF-only capabilities like the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. Since most subsystems are projected to be mature when required for integration into the F-15EX, the acquisition strategy is deemed low risk. To rapidly field the F-15EX, the USAF plans to focus engineering activities on integrating existing systems and ramping up the production line capacity. Test activities will likewise be tailored to focus on integration of F-15QA, EPAWSS, and the Suite 9.1 OFP, taking appropriate credit for previous USAF and FMS testing. Finally, logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 670131 / F-15 Advanced Development
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
F-15EX	Various	Various : Various	0.000	-		57.700	Jun 2020	-		-		-	0.000	57.700	-
Subtotal			0.000	-		57.700		-		-		-	0.000	57.700	N/A

Remarks
The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, telemetry kits, etc. that are required to meet each program's objectives. The execution vehicles between these DoD entities vary by effort.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Flight Test	Various	Eglin : Various	0.000	-		1.500	Jun 2020	-		-		-	0.000	1.500	-
Subtotal			0.000	-		1.500		-		-		-	0.000	1.500	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFLCMC CIV Pay	Various	AFLCMC CIV PAY : WPAFB & Robins AFBs	0.000	-		6.600	Oct 2019	-		-		-	0.000	6.600	-
Program Management Administration	Various	Various : Various	0.000	-		1.600	Oct 2019	-		-		-	0.000	1.600	-
Subtotal			0.000	-		8.200		-		-		-	0.000	8.200	N/A

			Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	-		67.400		-		-		-	0.000	67.400	N/A

Remarks
Boeing may make pre-contract investments to further accelerate initial aircraft deliveries.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / <i>F-15E Squadrons</i>	Project (Number/Name) 670131 / <i>F-15 Advanced Development</i>	

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>F-15EX</i>	
F-15EX NRE and Integration	[REDACTED]
F-15EX Test Aircraft	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / <i>F-15E Squadrons</i>	Project (Number/Name) 670131 / <i>F-15 Advanced Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>F-15EX</i>				
F-15EX NRE and Integration	3	2020	4	2023
F-15EX Test Aircraft	3	2020	2	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons				Project (Number/Name) 676020 / F-15			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676020: F-15	0.000	196.035	616.829	298.908	0.000	298.908	243.462	199.320	73.884	2.098	Continuing	Continuing
Quantity of RDT&E Articles	-	-	2	-	-	-	-	-	-	-		

Note

Due to congressional language, two (2) F-15EX aircraft were moved from Procurement to RDT&E.

A. Mission Description and Budget Item Justification

These development efforts include F-15 Radar Enhancements Electronic Protection (EP) capabilities, Operational Flight Program (OFP) upgrades, Flight Testing, Infrared Search and Track (IRST), Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS) and Mobile User Objective System (MUOS)/Second Generation Anti-jam Tactical UHF Radio for NATO(SATURN). Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

The Radar Enhancements (EP) will upgrade the digital Active Electronic Scanned Array (AESA) radar capabilities to counter sophisticated electronic threats. Prior OFP's introduced EP into the C/D-model fleet. Initial EP capability for APG-82(V)1 equipped E model aircraft took place in Suite 8E. Suite 9 and beyond will add additional EP capability to both the F-15E and F-15C.

For the F-15 to maintain operational effectiveness, the program must continuously provide the platforms with improved capabilities. To accomplish this there is an on-going need to develop software and hardware upgrades and to flight test new capabilities and systems. The OFP funding line is transiting the Air Force to an annual software release to counter the speed of technology and maintain a competitive advantage. Additionally, the OFP provides the path for integration for other activities into operations. At any one time, there will normally be three OFP upgrades in work: one in requirements definition/pricing, one in code writing and test, and one in flight test and release preparation. The Flight Test funding line allows the Air Force to fund the on-going test effort.

Infrared Search and Track (IRST) system will provide air to air detection, tracking and ranging capability for F-15C/D in a radar-contested environment.

Mobile User Objective System (MUOS)/Second Generation Anti-jam Tactical UHF Radio for NATO(SATURN) will provide Satellite Communications (SATCOM) capable Air Force F-15C/D/E aircraft the ability to communicate on the Mobile User Objective System (MUOS) constellation in support of a NORTHCOM Airspace Control Alert (ACA) requirement. SATURN will replace the Have Quick II and comply with the NSA lease key mandated dates.

Automatic Dependent Surveillance-Broadcast (ADS-B) provides Air Traffic Control position and other secondary surveillance data and must be installed on all CONUS aircraft by 2020 IAW FAA mandate.

Data Transfer Module II (DTM II) is an upgraded replacement for the obsolete and outdated data transfer device currently in the F-15. DTM is 30 years old and out of storage capacity. DTM II will provide improved mission planning capability, updated interfaces, replace an aging map system, and meet growing security requirements.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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Advanced Crew Station contains high resolution digital color large area displays; these will replace the current antiquated monochrome displays. These upgraded displays enable accurate distinction and identification of targets, decrease risk of frat/missed targeting, and enable full utilization of radar capability that significantly enhances situational awareness.

ALQ-128a will replace the legacy ALC-128 design and includes development and integration of a re-designed ALQ-128a Electronic Warfare Warning Set (EWWS).

A refresh of the F-15C/D fleet is critical to maintaining combat viability (lethality, survivability, and supportability) in support of the 2018 National Defense Strategy. Older F-15C/D aircraft will be replaced to maintain a viable mix of 4th and 5th generation fighters for the next 20+ years. The F-15EX will be based on the 2-seat F-15QA (Qatar) configuration upgraded with USAF only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. With two seats, it will be multirole-capable and operable by one or two aircrew. Many F-15C/Ds are beyond their service life and have SERIOUS structural risks, wire chafing issues, and obsolete parts. Readiness goals are unachievable due to continuous structural inspections, time consuming repairs, and on-going modernization efforts. The average F-15C/D is 36 years old with over 8,400 flight hours; the oldest F-15C was delivered in 1979. Logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure. Funding supports procurement of two (2) F-15EX aircraft and associated support equipment, training system upgrades and materials, depot stand-up planning, initial spares, and other related items to manufacture the aircraft, provide operational conversion (from F-15C/D to F-15EX) support, and meet logistics and sustainment requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-15 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Operational Flight Program (OFP) Development Efforts</p> <p>Description: Provides OFP program software and hardware updates to integrate new capabilities on all F-15 aircraft. This includes technical and acquisition related studies.</p> <p>FY 2020 Plans: Continue Suite 9 development and integration of major line items, such as Data Transfer Module (DTM) II, Advanced Crew Station (ACS), Passive Attack Display (PAD), Eagle Passive/Active Warning Survivability System (EPAWSS), Multi-functional Information Distribution System (MIDS) - Joint Tactical Radio System (JTRS) MIDS-JTRS, and implementing B61-12LEP (Life Extension Program); all on the new Advanced Display Core Processor (ADCP) II mission computer. Continuation of radar updates being delivered for the APG-63 and APG-82 radars, along with continuation of organic software support and Special Projects development efforts. Continuation of funding support for all F-15 trainers and ongoing Problem Report (PR) and Deficiency Report (DR) fixes. Continue work on Future OFP's. Perform technical and acquisition related studies to ensure F-15</p>	28.658	73.493	88.655	0.000	88.655

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>lethality and survivability beyond 2040. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p>FY 2021 Base Plans: Continue Suite 9 development and integration of major line items, such as Data Transfer Module (DTM) II, Passive Attack Display (PAD), Eagle Passive/Active Warning Survivability System (EPAWSS), Multi-functional Information Distribution System (MIDS) - Joint Tactical Radio System (JTRS) MIDS-JTRS, implementing B61-12LEP (Life Extension Program, F-15 EX, IRST (Infrared Search and track); all on the new Advanced Display Core Processor (ADCP) II mission computer. Continuation of radar updates being delivered for the APG-63 and APG-82 radars, along with continuation of organic software support and Special Projects development efforts. Continuation of funding support for all F-15 trainers and ongoing Problem Report (PR) and Deficiency Report (DR) fixes. Continue work on Future OFP's and award the Continuous Development & Integration (CD&I) contract to take advantage of industries cutting edge knowledge and providing greater flexibility and resilience to the F-15. Perform technical and acquisition related studies to ensure F-15 lethality and survivability beyond 2040. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities. Continue to support Program Management Activities in support of the OFP's and the F-15.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased because of a payback within the Air Force.</p>					
<p>Title: Flight Test</p> <p>Description: Flight test improvements. Baselined infrastructure and personnel support for F-15 Developmental Test (DT) and Operational Test (OT) operations. Purchased long-lead test support assets and unique aircraft test instrumentation. This included technical and acquisition related studies.</p> <p>FY 2020 Plans: F-15 Flight Test Support continues to provide contractor support cadre at Eglin and Nellis for DT/OT support, avionics integration, lab O&M, CTF O&M, and long-lead test unique equipment; i.e., program specific aircraft instrumentation, weapons instrumentation kits, data reduction/handling equipment. Repair test aircraft radar instrumentation. Continues design of replacement radar test aircraft obsolete instrumentation. Continue Richter Lab modernization and sustainment provisions, and acquisition of resources needed to maintain a robust test</p>	21.264	23.346	27.505	0.000	27.505

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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capability for the entire F-15 fleet going forward. Continue support to 896 TSS with additional manpower, to include prefabrication and surge capability, during increased F-15 modernization activity.

FY 2021 Base Plans:
F-15 Flight Test Support continues to provide contractor support cadre at Eglin and Nellis for DT/OT support, avionics integration, lab O&M, CTF O&M, and long-lead test unique equipment; i.e., program specific aircraft instrumentation, weapons instrumentation kits, data reduction/handling equipment. Repair test aircraft radar instrumentation. Continues design of replacement radar test aircraft obsolete instrumentation. Continue Richter Lab modernization and sustainment provisions, and acquisition of resources needed to maintain a robust test capability for the entire F-15 fleet going forward. Continue support to 896 TSS with additional manpower, to include prefabrication and surge capability, during increased F-15 modernization activity.

FY 2021 OCO Plans:
N/A

FY 2020 to FY 2021 Increase/Decrease Statement:
Funding increased due to additional flight test efforts.

Title: F-15 Radar Enhancements	45.831	69.523	69.728	0.000	69.728
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Description: Improvements to F-15 Radar Enhancements (EP). This includes technical and acquisition related studies.

FY 2020 Plans:
Implement EP into OFP's. Conduct Special Projects testing support. Analyze EP and Combat ID candidate risk reduction for future OFP integration. Study and analyze F-15 radar performance and utilization against current and future threat baselines. Develop and test radar technology candidates for future integration in accordance with ACC's F-15 roadmap and threat analysis. This includes technical and acquisition-related studies. Integrate efforts to ensure system wide acceptance of new hardware/software and desired capabilities.

FY 2021 Base Plans:
Continue implementation of EP into OFP's. Continue Special Projects testing support. Continue EP and Combat ID candidate risk reduction for future OFP integration. Continue to study and analyze F-15 radar performance and utilization against current and future threat baselines. Continue to develop and test radar technology candidates for future integration in accordance with ACC's F-15 roadmap and threat analysis.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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This includes technical and acquisition-related studies. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.

FY 2021 OCO Plans:
N/A

FY 2020 to FY 2021 Increase/Decrease Statement:
Funding increase due to inflation

Title: F-15 Infrared Search and Track (IRST)	45.376	18.272	32.735	0.000	32.735
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Description: The Infrared Search and Track (IRST) system provides F-15C/D/E/EX's with the capability to detect and track objects by infrared radiation. This capability complements the radar to enhance survivability and lethality against air-to-air threats, air-to-ground targeting, provides a passive infrared sensor system that searches for and detects infrared radiation, and provides the aircraft mission computer track file data on infrared targets. The IRST system further adds capability for the F-15 as a 4th generation fighter by supporting 5th/6th generation fighters to increase their lethality and survivability.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver IRST weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

FY 2020 Plans:
Continue integration of the Infrared Search and Track (IRST) system into the existing 7.2 OFP and future 9.2 OFP planning, EMD asset building and qualification, integration testing and flight test, and delivering initial low-rate production (LRIP). Continue integration of IRST with other F-15 advanced sensors. Continue efforts and planning to integrate future IRST capability into the next major block upgrade to ensure system wide acceptance of new hardware/software and desired capabilities.

FY 2021 Base Plans:
Continue integration with Suite 9.2

FY 2021 OCO Plans:
N/A

FY 2020 to FY 2021 Increase/Decrease Statement:

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding increased due to OFP 9.2 integration ramping up.					
<p>Title: Mobile User Objective System (MUOS)/Second Generation Anti-jam Tactical UHF Radio for NATO(SATURN)</p> <p>Description: Description: To enable F-15C/D/E's with MUOS/SATURN capability to replace the current UHF Follow-On (UFP) satellite system, the Have Quick II, and comply with the NSA Lease Key mandate dates.</p> <p>FY 2020 Plans: Continue with the integration into the OFP's. Purchase of any additional test assets not yet acquired. Begin and/or continue all required testing. Begin and/or continue the development of all kitting. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities. Begin/continue flight testing as necessary.</p> <p>FY 2021 Base Plans: Continue with the integration into the OFP's. Purchase of any additional test assets not yet acquired. Begin and/or continue all required testing. Begin and/or continue the development of all kitting. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities. Begin/continue flight testing as necessary.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased as program shifts to production.</p>	0.000	52.750	54.127	0.000	54.127
<p>Title: F-15 Multifunctional Information Distribution System - Joint Tactical Radio System (MIDS JTRS)</p> <p>Description: This upgrade integrates and installs a new Link 16 system on the F-15C & F-15E that complies with an NSA mandate on cryptographic modernization and an FAA mandate on frequency remapping. The FAA mandate requires all fielded Link-16 terminals incorporate the frequency re-mapping capability by 2025.</p> <p>FY 2020 Plans: Continue ESIL and Boeing flight test program. This includes technical and acquisition-related studies, oversee ESIL & flight test program. Monitoring, testing and incorporation of OFP fixes. System Verification Reviews on C & E model aircraft. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p>FY 2021 Base Plans:</p>	6.663	11.320	1.550	0.000	1.550

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue ESIL and Boeing flight test program. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to ramping down on integration costs as the program moves into production.					
Title: F-15 Advanced Crew Station (ACS) Description: Advanced Crew Station (ACS) contains high resolution digital color large area displays; these will replace the current antiquated monochrome displays. These upgraded displays enable accurate distinction and identification of targets, decrease risk of frat/misssed targeting, and enable full utilization of radar capability that significantly enhances situational awareness. This program element may include necessary civilian pay expenses required to manage, execute, and deliver Color Displays weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. FY 2020 Plans: Cockpit optimization studies used by ACS, began in FY19 and should complete FY20. Begin initial EMD activities for test facility LRUs, group A design, software updates, and purchasing long lead parts for test hardware. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities. FY 2021 Base Plans: Continue EMD activities for test facility LRUs, group A design, software updates, and purchasing long lead parts for test hardware. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase in development, testing and design, as well as integration into OFPs.	0.000	1.275	23.641	0.000	23.641
Title: F-15E Data Transfer Module II	0.000	2.450	0.967	0.000	0.967

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Data Transfer Module II will replace current low-memory, obsolescent data transfer system with an updated data transfer device that improves mission planning capability, updates interfaces, provides data encryption, delivers significant additional storage, and increases cyber security capability.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver DTM II weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>FY 2020 Plans: Procure flight test assets and initial group A kits. Begin software integration and testing to ensure system wide acceptance of new hardware/software and desired capabilities in both E and C model aircraft.</p> <p>FY 2021 Base Plans: Installs on flight test aircraft and begin flight test. Integration with S9.2 continuing.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in funding due to development and testing ending.</p>					
<p>Title: F-15EX</p> <p>Description: Additional F-15EX RDT&E FY20 funding in the amount of \$67.4 resides in Program 0207134F Project 670131. F-15EX will procure two (2) test aircraft to support the refresh of the F-15C/D fleet with new aircraft based on the F-15QA Foreign Military Sales (FMS) configuration being sold to Qatar. The program will also incorporate USAF-only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFF) software.</p> <p>FY 2020 Plans: Manufacture two F-15EX aircraft, support equipment, and initial spares to support test activities. Initiate integration of USAF Suite 9.1 Operational Flight Program (OFF) into F-15QA avionics configuration plus the Eagle Passive Active Warning and Survivability System (EPAWSS). Upgrade training systems and systems integration labs; develop training materials and technical manuals; and pursue other non-recurring engineering</p>	-	364.400	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities. FY 2021 Base Plans: Continue OFP integration efforts, including merging F-15EX-unique software back into the common F-15 OFP in Suite 9.2. Continue upgrading training systems and systems integration labs; developing training materials and technical manuals; and pursuing other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding is located in Program 0207146F Project 670131.					
Accomplishments/Planned Programs Subtotals	147.792	616.829	298.908	0.000	298.908

	FY 2019	FY 2020
Congressional Add: ALQ-128a FY 2019 Accomplishments: Program will replace the legacy ALQ-128 design which is no longer supportable, with a modern upgradeable architecture to provide automatic electronic warfare warning countermeasures and active jamming capability that can keep pace with modern threats. The design will incorporate a common architecture that can be integrated into multiple platforms including F-15C. Complete Engineering and Manufacturing Development (EMD) and Integration. FY 2020 Plans: N/A	48.243	0.000
Congressional Adds Subtotals	48.243	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 01 F015E0: F-15EX	-	621.100	-	-	-	-	-	-	-	0.000	621.100
• APAF 01 F015EX: F-15EX	-	-	1,403.347	-	1,403.347	1,346.652	1,502.155	2,217.670	2,226.026	Continuing	Continuing
• RDTE 07 0207146F: F-15EX	-	-	159.761	-	159.761	-	-	-	-	0.000	159.761

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item F01500: <i>F-15 Modification of In-Service Aircraft, PEs 0207130, 0207134, 0207445, 0809731</i>	338.622	311.873	516.771	-	516.771	199.348	216.004	206.004	-	Continuing	Continuing
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts (BP16)</i>	7.718	34.718	39.173	-	39.173	12.048	12.624	20.401	-	Continuing	Continuing
• APAF 07 Line Item F0150P: <i>F-15 Post Production Support</i>	52.271	43.356	101.711	-	101.711	54.283	17.164	17.473	-	Continuing	Continuing
• APAF 07 PE 0207040F: <i>Multi-Platform Electronic Warfare Equipment BPAC 190000</i>	10.000	-	-	-	-	-	-	-	-	0.000	10.000

Remarks

ALQ-128a is a Congressional Add.

D. Acquisition Strategy

The F-15EX design will be based on the F-15QA (Qatar) configuration upgraded with USAF-only capabilities like the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. Since most subsystems are projected to be mature when required for integration into the F-15EX, the acquisition strategy is deemed low risk. To rapidly field the F-15EX, the USAF plans to focus engineering activities on integrating existing systems and ramping up the production line capacity. Test activities will likewise be tailored to focus on integration of F-15QA, EPAWSS, and the Suite 9.1 OFP, taking appropriate credit for previous USAF and FMS testing. Finally, logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

Program is a continuation of effort which includes the development of all F-15 models. Funds are executed organically in support of equipment improvement, study, analysis, and test. Acquisition and management strategies for each program are independently developed and use a variety of contract methods and types to accomplish program objectives.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
F-15EX	Various	Various : Various	0.000	-		364.400	Jun 2020	-		-		-	0.000	364.400	-
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
OFP Suite 8/9/CD&I Development and Test	SS/ Various	Boeing : St. Louis, MO	0.000	28.658	Aug 2019	69.743	Mar 2020	81.060	Jun 2021	-		81.060	Continuing	Continuing	-
F-15 Radar Enhancement	SS/ Various	Boeing : St Louis, MO	0.000	45.831	Aug 2019	69.523	Aug 2020	69.728	Aug 2021	-		69.728	Continuing	Continuing	-
F-15 Infrared Search and Track	SS/ Various	Boeing : St Louis, MO	0.000	45.376	Feb 2019	18.272	Feb 2020	32.735	Feb 2021	-		32.735	Continuing	Continuing	-
Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS)	SS/ Various	Boeing : St. Louis, MO	0.000	6.663	Feb 2019	11.320	Feb 2020	1.550	Feb 2021	-		1.550	Continuing	Continuing	-
Service Life Extension Program (SLEP) Wing Replacement	TBD	Not specified. : NV	0.000	-		-		-		-		-	0.000	0.000	-
Cabin Pressure Indicator	TBD	TBD : Various	0.000	-		-		-		-		-	0.000	0.000	-
Mobile User Objective System (MUOS) /Second Generation Anti-jam Tactical UHF Radio for NATO (SATURN)	C/CPAF	Boeing : St. Louis	0.000	0.000	Mar 2019	52.750	Jan 2020	54.127	Jan 2021	-		54.127	Continuing	Continuing	-
F-15E Advanced Crew Station	TBD	TBD : TBD	0.000	-		1.275	Oct 2019	23.641	Oct 2020	-		23.641	Continuing	Continuing	-
F-15E Data Transfer Module II	TBD	TBD : TBD	0.000	-		2.450	Jan 2021	0.967	Jan 2022	-		0.967	Continuing	Continuing	-
ALQ-128a	TBD	TBD : TBD	0.000	45.176		-		-		-		-	0.000	45.176	-
Subtotal			0.000	171.704		589.733		263.808		-		263.808	Continuing	Continuing	N/A

Remarks
 The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, telemetry kits, etc. that are required to meet each program's objectives. The execution vehicles between these DoD entities vary by effort.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Boeing (Contractor Test Support)	SS/CPFF	Boeing : St. Louis, MO	0.000	21.264	Aug 2019	23.346	Aug 2020	27.505	Aug 2021	-		27.505	Continuing	Continuing	-
Subtotal			0.000	21.264		23.346		27.505		-		27.505	Continuing	Continuing	N/A

Remarks
The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, telemetry kits, etc. that are required to meet each program's objectives. The execution vehicles between these DoD entities vary by effort.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Program Mgt Support Costs	Various	Various : Various	0.000	3.067	Sep 2019	3.750	Sep 2020	7.595	Sep 2021	-		7.595	Continuing	Continuing	-
Subtotal			0.000	3.067		3.750		7.595		-		7.595	Continuing	Continuing	N/A

Remarks
The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, telemetry kits, etc. that are required to meet each program's objectives. The execution vehicles between these DoD entities vary by effort.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	196.035	616.829	298.908	-	298.908	Continuing	Continuing	N/A

Remarks
Boeing may make pre-contract investments to further accelerate initial aircraft deliveries for F-15EX.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / F-15E Squadrons	Project (Number/Name) 676020 / F-15
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
F-15																												
F-15EX NRE and Integration																												
F-15EX Test Aircraft																												
OFP Continuous Development																												
OFP Integration and Test																												
OFP Suite 9 Fielding																												
OFP Suite 9.2 Fielding																												
OFP CD&I Development																												
OFP CD&I Release 1																												
OFP CD&I Release 2																												
OFP CD&I Release 3																												
Radar Enhancements Suite 9 Fielding																												
Infrared Search and Track Integration and Test																												
Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS) Development																												
ADS-B Contract Award																												
Mobile User Objective System (MUOS) Second Generation Anti-jam Tactical UUF Radio for NATO (SATURN) Study																												
ALQ-128a																												
Advanced Crew Station																												
Data Transfer Module II																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207134F / <i>F-15E Squadrons</i>	Project (Number/Name) 676020 / <i>F-15</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
F-15				
F-15EX NRE and Integration	3	2020	4	2023
F-15EX Test Aircraft	3	2020	2	2022
OFP Continuous Development	1	2019	4	2025
OFP Integration and Test	1	2019	2	2025
OFP Suite 9 Fielding	1	2019	3	2021
OFP Suite 9.2 Fielding	2	2020	3	2023
OFP CD&I Development	2	2021	4	2025
OFP CD&I Release 1	3	2021	3	2024
OFP CD&I Release 2	3	2023	3	2025
OFP CD&I Release 3	3	2024	3	2025
Radar Enhancements Suite 9 Fielding	1	2019	3	2021
Infrared Search and Track Integration and Test	1	2019	4	2023
Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS) Development	1	2019	2	2021
ADS-B Contract Award	3	2019	3	2019
Mobile User Objective System (MUOS) Second Generation Anti-jam Tactical UUF Radio for NATO (SATURN) Study	2	2019	4	2019
ALQ-128a	3	2019	3	2021
Advanced Crew Station	3	2020	4	2025
Data Transfer Module II	2	2020	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207136F / <i>Manned Destructive Suppression</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	13.609	15.521	14.960	0.000	14.960	16.094	16.383	16.677	16.984	Continuing	Continuing
674595: <i>F-16 HARM Targeting Sys</i>	-	13.609	15.521	14.960	0.000	14.960	16.094	16.383	16.677	16.984	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Manned Destructive Suppression (MDS) program funds the development and sustainment of the Air Force's Suppression of Enemy Air Defenses (SEAD) and Destruction of Enemy Air Defenses (DEAD) capabilities. The F-16 HARM Targeting System (HTS) is currently the only programmed reactive SEAD/DEAD capability and enables targeting the HARM missile in its most lethal 'range known' mode. The program provides F-16 Block 50/52 and Block 40/42 aircraft with the ability to employ the AN/ASQ-213 Pod. With the introduction of Pre-Planned Product Improvement (P3I) HTS Revision 7 in 2007, the AN/ASQ-213 Pod now has a precision geo-location capability to target Precision Guided Munitions (PGMs) to destroy fixed and mobile enemy air defense elements. Additionally, by relocating the AN/ASQ-213 HTS R7 Pod to the aircraft's left inlet hard point, the F-16 can simultaneously carry the HTS R7 Pod and an Advanced Targeting Pod (ATP). HTS R7 fielding is complete and represents the Air Force's near-term solution for reactive time-critical targeting for DEAD until this mission can be transferred to the F-35. HTS R7 derived precision targeting data can be provided to all Joint Forces via Link-16. This effort continues upgrades for the HTS and applies technologies similar to those demonstrated in the Advanced Tactical Targeting Technologies (AT3) program and HTS R7 development.

Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MDS weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207136F / <i>Manned Destructive Suppression</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	15.238	15.521	15.792	0.000	15.792
Current President's Budget	13.609	15.521	14.960	0.000	14.960
Total Adjustments	-1.629	0.000	-0.832	0.000	-0.832
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-1.200	0.000			
• SBIR/STTR Transfer	-0.429	0.000			
• Other Adjustments	0.000	0.000	-0.832	0.000	-0.832

Change Summary Explanation

FY 2019 reduction of \$1.200M for higher Air Force Priorities
 FY 2019 reduction of \$0.429M for SBIR
 FY 2021 reduction of \$0.832M for reduced mission planning requirements

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: P3I R7 Software Upgrade (SWUP)	13.609	13.721	14.060	0.000	14.060
Description: HTS SWUP risk reduction and software development Engineering and Manufacturing Development(EMD) efforts include software updates in support of F-16 OFP releases. These releases improve the capability of the pod in an evolving threat environment.					
FY 2020 Plans: HTS SWUP 3 continues from risk reduction to software development and preparation for flight testing. Risk reduction activities for subsequent SWUP 4 upgrades will continue and transition to EMD efforts. Mission support (i.e., program management for administrative and technical support) will continue. Future upgrades will continue.					
FY 2021 Base Plans:					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207136F I <i>Manned Destructive Suppression</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Begin fielding first increment of SWUP 3 and prepare for operational testing for second increment of SWUP 3. SWUP 4 EMD activities will continue. Mission support (i.e., program management for administrative and technical support) will continue. Future upgrades will continue. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to more planned SWUP activity in FY21; SWUP 4 EMD will be implemented in FY21.					
Title: Flight Test Description: Conducts test planning, requirements derivation, and post-test data analysis and reporting. Provides test organization support to include test aircraft operations, threat/test range control and associated support, air refueling, and post-mission support. Ground testing, such as anechoic chamber testing, will also be accomplished as necessary. FY 2020 Plans: Government flight test operations will continue for SWUP 3 and continue in planning for SWUP 4. This funding also includes baselining requirements from actual test data during recent flight testing. FY 2021 Base Plans: Government flight test operations will continue for SWUP 3 and SWUP 4. This funding also includes baselining requirements from actual test data during recent flight testing. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A	0.000	0.900	0.900	0.000	0.900
Title: Mission Planning Description: Joint Mission Planning System (JMPS). This effort includes continued development and testing of candidate upgrades and incremental engineering releases in support of HTS SWUP fielding. FY 2020 Plans:	0.000	0.900	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207136F / <i>Manned Destructive Suppression</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue mission planning in support of HTS SWUP 4 and future upgrades. FY 2021 Base Plans: N/A FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to no currently planned mission planning activities (no new SWUP candidates) scheduled for FY21.					
Accomplishments/Planned Programs Subtotals	13.609	15.521	14.960	0.000	14.960

D. Other Program Funding Summary (\$ in Millions)
 N/A

Remarks

E. Acquisition Strategy
 The HTS R7 Software Update Program (SWUP) is underway to keep the HTS pod capable in a growing threat environment. The SWUP 3 Risk Reduction (RR) contract was awarded in December 2015 as a Cost-Plus-Fixed-Fee (CPFF) contract type. The SWUP 3 RR development effort completed in March 2019.

The SWUP 3 Engineering & Manufacturing Development (EMD) and SWUP 4 RR contract awarded in April 2019 as a CPFF contract type and is a 36 month effort. The SWUP 3 EMD portion includes plans for two releases to the field, Builds A and B. The SWUP 4 RR portion will mature candidates for future software builds by addressing findings from the field, incorporating requested improvements from the warfighter, and implementing other software changes to keep the HTS pod updated and mission capable.

The SWUP 4 EMD contract is planned for award in March 2020. This contract plans for two releases to the field, Build A and Build B.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207136F / <i>Manned Destructive Suppression</i>	Project (Number/Name) 674595 / <i>F-16 HARM Targeting Sys</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HTS R7 SWUP/P3I	SS/CPFF	Raytheon Systems Co. : Tucson, AZ	-	11.574	Apr 2019	11.817	Apr 2020	12.130	Apr 2021	-		12.130	Continuing	Continuing	-
JMPS	SS/CPIF	Multiple : Multiple	-	-		0.900	May 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	11.574		12.717		12.130		-		12.130	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Test	PO	412 TW : Edwards AFB, CA	-	-		0.900	Aug 2020	0.900	Nov 2020	-		0.900	Continuing	Continuing	-
Subtotal			-	-		0.900		0.900		-		0.900	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	C/Various	Multiple : Eglin AFB, FL	-	2.035	Jul 2019	1.904	Jul 2020	1.930	Jun 2021	-		1.930	Continuing	Continuing	-
Subtotal			-	2.035		1.904		1.930		-		1.930	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals		-	13.609	15.521	14.960	-	-	14.960	Continuing	Continuing

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207136F / <i>Manned Destructive Suppression</i>	Project (Number/Name) 674595 / <i>F-16 HARM Targeting Sys</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Manned Destructive Suppression</i>																												
SWUP 3 Risk Reduction																												
SWUP 3 Build A																												
SWUP 3 Build B																												
SWUP 4 Risk Reduction																												
SWUP 4 Build A																												
SWUP 4 Build B																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207136F / <i>Manned Destructive Suppression</i>	Project (Number/Name) 674595 / <i>F-16 HARM Targeting Sys</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Manned Destructive Suppression</i>				
SWUP 3 Risk Reduction	1	2019	2	2019
SWUP 3 Build A	3	2019	3	2020
SWUP 3 Build B	3	2019	3	2021
SWUP 4 Risk Reduction	3	2019	2	2022
SWUP 4 Build A	3	2020	3	2022
SWUP 4 Build B	3	2021	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	563.635	546.298	665.038	0.000	665.038	597.965	556.771	637.390	614.470	Continuing	Continuing
674785: <i>F-22</i>	0.000	304.668	470.138	514.429	0.000	514.429	431.443	428.583	560.566	594.821	Continuing	Continuing
674788: <i>F-22 Tactical Mandates</i>	0.000	258.967	76.160	150.609	0.000	150.609	166.522	128.188	76.824	19.649	Continuing	Continuing

Note
 Project Infrastructure, combined the following major thrusts Operational Software Development, Reliability and Maintainability Program, F-22 Small Projects, Combined Test Force from BPAC 674785 and Laboratory Test and Operations, Lab and Combined Test Force from BPAC 674788.

Project Communication Systems, combined the following major thrusts Link 16, Mode 5 Identification Friend or Foe and Systems Engineering/Program Management Support from BPAC 674788.

A. Mission Description and Budget Item Justification

The F-22 Raptor provides air superiority to the Joint Force, access in the highly contested operational environment, as well as homeland and cruise missile defense for the next 40+ years. The F-22 is a multi-mission fighter aircraft that combines low observability, supercruise, maneuverability and integrated avionics to make it the world's most capable air superiority aircraft. The program is continuing planned, incremental modernization development that enhances both F-22 Air Superiority and Global Strike capabilities. The F-22 modernization program upgrades the air vehicle, engine, and training systems to improve F-22 weapons, communications, navigations, pilot systems, and electronic warfare.

The F-22 Raptor's modernization development is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill Federal Aviation Administration or other mandates necessary to ensure continued aircrew safety and mission effectiveness. This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-22 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	584.743	496.298	666.253	0.000	666.253
Current President's Budget	563.635	546.298	665.038	0.000	665.038
Total Adjustments	-21.108	50.000	-1.215	0.000	-1.215
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	50.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-21.108	0.000			
• Other Adjustments	0.000	0.000	-1.215	0.000	-1.215

Change Summary Explanation

FY19 SBIR reduction of \$21.108M

FY20 Congressional transfer of \$50M from APAF Line 28 to RDT&E Line 182 for F-22A Modernization

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674785 / F-22			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674785: F-22	0.000	304.668	470.138	514.429	0.000	514.429	431.443	428.583	560.566	594.821	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project Infrastructure, combined the following major thrusts Operational Software Development, Reliability and Maintainability Program, F-22 Small Projects, Combined Test Force from BPAC 674785 and Laboratory Test and Operations, Lab and Combined Test Force from BPAC 674788.

A. Mission Description and Budget Item Justification

The F-22 Raptor provides air superiority to the Joint Force, access in the highly contested operational environment, as well as homeland and cruise missile defense for the next 40+ years. The F-22 is a multi-mission fighter aircraft that combines low observability, supercruise, maneuverability and integrated avionics to make it the world's most capable air superiority aircraft. The program is continuing planned, incremental modernization development that enhances both F-22 air superiority and global strike capabilities. The F-22 modernization program upgrades the air vehicle, engine, and training systems to improve F-22 weapons, communications, navigations, pilot systems, and electronic warfare.

The F-22 Raptor's modernization development is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.

FY20 planned execution in sensor systems in BPAC 674785 will be \$69M to include the \$50M Congressional Add for F-22 Modernization. FY20 planned execution in communication systems in BPAC 674788 will be \$186M.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Update 6	11.949	4.000	0.000
Description: Update 6 (U6) Interoperability, is an Operational Flight Program (OFP) update providing cryptographic updates required by the National Security Agency (NSA) to maintain interoperability with Link-16 and secure voice networks. The U6 Interoperability program builds upon the development work already accomplished in the KOV-20 cryptographic modernization program and integrates that development into a single OFP for fleet release. In addition, U6 Interoperability will correct other software deficiencies identified during operations. The F-22 Update 6 program is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.			
FY 2020 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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U6 Interoperability will complete system test and formal integrated flight test followed by completion of a sufficiency of test review. U6 Interoperability will then complete a fielding decision review and begin fleet release.

FY 2021 Plans:

U6 development program ends in FY20.

FY 2020 to FY 2021 Increase/Decrease Statement:

Development ends in FY20.

Title: Infrastructure	144.841	188.128	193.963
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Description: This major thrust was formerly comprised of: Operational Software Development, Reliability and Maintainability Program (RAMP), F-22 Small Projects, Combined Test Force (CTF), Laboratory Test and Operations (LTO), and the Lab and Combined Test Force thrust from BPAC 674788.

Labs and Combined Test Force are continuous activities that plan and conduct development, integration, test, and verification of Operational Flight Programs (OFPs) and other software and hardware in support of the F-22 Raptor. Labs provide maintenance, staffing, and operation of 16 development labs including four unique major System Integration Laboratories (SILs): Agile Integration Lab (AIL) with the Flying Test Bed (FTB), Ogden Test Enterprise (OTE) Lab, Air Combat Simulation (ACS) Lab, and the Vehicle System Simulator (VSS) Lab. The F-22 Combined Test Force (CTF) located at Edwards Air Force Base conducts full-up weapons system testing to assess the effect of the F-22 combined characteristics of stealth, speed, maneuverability, and integrated avionics upon mission accomplishment. The CTF uses operationally significant ground and flight test scenarios to identify system performance deficiencies early before they are more difficult and costly to resolve.

F-22 Small Projects provides technology studies and demonstrations to include, but not limited to, Low Observable (LO) signature management, threat modeling support, Developmental Test (DT) weapon assets, Pilot Training (PT), dynamic Synthetic Aperture Radar (SAR), cyber security, flight test engine refurbishment, support equipment development, Government Furnished Equipment (GFE), and Electronic Warfare (EW) system enhancements to counter evolving threats.

Operational Software Development utilizes commercially available agile and lean best practices to transform and accelerate the F-22 Raptor's modernization processes to develop, test, and field new capability enhancements. This includes, but is not limited to, the expansion of a cloud-based software development environment and partnering with commercial companies to adopt industry product development best practices.

The Reliability and Maintainability Program provides for solution identification and integration of modifications to improve reliability, availability and maintainability for F-22 test aircraft, located at Edwards AFB. RAMP includes modifications to address corrosion, reduce maintenance hours, increase safety, and provide urgent response requirements to the F-22 CTF.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>F-22 Infrastructure efforts are conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p>FY 2020 Plans: Labs and CTF will continue planning and execution of F-22 Raptor software and hardware in support of Link 16, Mode 5 IFF, Sensor Systems, and OFP releases within the Labs to hand off to the CTF for testing. Additionally, Labs plans to update critical systems to include technology refresh and laboratory improvements (to include virtual components) required to support new aircraft configurations and capabilities.</p> <p>F-22 Small Projects will continue technology planning studies and demonstrations for DT weapon assets, threat modeling support, test support, test aircraft modifications, Common Range Integrated Instrumentation System (CRIIS) development, cyber security, PT, dynamic SAR, Flutter Excitation System (FES), GFE, and EW enhancements.</p> <p>Operational Software Development continues maturing and scaling cloud-based computing environment to leverage commercially-based agile software and hardware development best practices and tools to increase the speed and quality of product delivery to the warfighter.</p> <p>RAMP will continue retrofit modifications on F-22 test aircraft in order to improve system/component reliability, maintainability and reduce F-22 weapon system life cycle costs.</p> <p>FY20 total includes \$17.893M for SBIR/STTR transfer that has not been implemented. FY20 and out also include costs for Lab/CTF test execution whereas FY19 did not. Lab/CTF test execution costs are anticipated to be \$20.8M in FY20.</p> <p>FY 2021 Plans: Laboratory Test and Operations (LTO) plans to incorporate support of F-22 In a Box/Joint Simulated Environment (JSE) which is scheduled to deliver in 2021. Provide support to the SILs for faster testing and assessment of F-22 enhancements. Continue to update critical systems required to support new aircraft configurations and capabilities. Further continue Lab test planning using agile methods for the following programs: Mode 5 IFF, Link 16, OFP releases, Sensor Systems and ATD to hand off to the CTF for testing.</p> <p>Small projects continues technology planning studies and demonstrations for DT weapon assets, threat modeling support, test support, test aircraft modifications, Common Range Integrated Instrumentation System (CRIIS) development, cyber security, PT, dynamic SAR, GFE, and EW enhancements.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Operational Software Development continues maturing and scaling cloud-based computing environment to leverage commercially-based agile software and hardware development best practices and tools to increase the speed and quality of product delivery to the warfighter.</p> <p>RAMP continues retrofit modifications on F-22 test aircraft in order to improve system/component reliability, maintainability and reduce F-22 weapon system life cycle costs.</p> <p>FY21 total includes \$24M for estimated SBIR/STTR transfer.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: \$5.84M increase from FY21 to FY20 due to CTF.</p>			
<p>Title: Advanced Technology Development (ATD)</p> <p>Description: Technology maturation, risk reduction, studies, demonstrations and prototypes of classified F-22 development efforts. The F-22 Advanced Technology Development (ATD) program is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p>FY 2020 Plans: Continue technology maturation and risk reduction projects in support of various classified F-22 development efforts. ATD also provides continued technology maturation and acquisition planning for the F-22 Sensor Systems program.</p> <p>FY 2021 Plans: Continue technology maturation and risk reduction projects in support of various classified F-22 development efforts. ATD also provides continued technology maturation and acquisition planning for the F-22 Sensor Systems program.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: \$45.400M decrease from FY20 to FY21 due to completion of technology demo.</p>	111.612	93.600	48.200
<p>Title: Sensor Systems</p> <p>Description: This major thrust was formerly known as Sensor Enhancements. As part of the F-22 Capability Pipeline, implemented through Section 804 Middle Tier Acquisition (MTA) authority, Sensor Systems improves sensor capabilities to maintain air dominance and preserve first look, first shot, and first kill capability. The F-22 Sensor Systems program is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p>	29.182	179.686	248.823

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: Continue software and hardware development for future fleet release and begin purchase of developmental test assets. FY20 also includes a \$50M Congressional Add for F-22 Modernization. FY20 planned execution in sensor systems in BPAC 674785 will be \$69M which includes the \$50M Congressional Add for F-22 Modernization. FY20 planned execution in communication systems in BPAC 674788 will be \$186M.</p> <p>FY 2021 Plans: Continue software and hardware development for future fleet release. Purchase of developmental test assets.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: \$69.14M increase from FY20 to FY21 due to continued purchase of DT/OT assets, supplier support for DT/OT planning, environment standup, lab/system/airframe integration, and logistics development</p>			
<p>Title: Navigation Systems</p> <p>Description: The Navigation Systems product line consists of the software and hardware development, integration, test, and fielding necessary to ensure the F-22's ability to maintain Precision, Navigation and Timing (PNT) capabilities, to include in Global Positioning System (GPS) degraded environments. As part of the F-22 Capability Pipeline, implemented through Section 804 Middle Tier Acquisition (MTA) authority, this effort will include the integration of Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M) onto the F-22 for M-Code, replacement of the legacy GPS antenna with a robust Controlled Radiation Pattern Antenna (CRPA), as well as other capabilities, to prevent exploitation of the weapon system by adversaries and provide an anti-jam PNT solution. F-22 Navigation Systems is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a cadence approach as capabilities mature.</p> <p>FY 2020 Plans: Complete risk reduction activities for F-22 GPS CRPA and transition to development. FY20 activities will include system level testing of the CRPA in F-22 system labs. Design Group A kits for CRPA and EGI-M.</p> <p>FY 2021 Plans: Continue to work development activities for F-22 GPS CRPA. FY21 activities will include continuing system level testing of the CRPA and begin to utilize EGI-M production representative units in F-22 system labs and tests. Continue designing Group A kits for CRPA and EGI-M and begin the transition to purchasing Group A kits for test.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: \$18.72M increase from FY20 to FY21 due to software development, hardware integration and CRPA test asset procurement.</p>	7.084	4.724	23.443
Accomplishments/Planned Programs Subtotals	304.668	470.138	514.429

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item F02200: <i>F-22A Squadrons, PE 0207138F*</i>	304.668	250.674	552.914	-	552.914	618.872	686.872	690.362	745.871	Continuing	Continuing
• APAF 05 Line Item F2232B: <i>F-22 Increment 3.2B, PE 0207138F***</i>	2.007	20.213	5.889	-	5.889	-	-	-	-	0.000	28.109
• RDTE 07 PE 0207138F: <i>F-22 Tactical Mandates</i>	258.967	76.160	150.609	-	150.609	166.522	128.188	76.824	19.649	Continuing	Continuing

Remarks

NOTES:

*F-22A Squadrons, APAF/PE 0207138F, includes funding for F-22A Squadrons BPs 11 (Aircraft Modifications), 13 (Post-Production Support), 16 (Initial Spares), and 19 (Depot Activation) only.

**F-22 Increment 3.2B, APAF/PE 0207138F includes funding for associated Increment 3.2B BPs 11 (Aircraft Modifications) and 16 (Initial Spares) only.

***F-22 Tactical Mandates, RDT&E/PE 0207138F, includes funding for F-22A Tactical Mandates modernization and development BPAC 674788.

D. Acquisition Strategy

The Raptor Enhancement Development & Integration II (REDI II) contract is an Indefinite Delivery/Indefinite Quantity (ID/IQ) ordering contract that maximizes flexibility to start, stop, accelerate and decelerate projects as required. The (REDI) II contract is a follow-on to the initial REDI contract. REDI II provides maximum flexibility to manage various modernization projects. The REDI II contract allows for the issuance of orders for efforts associated with the planning, analysis, design, development, qualification, test and documentation of F-22 weapon system performance enhancements, life-cycle improvements, Operational Flight Program (OFF) upgrades, and associated efforts essential to accomplishing the F-22 mission.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

F-22 Squadrons	
Update 6 Interoperability Flight Test	
Update 6 Interoperability Deployment Decision Review	
Update 6 Interoperability Full Deployment (Fleet Release)	
Advanced Technology Development Demonstrations	
Advanced Technology Development Studies & Analysis	
Navigation Systems Development, Integration, and Test	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>	Project (Number/Name) 674785 / <i>F-22</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>F-22 Squadrons</i>				
Update 6 Interoperability Flight Test	1	2019	2	2020
Update 6 Interoperability Deployment Decision Review	2	2020	2	2020
Update 6 Interoperability Full Deployment (Fleet Release)	3	2020	3	2020
Advanced Technology Development Demonstrations	1	2019	4	2025
Advanced Technology Development Studies & Analysis	1	2019	4	2025
Navigation Systems Development, Integration, and Test	1	2019	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674788 / F-22 Tactical Mandates			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674788: F-22 Tactical Mandates	0.000	258.967	76.160	150.609	0.000	150.609	166.522	128.188	76.824	19.649	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project Communication Systems, combined the following major thrusts Link 16, Mode 5 Identification Friend or Foe and Systems Engineering/Program Management Support from BPAC 674788.

A. Mission Description and Budget Item Justification

This Budget Program Activity Code focuses on delivering Link 16 and Mode 5 Identification Friend or Foe (IFF) capabilities to the F-22 Raptor.

Link 16 will deliver Link 16 Transmit and enhance existing receive capabilities. Link 16 capabilities will be enabled by Open System Architecture (OSA) and enables 5th generation F-22 fighter aircraft to transmit tactical information through datalink to the 5th generation F-35 (a.k.a. 5th-to-5th), as well as to 4th generation aircraft (a.k.a. 5th-to-4th). Transmitting tactical data to other aircraft types via datalink is a top Air Force priority. With Link 16 Transmit, the F-22's superior 5th Generation sensor suite will critically support the situational awareness of all participants in the operational environment. Mode 5 IFF will deliver IFF Transpond and Interrogate capabilities. Mode 5 IFF is a Joint Requirements Oversight Council-mandated Blue Force identification capability that improves Raptor survivability and reduces fratricide risk DoD-wide. Mode 5 IFF brings significantly enhanced combat identification in both quality and security. All capabilities will be fielded on the F-22 Block 30/35 combat coded F-22 fleet.

The F-22's Link 16 and Mode 5 IFF developments are conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.

FY20 planned execution in sensor systems in BPAC 674785 will be \$69M to include the \$50M Congressional Add for F-22 Modernization. FY20 planned execution in communication systems in BPAC 674788 will be \$186M.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Communication Systems	258.967	76.160	150.609
Description: This major thrust was formerly comprised of Link 16, Mode 5 Identification Friend or Foe (IFF) and Systems Engineering/Program Management Support. As part of the F-22 Capability Pipeline, implemented through Section 804 Middle Tier Acquisition (MTA) authority, Link 16 and Mode 5 IFF consists of software and hardware development necessary to field both the Link 16 Transmit capability, and tactical Mode 5 IFF Transpond and Interrogate on the F-22. Link 16 Transmit will be accomplished via an Open System Architecture (OSA) integrated with F-22 legacy avionics. The OSA implementation will provide a pathway to more competitive and open F-22 modernization. Mode 5 IFF also provides an opportunity to incorporate other			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674788 / F-22 Tactical Mandates

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>updates to Link 16 capabilities into the Raptor. This major thrust also captures F-22 program activities related to integrating the advanced Talon SPITBALL Link 16 antenna onto the F-22. Includes mission support requirements for the F-22 Program Office to include, but not be limited to: travel, computer costs, cost estimating data, strategic analysis and support, systems engineering process management and other miscellaneous contract support. The F-22 Link 16 and Mode 5 IFF product lines are conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a cadence approach as capabilities mature.</p> <p>FY 2020 Plans: Initial Link 16 and Mode 5 IFF Transpond capabilities will begin Developmental Test (DT) and Operational Test (OT) in preparation for release to the F-22 combat fleet. Mode 5 IFF Interrogate capabilities will continue development and begin system lab test of hardware and software. Transition F-22 Talon SPITBALL activities from Air Force Tactical Exploitation of National Capabilities (TENCAP) office to F-22 Program Office to continue development and integration activities for the F-22 Raptor. FY20 planned execution in communication systems in BPAC 674788 will be \$186M. FY20 planned execution in sensor systems in BPAC 674785 will be \$69M to include the \$50M Congressional Add for F-22 Modernization.</p> <p>FY 2021 Plans: Continue software development for additional Link 16 and Mode 5 IFF Transpond capabilities for fielding with subsequent releases. Mode 5 IFF Interrogate capabilities will continue development and system lab test of hardware and software. Continue transition F-22 Talon SPITBALL activities from Air Force Tactical Exploitation of National Capabilities (TENCAP) office to F-22 Program Office to continue development and integration activities for the F-22 Raptor.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: \$74.45M increase from FY20 to FY21 due to balancing between BPACs.</p>			
Accomplishments/Planned Programs Subtotals	258.967	76.160	150.609

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 07 PE 0207138F: F-22A Squadrons*	387.807	420.138	488.055	-	488.055	598.873	557.607	638.428	615.417	Continuing	Continuing
• APAF 05 Line Item F02200: F-22A Squadrons, PE 0207138F**	405.650	250.674	552.914	-	552.914	618.631	686.872	690.362	745.871	Continuing	Continuing
• APAF 05 Line Item F2232B: F-22A Increment 3.2B, PE 0207138F****	2.007	20.213	5.889	-	5.889	-	-	-	-	0.000	28.109

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674788 / F-22 Tactical Mandates
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

NOTES:

*F-22 Squadrons, RDT&E/PE 0207138F, includes funding for F-22A Squadrons modernization and development BPAC 674785.

**F-22A Squadrons, APAF/PE 0207138F, includes funding for F-22A Squadrons BPs 11 (Aircraft Modifications), 13 (Post-Production Support), 16 (Initial Spares), and 19 (Depot Activation) only.

***F-22 Squadrons, APAF/PE 0207138F/F2232B, includes funding for F-22 Increment 3.2B BPs 11 (Aircraft Modifications) and 16 (Initial Spares) only.

D. Acquisition Strategy

The Raptor Enhancement Development & Integration II (REDI) II contract is an Indefinite Delivery/Indefinite Quantity contract that maximizes flexibility to start, stop accelerate and reaccelerate projects as required. The REDI II contract is a follow-on to the initial REDI contract. REDI II provides maximum flexibility to manage various modernization projects. The REDI II contract allows for the issuance of orders for efforts associated with the planning, analysis, design, development, qualification, test and documentation of F-22 weapon system performance enhancements, life-cycle improvements, Operational Flight Program (OFP) upgrades, and associated efforts essential to accomplishing the F-22 mission.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674788 / F-22 Tactical Mandates
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
F-22 TACTICAL MANDATES																												
Link 16 Development , Integration & Test																												
Link 16 & IFF Transpond Developmental Test																												
Link 16 & IFF Transpond Production Decision																												
Link 16 & IFF Transpond Installs																												
Mode 5 IFF Development, Integration & Test																												
Mode 5 IFF Interrogate Developmental Test																												
Mode 5 IFF Interrogate Production Decision																												
Mode 5 IFF Interrogate Installs																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>	Project (Number/Name) 674788 / <i>F-22 Tactical Mandates</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>F-22 TACTICAL MANDATES</i>				
Link 16 Development , Integration & Test	1	2019	4	2021
Link 16 & IFF Transpond Developmental Test	2	2020	3	2021
Link 16 & IFF Transpond Production Decision	4	2019	4	2019
Link 16 & IFF Transpond Installs	1	2022	4	2024
Mode 5 IFF Development, Integration & Test	1	2019	1	2024
Mode 5 IFF Interrogate Developmental Test	4	2022	1	2024
Mode 5 IFF Interrogate Production Decision	2	2023	2	2023
Mode 5 IFF Interrogate Installs	2	2024	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	724.684	490.319	99.943	132.229	0.000	132.229	70.054	36.056	15.567	15.853	Continuing	Continuing
675346: <i>F-35</i>	642.871	414.998	11.850	7.678	0.000	7.678	4.940	4.188	3.737	3.806	Continuing	Continuing
675349: <i>HPSI</i>	0.000	0.000	16.754	18.415	0.000	18.415	19.854	20.246	0.000	0.000	0.000	75.269
676011: <i>JSF DUAL CAPABLE AIRCRAFT</i>	81.813	75.321	71.339	106.136	0.000	106.136	45.260	11.622	11.830	12.047	Continuing	Continuing

Program MDAP/MAIS Code: 198

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the United States Air Force, United States Navy, United States Marine Corps and International Partners countries. There are three variants: the F-35A Conventional Takeoff and Landing variant; the F-35B Short Take Off and Vertical Landing variant; and the F-35C Aircraft Carrier suitable variant. Maximum commonality among the variants, consistent with National Disclosure Policy, will minimize total air system life cycle costs.

Beginning in FY 2020, Continuous Capability Development & Delivery (C2D2) efforts designated as Block 4 that are not USAF-unique (US Service and International Partner common requirements) are requested in PE 0604840F. Remaining funding in PE 0207142F supports USAF-unique on-going User Information Data Exchange Service (UIDES), SEEK EAGLE, Hybrid Product Support Integrator (HPSI) and Dual Capable Aircraft (DCA) requirements. These continuing efforts are not new starts.

JSF C2D2 efforts provide incremental warfighting capability improvements to maintain joint air dominance against evolving threats. Requirements designated as Block 4 include a robust weapons integration portfolio and provide new opportunities for International Partners to assess, integrate, and field unique capabilities based on global sovereign requirements. The F-35 JSF Operational Requirements Document (ORD) calls for the F-35A to have the capabilities and provisions for DCA operations in the first post-SDD block upgrade. DCA is a NATO and US priority which is a critical capability in our collective defense and credible deterrence, with certification needed by Jan 2024. DCA refers to the capability to carry and deliver conventional and non-conventional weapons. DCA operations for the F-35A is internal carriage of up to two B-61s. Due to extensive certification requirements, the DCA capability planning and design, testing and certification will continue throughout Block 4. Funding in this PE will resource the following F-35A DCA activities: development, analysis, test, integration, certification and risk-reduction activities necessary to field and maintain F-35A DCA capabilities throughout post-SDD block upgrades; assessment of DCA weapon integration and certification impacts on the JSF aircraft; identification and mitigation of potential technical and cost risks; definition of integration and certification trade-space to field the DCA capability with the B61-12 weapon; follow-on risk reduction efforts to ensure future integration alignment with the earliest feasible post-SDD block upgrade; full integration efforts pending Service decisions. This is not a new start effort.

The Air Force SEEK EAGLE Office (AFSEO) is the AF organization chartered to perform the compatibility mission and manage the compatibility enterprise. AFSEO delivers warfighting capability through aircraft/store compatibility testing and evaluation and provides accurate combat weapon delivery and mission planning software.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>
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Beginning in FY2020, the USAF will support FTI wiring and weapons integration tasks related to SEEK EAGLE requests. These tasks include, but are not limited to, envelope expansion, mixed loads testing, and adding additional stores. This is not a new start effort.

The F-35 HPSI's primary role is to integrate support across the supply chain, maintenance, sustainment engineering, logistics information technology and training disciplines. It will deliver enduring, global support for fielded F-35s while preparing for future force expansion. USAF only will fund additional PMA to transition to a final HPSI, which will support sustainment analysis with product support managers, focused on long-term strategic planning and transition to a final integrated support plan. This is not a new start effort.

USAF F-35 User Information Data Exchange Service (UIDES) provides for Air Force development of a F-35 Autonomic Logistics Information System (ALIS) - UIDES that supports current and future Information Exchange Requirement (IER) data transfer capability from the F-35 ALIS into data reports and configurable tables to receive, store and integrate F-35 operations, maintenance, training and financial data within existing Air Force enterprise views and systems to support the growing fleet of AF F-35 aircraft, the ability to feed F-35 training and operations data to ALIS, and support modification of an enhanced data sharing capability (ability to consume increased volume and variety of ALIS IER data) to support operations planning, pilot and maintainer training, and depot data configuration and integration requirements. Activities also include studies and analysis to support both current program/project planning and execution and future program/project planning. This is not a new start effort.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-35 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	503.928	99.943	132.471	0.000	132.471
Current President's Budget	490.319	99.943	132.229	0.000	132.229
Total Adjustments	-13.609	0.000	-0.242	0.000	-0.242
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.001	0.000			
• SBIR/STTR Transfer	-13.608	0.000			
• Other Adjustments	0.000	0.000	-0.242	0.000	-0.242

Change Summary Explanation

The FY2020 funding reduced for Small Business Innovative Research (SBIR).

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons				Project (Number/Name) 675346 / F-35			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675346: F-35	642.871	414.998	11.850	7.678	0.000	7.678	4.940	4.188	3.737	3.806	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Total cost, including International partner contributions, USN, USMC, and USAF funding: FY 2019 \$1,062.771M; FY 2020 USAF only \$11.850M; FY 2021 USAF only \$7.678M. Other ongoing efforts previously included in this PE continue in PE 0604840F.

F-35 C2D2 Includes:

PE 0207142F BPAC 675346

PE 0604840F BPAC 675346

FY13: USN PE 0604800N Project Unit 2261

FY14: USN PE 0604800N Project Unit 9999

FY15-18: USN PE 0604810N Project Unit 2936

FY19: USN PE 0604840N Project Unit 2936

FY13: USMC PE 0604800M Project Unit 2262

FY14: USMC PE 0604800M Project Unit 9999

FY15-18: USMC PE 0604810M Project Unit 2935

FY19: USMC PE 0604840M Project Unit 3410

International Partner Contributions

A. Mission Description and Budget Item Justification

The Air Force SEEK EAGLE Office (AFSEO) is the AF organization chartered to perform the compatibility mission and manage the compatibility enterprise. AFSEO delivers warfighting capability through aircraft/store compatibility testing and evaluation and provides accurate combat weapon delivery and mission planning software. Beginning in FY2020, the USAF will support Flight Test Instrumentation (FTI) wiring and weapons integration tasks related to SEEK EAGLE requests. These tasks include, but are not limited to, envelope expansion, mixed loads testing, and adding additional stores.

USAF F-35 User Information Data Exchange Service (UIDES) provides for Air Force development of a F-35 Autonomic Logistics Information System (ALIS) - UIDES that supports current and future Information Exchange Requirement (IER) data transfer capability from the F-35 ALIS into data reports and configurable tables to receive, store and integrate F-35 operations, maintenance, training and financial data within existing Air Force enterprise views and systems to support the growing fleet of AF F-35 aircraft, the ability to feed F-35 training and operations data to ALIS, and support modification of an enhanced data sharing capability (ability to consume increased volume and variety of ALIS IER data) to support operations planning, pilot and maintainer training, and depot data configuration and integration requirements.

Neither the SEEK EAGLE nor UIDES effort is a new start.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Block 4 Planning and System Engineering</p> <p>Description: Block 4 Planning and Systems Engineering from preliminarily design and requirements decomposition through completion of Developmental Flight Test for all variants of the F-35 aircraft. Modernization efforts include Requirements Decomposition and continuous development and release of capabilities identified as Block 4 upgrades. This is a continuation of the previous Block 4 developmental contracts, which will include activities leading to successful completion of Developmental Flight Test, to include select facility upgrades required for Block 4 research, development, test and evaluation. Included in Block 4 are upgraded capabilities and continuous improvements to maintain Air System viability against evolving threats indicated in the Electronic Warfare Initial Capabilities Document (ICD), the Fifth Generation Fighter Modernization ICD, and the Block 4 Capability Development Document (CDD), reduce life cycle cost, and improve operational suitability. Continuous risk reduction activities to include Air System Integration, preplanning for subsequent Block 4 Modernization events, and investments to deliver the full Block 4 Air System capabilities as needed. C2D2 capability planning includes an efficient transition from F-35 SDD to C2D2. As SDD development activities ramp down C2D2 will assume responsibility for improvements and modernization efforts.</p> <p>Beginning in FY 2020, the USAF unique ALIS User Information Data Exchange Service (UIDES) requirement will be broken out separately from the remaining systems engineering. USAF F-35 UIDES provides for Air Force development of a F-35 Autonomic Logistics Information System (ALIS) - User IT Data Exchange Service (UIDES) that supports current and future Information Exchange Requirement (IER) data transfer capability from the F-35 ALIS into data reports and configurable tables to receive, store and integrate F-35 operations, maintenance, training and financial data within existing Air Force enterprise views and systems to support the growing fleet of AF F-35 aircraft, the ability to feed F-35 training and operations data to ALIS, and support modification of an enhanced data sharing capability (ability to consume increased volume and variety of ALIS IER data) to support operations planning, pilot and maintainer training, and depot data configuration and integration requirements. Activities also include studies and analysis to support both current program/project planning and execution and future program/project planning.</p> <p>FY 2020 Plans: Continue to support/develop companion USAF F-35 UIDES projects to support the IER updates and related new functionality.</p> <p>FY 2021 Base Plans:</p>	319.964	2.550	2.588	0.000	2.588

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue to support/develop companion USAF F-35 UIDES projects to support the IER updates and related new functionality. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to program growth as USAF F-35 UIDES support and development efforts ramp up.					
Title: Technology Refresh 3 (TR-3) Description: Technology Refresh 3 (TR3) conducts post Critical Design Review (CDR) design activities. This effort will develop and deliver a TR3 system through full flight-worthy certification and production readiness review for Lot 15. The design of TR3 subsystems Integrated Core Processor (ICP), Aircraft Memory System (AMS), and Panoramic Cockpit Display Electronics Unit and Display Unit (PCD-EU, PCD-DU) configurations will contain new backplane technology, commercial operating systems, and modified middleware necessary to support Block 3F functionality and incorporation of all Block 4 capabilities. This work includes nonrecurring engineering for the developing, test, and certification of the ICP, AMS, PCD-EU, and PCD-DU, and is required to support 4x processing growth factor based on the current processing estimated for all 3F capabilities. FY 2020 Plans: N/A FY 2021 Base Plans: N/A FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A	156.992	0.000	0.000	0.000	0.000
Title: Infrastructure and Support Costs Description: Funding will support infrastructure investment planning and other test planning activities required for Block 4 development, integration, test and evaluation. Funding related to the Integrated Test Force, government, and contractor labor. Support efforts for airframe, air vehicle systems, air ship integration, mission systems, weapons integration, offboard mission support, autonomic logistics development, joint reprogramming enterprise and modeling and joint simulation environment activities, including Nimble Lightning efforts. Funding	230.384	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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related to the Integrated Test Force, government, and contractor labor. Other costs in support of ranges, chase planes and DT site operations.

FY 2020 Plans:

N/A

FY 2021 Base Plans:

N/A

FY 2021 OCO Plans:

N/A

FY 2020 to FY 2021 Increase/Decrease Statement:

N/A

Title: Test and Evaluation

Description: Integrated Test activities in support of Block 4, to include Lockheed Martin and Pratt & Whitney support at all test sites. Non-recurring engineering required to plan for the service life extension of existing DT aircraft and modification necessary to bring DT aircraft fleet to a more production representative and sustainable configuration, and to develop flight test instrumentation and release test software to meet Block 4 requirements. Additional upgrades required to support development and evaluation of improvements driven by changes in the threat environment and as identified in the Electronic Warfare ICD, the Fifth Generation Fighter Modernization ICS, and the Block 4 Capability Development Document (CDD). Efforts include non-recurring engineering and procurement of a test article to evaluate service life of F-35B STOVL Aircraft.

Beginning in FY 2020, the USAF will support Flight Test Instrumentation (FTI) wiring and weapons integration tasks related to SEEK EAGLE requests. These tasks include, but are not limited to, envelope expansion, mixed loads testing and additional stores.

FY 2020 Plans:

USAF only funding will begin supporting SEEK EAGLE requests by providing FTI wiring and supporting weapons integration tasks.

FY 2021 Base Plans:

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
related to the Integrated Test Force, government, and contractor labor. Other costs in support of ranges, chase planes and DT site operations.					
FY 2020 Plans: N/A					
FY 2021 Base Plans: N/A					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
Title: Test and Evaluation	243.188	9.300	5.090	0.000	5.090
Description: Integrated Test activities in support of Block 4, to include Lockheed Martin and Pratt & Whitney support at all test sites. Non-recurring engineering required to plan for the service life extension of existing DT aircraft and modification necessary to bring DT aircraft fleet to a more production representative and sustainable configuration, and to develop flight test instrumentation and release test software to meet Block 4 requirements. Additional upgrades required to support development and evaluation of improvements driven by changes in the threat environment and as identified in the Electronic Warfare ICD, the Fifth Generation Fighter Modernization ICS, and the Block 4 Capability Development Document (CDD). Efforts include non-recurring engineering and procurement of a test article to evaluate service life of F-35B STOVL Aircraft.					
Beginning in FY 2020, the USAF will support Flight Test Instrumentation (FTI) wiring and weapons integration tasks related to SEEK EAGLE requests. These tasks include, but are not limited to, envelope expansion, mixed loads testing and additional stores.					
FY 2020 Plans: USAF only funding will begin supporting SEEK EAGLE requests by providing FTI wiring and supporting weapons integration tasks.					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>USAF only funding will continue supporting SEEK EAGLE requests by providing FTI wiring and supporting weapons integration tasks.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease as reduction in SEEK EAGLE support efforts ramp down.</p>					
<p>Title: Autonomic Logistics Information System (ALIS) Development</p> <p>Description: Autonomic Logistics Information System (ALIS) continues to deliver the core logistics and maintenance infrastructure requirements for the F-35 enterprise. ALIS includes features such as aircraft scheduling, training delivery, record keeping, technical data delivery, supply chain management, maintenance management, pilot and maintenance debriefing, and mission planning. The ALIS development program is focused on two primary lines of effort: supporting the F-35 enterprise Data Transformation effort and continuously integrating and delivering new capability.</p> <p>ALIS is focused on continuously integrating and delivering new software for current and the F-35 enterprise's next generation logistics and maintenance configuration. The required new capabilities have been defined by the US Services and include cybersecurity updates, decentralized maintenance, Prognostic Health Monitoring (PHM), Training Management System upgrades, Personnel Flight Equipment (PFE), Low Observable Health Assessment System (LOHAS), Corrosion Management System, squadron resource sharing, and new propulsion capabilities. All aspects of ALIS software are included in current ALIS development. The software development will have applicability to the Standard Operating Units (SOU), Central Points of Entry (CPE), and the Autonomic Logistics Operating Unit (ALOU) for both classified and unclassified hardware. Under the umbrella of current ALIS, an Agile DevOps pilot is working to rapidly deliver capability updates to the fleet and change the way that current ALIS delivers software.</p> <p>ALIS re-architecture effort that began in FY 2019 will deliver its first next-generation configuration in Sep 2020, and complete fielding in FY 2023. ALIS will redesign its software, data, and hardware architecture with a focus on cybersecurity, affordability, resiliency, and supportability.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Base Plans:</p>	112.243	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
	N/A				
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	1,062.771	11.850	7.678	0.000	7.678
Other Service Funding Adjustment	647.773	-	-	-	-
Air Force Subtotals	414.998	11.850	7.678	0.000	7.678

C. Other Program Funding Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
			Base	OCO	Total						
• RDTE 07 PE 0604840F: <i>F-35A Continuous Capability Development and Delivery</i>	0.000	642.371	785.336	0.000	785.336	549.279	450.915	521.012	586.709	Continuing	Continuing
• RDTE 07 PE 0207142F 6011: <i>Dual Capable Aircraft (DCA), BPAC 676011</i>	75.321	71.339	106.136	0.000	106.136	46.260	11.622	11.830	12.047	Continuing	Continuing
• RDTE 07 PE 0604840N 2936: <i>F-35C Continuous Capability Development and Delivery (CV)</i>	215.366	354.960	413.875	0.000	413.875	284.709	198.878	214.861	199.964	Continuing	Continuing
• RDTE 07 PE 0604840M 3410: <i>F-35B Continuous Capability Development and Delivery (STOVL)</i>	222.644	391.165	379.549	0.000	379.549	323.597	294.404	283.981	244.932	Continuing	Continuing
• RDTE International: <i>International Continuous Capability Development and Delivery</i>	209.763	281.887	339.139	0.000	339.139	224.501	189.728	158.811	177.542	Continuing	Continuing

Remarks
This is a joint program with no executive service. Service Acquisition Executive (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Navy.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
<p>Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to FY2002. The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, and Norway are participants in the SDD phase of JSF.</p> <p>PE 0604810M/N ends in FY18 and continues in PE 0604840M/N as budget moves from BA05 to BA07.</p> <p>PE 0207142F common Block 4 requirements moved in FY20 to PE 0604840F to separate USAF unique requirements.</p>											

D. Acquisition Strategy

The C2D2 acquisition strategy is to employ both Cost and Fixed Price Incentive contracts for the Block 4 engineering and development efforts. A new modernization contract structure will be established for all post SDD Block 4 efforts. In addition, a separate Basic Ordering Agreement or Indefinite Quantity/Indefinite Delivery contract is planned to provide a long term approach to upgrading and maintaining laboratories and test aircraft and supporting technology maturation for future C2D2 capabilities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prime LM 18-C-1004 PHASE II	SS/ Various	Lockheed Martin : Ft Worth, TX	226.618	260.674	Dec 2018	-		-		-		-	1,031.289	1,518.581	1,614.161
Prime LM 14-G-0020 TR3	C/CPFF	Lockheed Martin : Ft Worth, TX	239.789	156.992	Dec 2018	-		-		-		-	510.000	906.781	878.558
Prime LM BOA 0020 (Nimble Lightning+Pilot Training)	C/CPFF	Lockheed Martin : Ft Worth, TX	8.956	4.500	Mar 2019	-		-		-		-	17.500	30.956	31.216
Prime LM Flight Test Asset	Various	Various : TBD	37.548	11.571	Jan 2019	-		-		-		-	406.000	455.119	528.894
Prime LM TBD DT AC Viability	C/Various	Lockheed Martin : Ft Worth, TX	40.000	25.550	Jan 2019	-		-		-		-	415.000	480.550	580.305
Prime PW Propulsion	SS/CPFF	Pratt Whitney : East Hartford, CT	0.000	30.481	Feb 2019	-		-		-		-	220.000	250.481	269.450
Prime LM Developmental Foundation Contract	C/CPFF	Lockheed Martin : Ft Worth, TX	26.312	82.000	Nov 2018	-		-		-		-	345.000	453.312	445.550
Prime LM JRE Dev.	C/CPFF	Lockheed Martin : Ft Worth, TX	7.500	11.940	Dec 2018	-		-		-		-	0.000	19.440	-
Prime LM ALIS Next	C/Various	Lockheed Martin : Ft Worth, TX	0.000	6.968	Jan 2019	-		-		-		-	0.000	6.968	-
Prime LM ALIS Dev	C/CPAF	Lockheed Martin : Ft Worth, TX	0.000	52.443	Jul 2019	-		-		-		-	0.000	52.443	-
Prime LM Air Vehicle Integration	C/CPAF	Lockheed Martin : Ft Worth, TX	0.000	40.000	Jun 2019	-		-		-		-	0.000	40.000	-
Prime LM F-35B Fatigue Test Article	C/Various	Lockheed Martin : Ft Worth, TX	0.000	0.000	Jan 2020	-		-		-		-	0.000	0.000	-
Training Investments	C/CPFI	Lockheed Martin : Ft Worth, TX	0.000	5.000	Dec 2019	-		-		-		-	0.000	5.000	-
System Engineering	Various	Not specified. : TBD	28.142	19.290	Jan 2019	-		-		-		-	0.000	47.432	-
Prior Year no longer funded in FYDP	Various	Various : TBD	144.540	-		-		-		-		-	0.000	144.540	144.540
Subtotal			759.405	707.409		-		-		-		-	2,944.789	4,411.603	N/A

Remarks
Added Prime LM Air Vehicle Integration line to separate Air System risk reduction activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Block 4 Modernization on R-2A includes Phase II Development, Air Vehicle Integration and Systems Engineering. Infrastructure and Support on R-2A includes Nimble Lightning, LM JRE Development & Training Investments. Prime LM Phase II Development Contract is a hybrid CPIF/CPAF contract. Prime LM F-35B Fatigue Test Article is a hybrid CPIF/CPFF contract. Prime LM ALIS Next Contract is a hybrid CPFF/CPIF contract. Flight Test assets include weapons to support Test and assets needed for flight test instrumentation.															

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified : TBD	0.000	-		-		-		-		-	0.000	0.000	-
NAWC Paxutent River	WR	NAWCAD : Paxutent River, MD	24.648	38.947	Dec 2018	-		-		-		-	Continuing	Continuing	-
NAWC China Lake	WR	NAWCWD : China Lake, CA	3.579	10.298	Dec 2018	-		-		-		-	43.083	56.960	-
Edwards Air Force Base	Various	Edwards AFB : Edwards AFB, CA	1.486	0.000		-		-		-		-	0.000	1.486	-
AFFTC / Eglin AFB	Various	Eglin : Various	5.715	2.511	Dec 2018	-		-		-		-	15.268	23.494	-
IPT Development Support	Various	Various : Various : Various : Various	31.729	19.521	Dec 2018	-		-		-		-	0.000	51.250	-
Technical Planning/AFRL	Various	AFLCMC : Wright Patterson AFB, OH	2.411	8.344	Dec 2018	-		-		-		-	13.923	24.678	-
JRE Development Support	MIPR	Various : Various	23.520	24.705	Dec 2018	-		-		-		-	0.000	48.225	-
ALIS DevOps Development	Various	Various : Various	0.000	35.220	Dec 2018	-		-		-		-	0.000	35.220	-
ALIS Next Development	MIPR	Various : Various	10.739	17.612	Dec 2018	-		-		-		-	0.000	28.351	-
USAF SEEK EAGLE	Various	Various : Various	0.000	-		9.300	Mar 2020	5.090	Mar 2021	-		5.090	0.000	14.390	-
USAF UIDES	MIPR	Various : Various	0.000	-		2.550	Feb 2020	2.588	Feb 2021	-		2.588	0.000	5.138	-
Subtotal			103.827	157.158		11.850		7.678		-		7.678	Continuing	Continuing	N/A

Remarks
 Changed ALIS Development Support to ALIS DevOps Development Support to capture DevOps effort.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675346 / F-35
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test & Evaluation PAX River	WR	NAWCAD : Paxutent River, MD	37.500	42.400	Dec 2018	-		-		-		-	174.872	254.772	-
Developmental Test & Evaluation China Lake	WR	NAWCWD : China Lake, CA	10.350	4.966	Dec 2018	-		-		-		-	40.470	55.786	-
Developmental Test & Evaluation Edwards/AFB	Various	Edwards AFB : Edwards AFB, CA	11.575	36.275	Dec 2018	-		-		-		-	110.470	158.320	-
Developmental Test & Evaluation	Various	Various : Various	10.250	3.500	Dec 2018	-		-		-		-	57.087	70.837	-
AFOTEC	MIPR	AFOTEC : Kirtland AFB, NM	4.500	0.000		-		-		-		-	0.000	4.500	-
Operational Test & Evaluation	WR	Various : Various	0.000	6.445	Dec 2018	-		-		-		-	0.000	6.445	-
Subtotal			74.175	93.586		-		-		-		-	382.899	550.660	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
AFLCMC Civilian Pay	Various	AFLCMC CIV PAY : Wright Patterson AFB, OH	65.277	37.886	Oct 2018	-		-		-		-	231.610	334.773	-
HPSI Program Sppt	Various	AFLCMC : Wright Patterson AFB, OH	10.225	12.078	Oct 2018	-		-		-		-	0.000	22.303	-
Financial Mgmt Database Support IDS	C/CPAF	IDS : Arlington, VA	0.800	0.812	Dec 2018	-		-		-		-	4.301	5.913	-
Earned Value/Finance/ Cost ACT-I	C/CPAF	ACT-I : Arlington, VA	4.500	3.500	Dec 2018	-		-		-		-	23.518	31.518	-
CIO BOS	C/CPAF	Various : TBD	7.801	0.000		-		-		-		-	0.000	7.801	-
System High BOS	C/CPAF	Various : Various	10.238	0.892	Dec 2018	-		-		-		-	95.066	106.196	-
Other CIO Services	Various	TBD : TBD	10.629	0.000		-		-		-		-	0.000	10.629	-
Operating Core Support	C/CPAF	Various : Various	0.000	11.074	Dec 2018	-		-		-		-	45.342	56.416	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons					Project (Number/Name) 675346 / F-35			

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Other Core Civ Pay	Various	NAWCAD/WD : TBD	20.372	28.299	Dec 2018	-		-		-		-	0.000	48.671	-
Other Core Contractor Sppt	C/CPAF	Not specified. : TBD	5.113	6.382	Dec 2018	-		-		-		-	0.000	11.495	-
Travel	Various	Various : Various	5.039	3.695	Dec 2018	-		-		-		-	8.569	17.303	-
Subtotal			139.994	104.618		-		-		-		-	408.406	653.018	N/A

Remarks

Breaking out HPSI AFLCMC funding from AFLCMC Civilian Pay line for visibility.
Added Other Core Civ Pay & Other Core Contractor Sppt to account for program operations support.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Subtotals	1,077.401	1,062.771	11.850	7.678	-	7.678	Continuing	Continuing	N/A
Other Service Funding Adjustment	434.530	647.773	-	-	-	-			-
Project Cost Totals	642.871	414.998	11.850	7.678	-	7.678	0.000	0.000	-

Remarks

The Project information shown here reflects USN, USMC, USAF and International Partner funding total for each contract. By agreement, USN and USMC funding shares are approximately equal and when combined are equal to the USAF share. Partner funding share is based upon future aircraft procurement numbers updated annually in accordance with the Production, Sustainment, Continuous Capability Development and Delivery (C2D2) (formerly Follow-on Modernization (FoM)) Memorandum of Agreement.

Subtotals and totals may not add due to rounding.

FY 2019 reflects \$414.998M USAF/\$215.366M USN/\$222.644M USMC/\$209.763M International/Total \$1,062.771M
 FY 2020 reflects \$11.850M USAF only; remaining efforts continue in PEs 0604840F/M/N
 FY 2021 reflects \$7.678M USAF only; remaining efforts continue in PEs 0604840F/M/N

F-35 C2D2 Includes:

- PE 0207142F BPAC 675346 - ends FY19
- USAF PE 0604840F BPAC 675346 - begins FY20
- FY13: USN PE 0604800N Project Unit 2261
- FY14: USN PE 0604800N Project Unit 9999
- FY15-18: USN PE 0604810N Project Unit 2936
- FY19: USN PE 0604840N Project Unit 2936
- FY13: USMC PE 0604800M Project Unit 2262
- FY14: USMC PE 0604800M Project Unit 9999

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 675346 / <i>F-35</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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FY15-18: USMC PE 0604810M Project Unit 2935 FY19: USMC PE 0604840M Project Unit 3410 International Partner Contributions									
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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 675346 / <i>F-35</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>F-35 UIDES and SEEK EAGLE</i>	
Ongoing support activities	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 675346 / <i>F-35</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>F-35 UIDES and SEEK EAGLE</i>				
Ongoing support activities	1	2019	4	2025

Note
Schedule for Block 4 efforts reflected in FY19 and continuing in PE 0604840F is depicted in R-4/R-4A exhibits for PE 0604840F

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons				Project (Number/Name) 675349 / HPSI			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675349: HPSI	0.000	0.000	16.754	18.415	0.000	18.415	19.854	20.246	0.000	0.000	0.000	75.269
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The F-35 Hybrid Product Support Integrator's (HPSI's) primary role is to integrate support across the supply chain, maintenance, sustainment engineering, logistics information technology and training disciplines. It will deliver enduring, global support for fielded F-35s while preparing for future force expansion. USAF only will fund additional PMA to transition to a final HPSI, which will support sustainment analysis with product support managers, focused on long-term strategic planning and transition to a final integrated support plan.

Funding for HPSI was previously programmed for in PE 27142F/BPAC 675346. This is not a new start.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Management Services	0.000	16.754	18.415	0.000	18.415
Description: This funding provides for the transition of the F-35 HPSI from multiple locations to Wright-Patterson Air Force Base (AFB). The funding supports HPSI AFLCMC civilian pay, contractor support and travel.					
FY 2020 Plans: HPSI AFLCMC civilian personnel, contractor support and travel.					
FY 2021 Base Plans: The HPSI organization will continue to transition to Wright-Patterson AFB. This funding provides for HPSI AFLCMC civilian pay, contractor support and travel.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to greater number of personnel at Wright-Patterson AFB as HPSI transition continues.					
Accomplishments/Planned Programs Subtotals	0.000	16.754	18.415	0.000	18.415

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

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 675349 / <i>HPSI</i>

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

Remarks

HPSI is an effort supporting F-35, a joint program with no executive service. Service Acquisition Executive (SAE) authority alternates between the Department of the Navy and the Department of the Air force and currently resides with the Navy.

D. Acquisition Strategy

The HPSI will deliver enduring, global support for fielded F-35s, integrating sustainment support across the supply chain, maintenance sustainment engineering, logistics, information technology and training.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675349 / HPSI
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
AFLCMC Civilian Pay	Allot	AFLCMC : TBD	0.000	-		10.902	Oct 2019	12.001	Oct 2020	-		12.001	0.000	22.903	-
Other Core Contractor Support	Various	Various : TBD	0.000	-		5.279	Oct 2019	5.783	Oct 2020	-		5.783	0.000	11.062	-
Travel	Various	Various : TBD	0.000	-		0.573	Oct 2019	0.631	Oct 2020	-		0.631	0.000	1.204	-
Subtotal			0.000	-		16.754		18.415		-		18.415	0.000	35.169	N/A
Project Cost Totals			0.000	-		16.754		18.415		-		18.415	0.000	35.169	N/A

Remarks
 Prior years reflect no funding because funding for HPSI in prior years was programmed under PE 27142F/BPAC 675346.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 675349 / HPSI
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Hybrid Product Support Integrator	
Management Support Activities	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 675349 / <i>HPSI</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Hybrid Product Support Integrator</i>				
Management Support Activities	1	2019	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676011: JSF DUAL CAPABLE AIRCRAFT	81.813	75.321	71.339	106.136	0.000	106.136	45.260	11.622	11.830	12.047	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

F-35 C2D2 Includes:

- USAF PE 0207142F BPAC 675346 - ends FY19
- USAF PE 0604840F BPAC 675346 - begins FY20
- FY13: USN PE 0604800N Project Unit 2261
- FY14: USN PE 0604800N Project Unit 9999
- FY15-18: USN PE 0604810N Project Unit 2936
- FY19: USN PE 0604840N Project Unit 2936
- FY13: USMC PE 0604800M Project Unit 2262
- FY14: USMC PE 0604800M Project Unit 9999
- FY15-18: USMC PE 0604810M Project Unit 2935
- FY19: USMC PE 0604840M Project Unit 3410
- International Partner Contributions

F-35 DCA Includes:

- USAF PE 0207142F BPAC 676011

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Operational Requirements Document (ORD) calls for the F-35A variant to have the capabilities and provisions for Dual Capable Aircraft (DCA) operations in the first post SDD block upgrade. DCA refers to the capability to carry and deliver conventional and non-conventional weapons. DCA operation for the F-35A is internal carriage of either one or two B-61-12 weapons.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Dual Capable Aircraft (DCA) (F-35 JSF)	75.321	71.339	106.136	0.000	106.136
Description: This effort provides for the assessment of Dual Capable Aircraft (DCA) weapon integration and certification impacts on the Joint Strike Fighter (JSF) aircraft. It identifies and mitigates potential technical and cost risks, as well as defines the integration and certification trade-space to field the DCA capability with the					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>B61-12 weapon. This effort also supports follow-on risk reduction efforts that will ensure future integration alignment with the earliest feasible post-SDD block upgrade, and is expected to include full integration efforts pending Service decisions.</p> <p>FY 2020 Plans: Continue execution of the Phase 2 C2D2 contract, completing: DCA Software Development, Separation Flight Testing, Mission System Flight Testing, and Preliminary AMAC Testing. The NSAR, TNSA, MICD, and EICD documentation for the initial nuclear certification will be completed. Delta Nuclear Certification activities will ramp up in order to certify Lot 14 F-35As, that contain additional DCA hardware and software, as well as Lot 15 F-35As which comprises of a major hardware upgrade, TR-3. The initial nuclear certification hardware and software development and testing is finished by the prime contractor, Lockheed Martin. At this point the capability is considered MFR (Military Flight Release) complete and ready for graduation certification events in FY2021.</p> <p>FY 2021 Base Plans: Continue execution of the Phase 2 C2D2 contract, completing: DCA Software Development, Separation Flight Testing, Mission System Flight Testing, and Preliminary AMAC Testing. The NSAR, TNSA, MICD, and EICD documentation for the initial nuclear certification will be completed. Delta Nuclear Certification activities continue in order to certify Lot 14 F-35As, that contain additional DCA hardware and software, as well as Lot 15 F-35As which comprises of a major hardware upgrade, TR-3. Continue initial nuclear certification hardware and software development and testing by the prime contractor, Lockheed Martin. In addition, the capability is considered MFR (Military Flight Release) complete and ready for graduation certification events ramp up in FY2021. Initiate the DCA monitor and control on a production aircraft as well as monitor and control graduation event on production aircraft. Complete full-up guide weapons test drops using production aircraft, initiate interim operational plan data document, and complete the final aircraft nuclear safety analysis report.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to planned program ramp up of DCA testing and development efforts.</p>					
Accomplishments/Planned Programs Subtotals	75.321	71.339	106.136	0.000	106.136

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RDTE 07 PE 0207142F 5346: JSF Follow on Modernization, BPAC 675346	414.998	11.850	7.678	-	7.678	4.940	4.188	3.737	3.806	Continuing	Continuing
• RDTE 07 PE 0604840F: F-35A Continuous Capability Development and Delivery	-	642.371	785.336	-	785.336	549.279	450.915	521.012	586.709	Continuing	Continuing
• RDTE 07 PE 0604840N 2936: F-35C Continuous Capability Development and Delivery (CV)	215.366	354.960	413.875	-	413.875	284.709	198.878	214.861	199.694	Continuing	Continuing
• RDTE 07 PE 0604840M 3410: F-35B Continuous Capability Development and Delivery (STOVL)	222.644	391.165	379.549	-	379.549	323.597	294.404	283.981	244.932	Continuing	Continuing
• RDTE International: International Continuous Capability Development and Delivery	209.763	258.004	359.626	-	359.626	285.969	211.292	208.053	177.542	Continuing	Continuing

Remarks

Service Acquisition Executive (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Navy.

Program Element 0604800N/M continues USN development efforts budgeted in 0603800N prior to FY2002.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark and Norway are international participants in the SDD and C2D2 phases of JSF.

Department of Navy funding in PEs 0604810N/M in FY18 and prior continue in 0604840N/M as the budget moved from BA05 to BA07.

D. Acquisition Strategy

The DCA effort will leverage contracting vehicles for the overall Block 4 F-35 C2D2 effort. The C2D2 acquisition strategy is to employ both Cost and Fixed Price Incentive contracts for the Block 4 engineering and development efforts. A new modernization contract structure will be established for all post SDD Block 4 efforts. In addition, a separate Basic Ordering Agreement or Indefinite Quantity/Indefinite Delivery contract is planned to provide a long term approach to upgrading and maintaining laboratories and test aircraft and supporting technology maturation for future C2D2 capabilities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020				
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons					Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT				

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Block 4 Phase 1 - DCA Requirements Decomposition	SS/CPFF	Lockheed Martin : Ft. Worth, TX	21.572	-		-		-		-		-	Continuing	Continuing	-
Block 4 Phase 2.1 - DCA to PDR	SS/CPFF	Lockheed Martin : Ft. Worth, TX	8.080	19.990	Jan 2019	-		-		-		-	Continuing	Continuing	-
Block 4 Phase 2.3 - DCA to DT Complete	SS/CPFF	Lockheed Martin : Ft. Worth, TX	4.515	17.617	Feb 2019	32.200	Feb 2020	39.300	Feb 2021	-		39.300	Continuing	Continuing	-
Delta Certification	SS/CPFF	Lockheed Martin : Ft. Worth, TX	0.000	10.664	Jun 2019	15.839	Mar 2020	19.400	Mar 2021	-		19.400	Continuing	Continuing	-
Prior Year - no longer funded in FYDP	Various	Not specified. : TBD	1.739	-		-		-		-		-	0.000	1.739	-
Prior Year - Block 4 Realignment	C/CPAF	Not specified. : TBD	14.676	-		-		-		-		-	0.000	14.676	-
Subtotal			50.582	48.271		48.039		58.700		-		58.700	Continuing	Continuing	N/A

Remarks
FY17 has not been updated for actuals in official budgetary systems to reflect FY17 movement from BPAC 676011 to 675346 (total \$14.676M)

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
B61-12/F-35 Certification	Various	Various : TBD	26.356	21.340	Feb 2019	17.040	Feb 2020	22.800	Feb 2021	-		22.800	Continuing	Continuing	-
Tail-kit Program Office	MIPR	TKA SPO : Eglin AFB, FL	1.900	3.300	Feb 2019	4.900	Feb 2020	6.800	Mar 2021	-		6.800	Continuing	Continuing	-
AFNWC/AFSEC Support	MIPR	Various : TBD	1.360	2.410	Feb 2018	1.360	Feb 2020	4.200	Feb 2021	-		4.200	Continuing	Continuing	-
Prior Year - no longer funded in FYDP	Various	Various : TBD	0.791	-		-		-		-		-	0.000	0.791	-
Subtotal			30.407	27.050		23.300		33.800		-		33.800	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation Edwards	C/CPAF	Testing : Edwards, CA	0.000	-		-		6.200	Feb 2021	-		6.200	0.000	6.200	-
Air Force SEEK EAGLE Office (Combat Weapons Delivery Software)	MIPR	Testing : Eglin, FL	0.000	-		-		2.000	Feb 2021	-		2.000	0.000	2.000	-
Prior Year - no longer funded in FYDP	Various	Not specified. : TBD	0.824	-		-		-		-		-	0.000	0.824	-
Subtotal			0.824	-		-		8.200		-		8.200	0.000	9.024	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		5.436	Feb 2021	-		5.436	0.000	5.436	-
Subtotal			0.000	-		-		5.436		-		5.436	0.000	5.436	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		81.813	75.321	71.339	106.136	-	106.136	Continuing	Continuing	N/A

Remarks
 F-35 C2D2 Includes:
 USAF PE 0207142F BPAC 675346 - ends FY19
 USAF PE 0604840F BPAC 675346 - begins FY20
 FY13: USN PE 0604800N Project Unit 2261
 FY14: USN PE 0604800N Project Unit 9999
 FY15-18: USN PE 0604810N Project Unit 2936
 FY19: USN PE 0604840N Project Unit 2936
 FY13: USMC PE 0604800M Project Unit 2262
 FY14: USMC PE 0604800M Project Unit 9999
 FY15-18: USMC PE 0604810M Project Unit 2935
 FY19: USMC PE 0604840M Project Unit 3410
 International Partner Contributions

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 676011 / <i>JSF DUAL CAPABLE AIRCRAFT</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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F-35 DCA Includes:
USAF PE 0207142F BPAC 676011

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons	Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

676011: JSF Dual Capable Aircraft	
Nuclear Certification - NNSA & TKA SPO	
Phase 1 (Nuclear Certification Tasks) Requirements Decomposition	
Phase 2.1 (Nuclear Certification Tasks) DCA to Preliminary Design Review (PDR)	
Phase 2.3 (Nuclear Certification Tasks) DCA to DT Complete	
Delta Certification of Hardware/Software Upgrades	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207142F / <i>F-35 Squadrons</i>	Project (Number/Name) 676011 / <i>JSF DUAL CAPABLE AIRCRAFT</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
676011: JSF Dual Capable Aircraft				
Nuclear Certification - NNSA & TKA SPO	1	2019	4	2023
Phase 1 (Nuclear Certification Tasks) Requirements Decomposition	1	2019	2	2019
Phase 2.1 (Nuclear Certification Tasks) DCA to Preliminary Design Review (PDR)	1	2019	4	2021
Phase 2.3 (Nuclear Certification Tasks) DCA to DT Complete	1	2019	4	2023
Delta Certification of Hardware/Software Upgrades	3	2019	4	2025

Note

Schedule details reflect fiscal years

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207146F / F-15EX
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	159.761	0.000	159.761	0.000	0.000	0.000	83.871	0.000	243.632
670131: <i>F-15EX</i>	-	0.000	0.000	159.761	0.000	159.761	0.000	0.000	0.000	0.000	0.000	159.761
676020: <i>F-15*</i>	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	83.871	0.000	83.871

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2021

Note

The total F-15EX RTD&E funding for FY20 in the amount of \$431.8M resides in Program 0207134F Project 670131 (\$67.4M) and Project 676020 (\$364.4M).

A. Mission Description and Budget Item Justification

A refresh of the F-15C/D fleet is critical to maintaining combat viability (lethality, survivability, and supportability) in support of the 2018 National Defense Strategy. Older F-15C/D aircraft will be replaced to maintain a viable mix of 4th and 5th-generation fighters for the next 20+ years. The F-15EX will be based on the 2-seat F-15QA (Qatar) configuration upgraded with USAF only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. With two seats, it will be multirole-capable and operable by one or two aircrew. Many F-15C/Ds are beyond their service life and have serious structural risks, wire chafing issues, and obsolete parts. Readiness goals are unachievable due to continuous structural inspections, time consuming repairs, and on-going modernization efforts. The average F-15C/D is 36 years old with over 8,400 flight hours; the oldest F-15C was delivered in 1979. Logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

Funds may be used to manufacture aircraft, support equipment, and initial spares to support test activities; integrate hardware and software subsystems; upgrade training systems and systems integration labs; develop training materials and technical manuals; pursue other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities; resolve Diminishing Manufacturing Sources/ Material Shortages (DMSMS) and/or obsolescence issues; fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness; and cover other related requirements to manufacture and sustain the test aircraft.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-15 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207146F / F-15EX
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	159.761	0.000	159.761
Total Adjustments	0.000	0.000	159.761	0.000	159.761
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	159.761	0.000	159.761

Change Summary Explanation

The F-15EX program was an FY20 new start in PE 0207134F F-15E. In FY21 F-15EX program funding moved from PE 0207134F F-15E to PE 0207146F F-15EX.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207146F / F-15EX				Project (Number/Name) 670131 / F-15EX			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
670131: F-15EX	-	0.000	0.000	159.761	0.000	159.761	0.000	0.000	0.000	0.000	0.000	159.761
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The total F-15EX RTD&E funding for FY20 in the amount of \$431.8M resides in Program 0207134F Project 670131 (\$67.4M) and Project 676020 (\$364.4M).

A. Mission Description and Budget Item Justification

A refresh of the F-15C/D fleet is critical to maintaining combat viability (lethality, survivability, and supportability) in support of the 2018 National Defense Strategy. Older F-15C/D aircraft will be replaced to maintain a viable mix of 4th and 5th-generation fighters for the next 20+ years. The F-15EX will be based on the 2-seat F-15QA (Qatar) configuration upgraded with USAF only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. With two seats, it will be multirole-capable and operable by one or two aircrew. Many F-15C/Ds are beyond their service life and have serious structural risks, wire chafing issues, and obsolete parts. Readiness goals are unachievable due to continuous structural inspections, time-consuming repairs, and on-going modernization efforts. The average F-15C/D is 36 years old with over 8,400 flight hours; the oldest F-15C was delivered in 1979. Logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

Funds may be used to manufacture aircraft, support equipment, and initial spares to support test activities; integrate hardware and software subsystems; upgrade training systems and systems integration labs; develop training materials and technical manuals; pursue other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities; resolve Diminishing Manufacturing Sources/ Material Shortages (DMSMS) and/or obsolescence issues; fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness; and cover other related requirements to manufacture and sustain the test aircraft.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-15 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: F-15EX	-	0.000	159.761	0.000	159.761
Description: FY 2020 funding resides in Program 0207134F Project 670131 and Program 0207134F Project 676020. F-15EX will refresh the F-15C/D fleet with new aircraft based on the F-15QA Foreign Military Sales (FMS) configuration being sold to Qatar. The program will also incorporate USAF-only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207146F / F-15EX	Project (Number/Name) 670131 / F-15EX

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A. See PE 0207134F F-15E.					
<i>FY 2021 Base Plans:</i> Continue OFP integration efforts, including merging F-15EX-unique software back into the common F-15 OFP in Suite 9.2. Continue upgrading training systems and systems integration labs; developing training materials and technical manuals; and pursuing other non-recurring engineering activities to reduce integration risks, ramp up the production line capacity, prepare for flight testing, and investigate technology insertion opportunities.					
<i>FY 2021 OCO Plans:</i> N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> FY 2020 funding resides in Program 0207134F Project 670131 and Program 0207134F Project 676020.					
Accomplishments/Planned Programs Subtotals	-	0.000	159.761	0.000	159.761

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 01 F015E0: F-15EX	-	621.100	-	-	-	-	-	-	-	0.000	621.100
• APAF 01 F015EX: F-15EX	-	-	1,403.347	-	1,403.347	1,346.652	1,502.155	2,217.670	2,226.026	Continuing	Continuing
• RDTE 07 0207134F: F-15E Squadrons	196.035	684.229	458.669	-	458.669	243.462	199.320	73.884	2.098	Continuing	Continuing

Remarks

D. Acquisition Strategy

The F-15EX design will be based on the F-15QA (Qatar) configuration upgraded with USAF-only capabilities like the Eagle Passive Active Warning and Survivability System (EPAWSS) and the Suite 9.1 Operational Flight Program (OFP) software. Since most subsystems are projected to be mature when required for integration into the F-15EX, the acquisition strategy is deemed low risk. To rapidly field the F-15EX, the USAF plans to focus engineering activities on integrating existing systems and ramping up the production line capacity. Test activities will likewise be tailored to focus on integration of F-15QA, EPAWSS, and the Suite 9.1 OFP, taking appropriate credit for previous USAF and FMS testing. Finally, logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207146F / F-15EX	Project (Number/Name) 670131 / F-15EX
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
F-15EX	Various	Various : Various	-	-		-		146.761	Jan 2021	-		146.761	Continuing	Continuing	-
Subtotal			-	-		-		146.761		-		146.761	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Flight Test	Various	Eglin: : Various	-	-		-		4.600	Jan 2021	-		4.600	Continuing	Continuing	-
Subtotal			-	-		-		4.600		-		4.600	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFLCMC Civ Pay	Various	AFLCMC CIV PAY: : WPAFB & Robins AFBs	-	-		-		6.800	Oct 2020	-		6.800	Continuing	Continuing	-
Program Management Administration	Various	Various: : Various	-	-		-		1.600	Oct 2020	-		1.600	Continuing	Continuing	-
Subtotal			-	-		-		8.400		-		8.400	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals		-	-	0.000	159.761	-	Continuing	Continuing

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207146F / F-15EX	Project (Number/Name) 670131 / F-15EX
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

F-15EX	
F-15EX NRE and Integration	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207146F / <i>F-15EX</i>	Project (Number/Name) 670131 / <i>F-15EX</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>F-15EX</i>				
F-15EX NRE and Integration	2	2021	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	194.623	29.042	10.314	19.417	0.000	19.417	26.760	21.187	14.254	14.515	55.471	385.583
674132: <i>AIM-9 Product Improvement</i>	194.623	29.042	10.314	19.417	0.000	19.417	26.760	21.187	14.254	14.515	55.471	385.583
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code: 442

Note

Funding in FY11 and beyond is for the Block II program only. The AIM-9X Block I program costs for FY11 and prior are \$233.583M.

A. Mission Description and Budget Item Justification

The AIM-9X Block II/II+ Sidewinder (AIM-9X Blk II/II+) continues the evolution of the AIM-9 series of missiles. This missile program delivers a launch and leave, air combat munition that uses passive Infrared (IR) energy to acquire and track enemy air targets and complements the radar guided Advanced Medium Range Air-to-Air Missile (AMRAAM). The missile provides first shot, first kill opportunities while conducting basic fighter maneuvering (dogfighting) Within Visual Range (WVR) which is essential for aircrew survival. The AIM-9X provides these opportunities with unmatched offensive and defensive capabilities against threats WVR, even when IR countermeasures are employed. The AIM-9X also provides air superiority in the Beyond Visual Range (BVR) air-to-air battle. Anti-tamper features have been incorporated to protect improvements inherent in this design. The AIM-9X Block II missile is critical for projecting power and winning decisively against threats identified in Defense Planning Guidance and the Air Force Strategic Master Plan.

AIM-9X is a Post Milestone C, Acquisition Category IC (ACAT-IC) joint service program led by the Department of the Navy. The Block II program has completed independent operational testing and found to be operationally effective and operational/suitable. The program achieved Air Force Initial Operational Capability (IOC) in September 2016 and received Full Rate Production decision in August 2015. The first Full Rate Production Lot contract was awarded in September 2015. This budget line will continue technical refresh of critical obsolete components, implement cost reduction initiatives, improve insensitive munitions performance, correct deficiencies, and increase capabilities through software enhancements, and conduct testing to ensure platform integration onto threshold US Air Force aircraft.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AIM-9X weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	37.230	10.314	19.452	0.000	19.452
Current President's Budget	29.042	10.314	19.417	0.000	19.417
Total Adjustments	-8.188	0.000	-0.035	0.000	-0.035
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-7.261	0.000			
• SBIR/STTR Transfer	-0.927	0.000			
• Other Adjustments	0.000	0.000	-0.035	0.000	-0.035
 Change Summary Explanation					
FY 2019 reduction of \$7.261M for higher Air Force priorities					
FY 2019 reduction of \$0.927M for SBIR					
FY 2021 reduction of \$0.035M for inflation adjustment					

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: AIM- 9X Product Development	27.147	9.049	17.699
Description: Continuation of Primary Hardware Development/Pre-Planned Product Improvement (Tech Refresh) efforts for the AIM-9X weapon system. This includes Systems Engineering / Program management, as well as support required to ensure AIM-9X missile integration with threshold US Air Force aircraft platforms. This also includes efforts to redesign missile components in order to resolve obsolescence to ensure missile producibility and increase reliability. Improve anti-tamper and cyber security technology improvements, implement cost reduction initiatives, and comply with the Insensitive Munitions (IM) requirements. In addition, the program will evaluate and begin risk reduction efforts that will address hardware and software improvements to facilitate follow-on capability and mitigate obsolescence.			
FY 2020 Plans: Continue Engineering Manufacturing Development required to redesign, integrate, test and qualify components due to obsolescence and implement cost reduction initiatives to include System Improvement Program (SIP) III Inertial Measurement Unit and processor hardware Critical Design Review (CDR). Continue to support v9.4 Block II software improvements to pace the threat and fully utilize the capabilities of the missile. Continue anti-tamper and cyber security technology improvements. Continue			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
to develop missile hardware design improvements necessary to enhance IM performance. Evaluate and begin risk reduction efforts that will address hardware and software improvements to facilitate follow-on capability and mitigate obsolescence. FY 2021 Plans: Continue Engineering Manufacturing Development required to redesign, integrate, test and qualify components due to obsolescence and implement cost reduction initiatives to include execution of SIP III Inertial Measurement Unit and processor hardware. In addition, continue development of the version 10.4 software, as well continue to support v9.4 Block II software testing. Continue anti-tamper and cyber security technology improvements. Continue to develop missile hardware design improvements necessary to enhance IM performance. Continue evaluation and risk reduction efforts to address hardware and software improvements to facilitate follow-on capability and obsolescence mitigation. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to FY20 funding reductions to account for the availability of prior year execution balances.			
Title: AIM-9X, Test and Evaluation Description: Test and Evaluation (T&E) and associated governmental support required to ensure the AIM-9X missile integration with US Air Force aircraft platforms. Developmental and Operational testing of Operation Flight Software. FY 2020 Plans: Complete Developmental integration and Testing DT/IT-D1 of Operational Flight Software v9.4 including improvements associated with additional integrating on Air Force aircraft. FY 2021 Plans: Complete Operational Testing (OT-D1) of Operational Flight Software v9.4 and field v9.4 Block II software. Flight test Operational Flight Software v10.4. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to FY20 funding reductions to account for the availability of prior year execution balances.	1.895	1.265	1.718
Accomplishments/Planned Programs Subtotals	29.042	10.314	19.417

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	Total Cost
			Base	OCO	Total					Complete	
• MPAF 02 Line Item M09HAI: <i>Sidewinder (AIM-9X)</i>	118.253	155.289	164.769	-	164.769	117.514	121.816	120.381	122.537	1,368.894	2,289.453

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 04 Line Item 000999: <i>Replen Spares, USAF</i>	2.713	5.818	5.906	-	5.906	6.026	6.133	6.243	6.354	0.000	39.193
• MPAF 04 Line Item 000999 <i>(2)...: Inital Spares, USAF</i>	1.800	0.234	1.861	-	1.861	2.699	2.732	1.968	2.004	51.185	64.483
• RDTE 07 PE 0207161N: <i>Tactical AIM Missile</i>	36.444	19.488	5.859	-	5.859	6.015	3.948	1.637	0.445	0.000	73.836
• WPN Line Item 2209: <i>Sidewinder</i>	121.481	149.239	126.485	-	126.485	110.636	97.194	124.508	126.523	1,323.166	2,179.232

Remarks

E. Acquisition Strategy

Milestone C decision for Low Rate Initial Production (LRIP) was held June 24, 2011. The program received USN Initial Operational Capability (IOC) in March 2015 and Full Rate Production (FRP) Approval in August 2015 followed by contract award for FRP-1 in September 2015. The Air Force achieved IOC in September 2016. The program awarded the FRP-3 contract in March 2017, awarded FRP-4 in December 2018, and awarded FRP-5 in April 2019. The program plans to award FRP-6 in February 2020. In February 2019, the Acquisition Program Baseline for the Navy and USAF was revised to increase total missile procurements and extend missile procurements through 2035.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>	Project (Number/Name) 674132 / <i>AIM-9 Product Improvement</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software/OFP Upgrade/Hdw Development	SS/CPFF	RMS : Tucson, AZ	141.584	24.271	Jun 2019	4.305	May 2020	13.694	Oct 2020	-		13.694	99.568	283.422	312.877
Flight Termination System	MIPR	NAWC WD : China Lake, CA	2.699	0.360	Dec 2019	2.195	Feb 2020	2.000	Feb 2021	-		2.000	7.488	14.742	-
Munitions Improvement Study (USG)	MIPR	NAWC WD : China Lake, CA	11.943	0.500	Apr 2019	0.500	Apr 2020	0.500	Apr 2021	-		0.500	3.401	16.844	-
Systems Engineering (USG)	MIPR	NAWC WD : China Lake, CA	3.625	0.494	May 2019	1.050	Feb 2020	0.500	Feb 2021	-		0.500	3.205	8.874	-
Aircraft Integration	SS/CPFF	Boeing : St. Louis, MO	0.762	0.126	Apr 2019	0.125	May 2020	0.125	May 2021	-		0.125	0.850	1.988	2.112
Subtotal			160.613	25.751		8.175		16.819		-		16.819	114.512	325.870	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DT&E/OT&E	PO	Eglin AFB : Eglin, FL	26.224	1.537	May 2019	1.089	Jan 2020	1.542	Jan 2021	-		1.542	10.491	40.883	-
IT/OT Support F-15	SS/CPAF	RMS : Tuscon, AZ	0.155	0.358	Mar 2019	0.176	May 2020	0.176	May 2021	-		0.176	1.197	2.062	0.994
Subtotal			26.379	1.895		1.265		1.718		-		1.718	11.688	42.945	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA	Various	Eglin AFB : Eglin, FL	7.631	1.396	Jan 2019	0.874	Jan 2020	0.880	Jan 2021	-		0.880	5.987	16.768	8.904
Subtotal			7.631	1.396		0.874		0.880		-		0.880	5.987	16.768	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			194.623	29.042	10.314	19.417	-	19.417	132.187	385.583	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>	Project (Number/Name) 674132 / <i>AIM-9 Product Improvement</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<u>Remarks</u>									

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>	Project (Number/Name) 674132 / <i>AIM-9 Product Improvement</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
AIM-9X Production Milestones																												
Contract Award: Lot 19 (FRP 5)			■																									
Contract Award: Lot 20 (FRP 6)						■																						
Contract Award: Lot 21 (FRP 7)										■																		
Contract Award: Lot 22 (FRP 8)														■														
Contract Award: Lot 23 (FRP 9)																			■									
Contract Award: Lot 24 (FRP 10)																										■		
Contract Award: Lot 25 (FRP 11)																											■	
Production Deliveries: Lot 16 (FRP 2)	■	■	■																									
Production Deliveries: Lot 17 (FRP 3)			■	■	■																							
Production Deliveries: Lot 18 (FRP 4)					■	■	■	■																				
Production Deliveries: Lot 19 (FRP 5)									■	■	■	■																
Production Deliveries : Lot 20 (FRP 6)																■	■	■										
Production Deliveries: Lot 21 (FRP 7)																					■	■	■					
Production Deliveries: Lot 22 (FRP 8)																										■	■	
Production Deliveries: Lot 23 (FRP 9)																											■	
AIM-9X Block II System Improvement Program (SIP) II																												
Operational Flight Software Release v9.317			■																									
AIM-9X Block II Tech Refresh (SIP III): Hardware																												
Controlled Actuation System (CAS) Battery Design			■	■	■																							
Phase II Hardware (IMU, Dome & Processor)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Phase II Hardware Critical Design Review							■																					

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>	Project (Number/Name) 674132 / <i>AIM-9 Product Improvement</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Phase II Hardware Cut In: Engineering Change Proposal																												
AIM-9X Block II Tech Refresh (SIP III): Software																												
Software v9.4 Improvements: Development Testing (DT-D1)	█	█	█																									
Software v9.4 Improvements: Development Test / Integrated Testing (DT/IT-D1)	█	█	█	█																								
Insensitive Munition Warhead Risk Reduction, Studies and Testing	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Software v9.4 Improvements: Operational Test Readiness Review (OTRR)								█																				
Software v9.4 Improvements: Operational Testing (OT-D1)								█																				
Software v9.4 Improvements: Software v9.4 Release												█																
Software v10.4 Rehost: Development Testing (DT-D2)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█												
Software v10.4 Rehost: Software v10.4 Release																█												
AIM-9X Block II Tech Refresh (SIP IV)																												
Hardware and Software Obsolescence								█																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>	Project (Number/Name) 674132 / <i>AIM-9 Product Improvement</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AIM-9X Production Milestones</i>				
Contract Award: Lot 19 (FRP 5)	3	2019	3	2019
Contract Award: Lot 20 (FRP 6)	2	2020	2	2020
Contract Award: Lot 21 (FRP 7)	2	2021	2	2021
Contract Award: Lot 22 (FRP 8)	2	2022	2	2022
Contract Award: Lot 23 (FRP 9)	2	2023	2	2023
Contract Award: Lot 24 (FRP 10)	2	2024	2	2024
Contract Award: Lot 25 (FRP 11)	2	2025	2	2025
Production Deliveries: Lot 16 (FRP 2)	1	2019	3	2019
Production Deliveries: Lot 17 (FRP 3)	3	2019	2	2020
Production Deliveries: Lot 18 (FRP 4)	2	2020	2	2021
Production Deliveries: Lot 19 (FRP 5)	2	2021	4	2022
Production Deliveries : Lot 20 (FRP 6)	1	2023	4	2023
Production Deliveries: Lot 21 (FRP 7)	4	2023	3	2024
Production Deliveries: Lot 22 (FRP 8)	3	2024	2	2025
Production Deliveries: Lot 23 (FRP 9)	3	2025	4	2025
<i>AIM-9X Block II System Improvement Program (SIP) II</i>				
Operational Flight Software Release v9.317	2	2019	2	2019
<i>AIM-9X Block II Tech Refresh (SIP III): Hardware</i>				
Controlled Actuation System (CAS) Battery Design	2	2019	3	2020
Phase II Hardware (IMU, Dome & Processor)	1	2019	1	2022
Phase II Hardware Critical Design Review	3	2020	3	2020
Phase II Hardware Cut In: Engineering Change Proposal	4	2021	4	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207161F / <i>Tactical AIM Missiles</i>	Project (Number/Name) 674132 / <i>AIM-9 Product Improvement</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AIM-9X Block II Tech Refresh (SIP III): Software</i>				
Software v9.4 Improvements: Development Testing (DT-D1)	1	2019	3	2019
Software v9.4 Improvements: Development Test / Integrated Testing (DT/IT-D1)	1	2019	3	2020
Insensitive Munition Warhead Risk Reduction, Studies and Testing	1	2019	2	2025
Software v9.4 Improvements: Operational Test Readiness Review (OTRR)	2	2020	2	2020
Software v9.4 Improvements: Operational Testing (OT-D1)	2	2020	1	2021
Software v9.4 Improvements: Software v9.4 Release	3	2021	3	2021
Software v10.4 Rehost: Development Testing (DT-D2)	1	2019	1	2022
Software v10.4 Rehost: Software v10.4 Release	3	2022	3	2022
<i>AIM-9X Block II Tech Refresh (SIP IV)</i>				
Hardware and Software Obsolescence	1	2020	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	605.292	50.728	55.384	51.799	0.000	51.799	54.993	50.485	32.037	68.185	97.894	1,066.797
673777: <i>AMRAAM</i>	605.292	50.728	55.384	51.799	0.000	51.799	54.993	50.485	32.037	68.185	97.894	1,066.797
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 185

A. Mission Description and Budget Item Justification

The Air Force and Navy continue to develop improvements to the Advanced Medium Range Air-to-Air Missile (AMRAAM) to counter existing and emerging air vehicle threats operating at high or low altitude, and having advanced Electronic Attack (EA) capabilities. The development program also enables AMRAAM compatibility with advanced fighters, enhances AMRAAM capability and operational flexibility against current and projected threats, incorporates high payoff technology development, performs risk reduction activities, and investigates new variants and/or alternate missions that may use AMRAAM attributes. The latest AMRAAM variant, the AIM-120D, delivers improved performance via Global Positioning System (GPS)-aided navigation; two-way datalink capability for enhanced aircrew survivability and improved network compatibility; and incorporates new guidance software that improves kinematic performance and weapon effectiveness. Operational Testing (OT) was completed in Jul 14 and the Air Force and Navy authorized operational fielding in Jan 15. The Navy declared Initial Operational Capability (IOC) in Jan 15 and the Air Force declared IOC in Jul 15. The program continues to address aircraft integration efforts to maintain compatibility/performance of the missile with changes occurring on threshold AMRAAM platforms per the Capability Production Document (CPD). To keep the existing inventory as effective as possible and address findings from the field, the Air Force and Navy also develop, test, and field improvements that are implemented via software upgrades reprogrammed into fielded AMRAAMs, and/or hardware upgrades inserted into production units. AMRAAM is a joint Air Force/Navy, Acquisition Category IC (ACAT IC) program with Air Force as lead service.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AMRAAM weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	57.293	55.384	52.794	0.000	52.794
Current President's Budget	50.728	55.384	51.799	0.000	51.799
Total Adjustments	-6.565	0.000	-0.995	0.000	-0.995
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-4.741	0.000			
• SBIR/STTR Transfer	-1.824	0.000			
• Other Adjustments	0.000	0.000	-0.995	0.000	-0.995

Change Summary Explanation

FY 2019 reduction of \$4.741M for higher Air Force Priorities
 FY 2019 reduction of \$1.824M for SBIR
 FY 2021 reduction of \$0.995M for decreased development activities

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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Title: System Improvement Program (SIP)	27.201	30.096	27.323
Description: Continuation of System Improvement Program (SIP) / Risk Reduction (RR) efforts for the AMRAAM weapons system. These include systems engineering, program management, missile software and/or hardware upgrades to increase capability, survivability, lethality, as well as aircraft Operational Flight Program (OFP) updates on a recurring basis.			
FY 2020 Plans: Continue SIP-3 Engineering and Manufacturing Development (EMD), and conduct a Functional Configuration Audit (FCA) and Operational Test Readiness Review (OTRR) to begin Operational Test (OT). Begin SIP-3F software development on the AIM-120D3 missile hardware configuration. Continue SIP-4 RR and early software development builds. Continue the AIM-120 Candidate Selection Process (CSP) to analyze warfighters' priority deficiencies and enhancements. Continue AIM-120C3-C7 software development to address emerging threats.			
FY 2021 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Complete SIP-3 OT and deliver the tactical AIM-120D software to the field. Continue SIP-3F software development builds and complete SIP-4 RR to mature software for the AIM-120D3 (F3R) configuration. Continue the AIM-120 CSP to analyze warfighters' priority deficiencies and enhancements. Continue AIM-120C3-C7 software development to address emerging threats. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to completion of SIP-3 EMD.				
Title: Test and Evaluation Description: Provides support to Developmental Testing/Operational Testing (DT/OT); develops test resources and equipment necessary to complete DT/OT events; provides contractor field team support personnel and services. FY 2020 Plans: Continue to develop new test resources and provide support personnel necessary to meet AIM-120 DT/OT test requirements. FY 2021 Plans: Continue to develop new test resources and provide support personnel necessary to meet AIM-120 DT/OT test requirements. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to end of Developmental Test for SIP 3 EMD.		19.788	20.578	19.402
Title: Aircraft Integration Description: Supports the integration of AIM-120 on multiple aircraft platforms as AIM-120 and/or software and hardware is updated. FY 2020 Plans: Continue integration and testing of AIM-120 on multiple aircraft platforms. FY 2021 Plans: Continue integration and testing of AIM-120 on multiple aircraft platforms. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to inflation indices applied to program office estimate.		3.739	4.710	5.074
Accomplishments/Planned Programs Subtotals		50.728	55.384	51.799

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 02 Line Item MAMRA0: <i>Missile Procurement, Air Force</i>	307.486	311.730	453.223	-	453.223	406.999	444.464	454.837	597.133	305.747	3,281.619
• MPAF 04 Line Item 000999: <i>Initial Spares/Repair Parts</i>	0.023	0.529	2.091	-	2.091	3.049	3.087	2.211	2.251	2.296	15.537
• MPAF 04 Line Item 000999 <i>Replen: Replen Spares/Repair Parts</i>	0.839	0.854	0.868	-	0.868	0.886	0.902	0.918	0.935	0.954	7.156
• MPAF 02 Line Item 2206: <i>Weapons Procurement, Navy</i>	188.441	211.827	326.952	-	326.952	344.998	363.244	227.255	240.051	0.000	1,902.768
• RDTE 07 Line Item 0981: <i>RDTE, Navy</i>	27.698	34.191	44.323	-	44.323	33.258	25.599	26.121	26.151	80.542	297.883

Remarks

E. Acquisition Strategy

System Improvement Program (SIP) is underway as part of the AIM-120 missile upgrade program. SIP-2 fielding planned for 3QFY20. SIP-3 EMD is a Cost Plus Incentive Fee (CPIF) effort that was awarded in Sep 17 and primarily incorporates Electronic Protection Improvement Program (EPIP) Advanced software capabilities in the AIM-120D. SIP-3 fielding is planned for 4QFY21. SIP-4 RR is a Cost Plus Fixed Fee (CPFF) effort that was awarded in May 19. SIP 4 Development planned to begin 4QFY21.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)					
3600 / 7				PE 0207163F / Advanced Medium Range Air-to-Air Missile (AMRAAM)						673777 / AMRAAM					
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Electronic Protection Improvement Program (EPIP)	Various	Raytheon : Tucson, AZ	86.959	-		-		-		-		-	0.000	86.959	86.959
System Improvement Program (SIP)	Various	Raytheon : Tucson, AZ	183.460	26.143	Jun 2019	28.270	Jun 2020	26.163	Jun 2021	-		26.163	126.030	390.066	382.104
F-22 Aircraft Integration	MIPR	Wright-Patterson AFB : Dayton, OH	114.890	-		-		-		-		-	0.000	114.890	114.890
Aircraft Integration Support	SS/CPFF	Raytheon : Tucson, AZ	10.530	3.739	May 2019	4.710	May 2020	5.074	May 2021	-		5.074	29.440	53.493	56.746
Subtotal			395.839	29.882		32.980		31.237		-		31.237	155.470	645.408	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Test	Various	Various : Various	79.510	4.199	Jan 2019	8.630	Jan 2020	6.306	Jan 2021	-		6.306	43.772	142.417	136.151
Test Support	SS/CPFF	Raytheon : Various	114.128	15.589	Jan 2019	11.948	Jan 2020	13.096	Jan 2021	-		13.096	92.411	247.172	245.425
Subtotal			193.638	19.788		20.578		19.402		-		19.402	136.183	389.589	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Administration	Various	Various : Various	15.815	1.058	Jan 2019	1.826	Jan 2020	1.160	Jan 2021	-		1.160	11.940	31.799	37.706
Subtotal			15.815	1.058		1.826		1.160		-		1.160	11.940	31.799	N/A
Project Cost Totals			605.292	50.728		55.384		51.799		-		51.799	303.593	1,066.796	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>	Project (Number/Name) 673777 / AMRAAM

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
AMRAAM Development Program																												
AIM-120D SIP-2 EMD																												
AIM-120D SIP-2 IOC																												
AIM-120D SIP-3 EMD																												
AIM-120D SIP-3 FCA																												
AIM-120D SIP-3 IOC																												
AIM-120D SIP-3F Development																												
AIM-120D SIP-3F FCA																												
AIM-120D SIP-3F IOC																												
AIM-120D SIP-4 RR																												
AIM-120D SIP-4 Development																												
AIM-120D SIP-4 FCA																												
AIM-120D SIP-4 IOC																												
AIM-120D SIP-5 Development																												
EPIP Advanced Tape 2 IOC																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>	Project (Number/Name) 673777 / AMRAAM

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AMRAAM Development Program				
AIM-120D SIP-2 EMD	1	2019	3	2020
AIM-120D SIP-2 IOC	3	2020	3	2020
AIM-120D SIP-3 EMD	1	2019	4	2021
AIM-120D SIP-3 FCA	3	2020	3	2020
AIM-120D SIP-3 IOC	4	2021	4	2021
AIM-120D SIP-3F Development	2	2020	1	2023
AIM-120D SIP-3F FCA	2	2022	2	2022
AIM-120D SIP-3F IOC	1	2023	1	2023
AIM-120D SIP-4 RR	3	2019	4	2021
AIM-120D SIP-4 Development	4	2021	3	2025
AIM-120D SIP-4 FCA	3	2024	3	2024
AIM-120D SIP-4 IOC	3	2025	3	2025
AIM-120D SIP-5 Development	2	2024	4	2025
EPIP Advanced Tape 2 IOC	2	2019	2	2019

Note

Actual Dates:

- SIP-2 EMD began 03 Jul 2015
- SIP-3 EMD began 05 Sep 2017
- SIP-5 Development ends 3QFY27

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207227F I <i>Combat Rescue - Pararescue</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.623	0.281	0.669	0.000	0.669	0.910	0.846	0.708	0.721	Continuing	Continuing
675352: <i>Guardian Angel RDT&E</i>	-	0.623	0.281	0.669	0.000	0.669	0.910	0.846	0.708	0.721	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Guardian Angel (GA) is an Air Force non-aircraft weapon system within the overarching Special Warfare Modernization program. GA is a Family of Systems (FoS) based in both human and equipment capabilities formulated to execute Air Force Personnel Recovery (PR) across the full spectrum of military operations. Established by the Air Force Chief of Staff in 2003 and officially captured in AFPD 10-9, the GA FoS is employed by three distinct Air Force specialties: Pararescuemen (PJ), Combat Rescue Officer (CRO), and Survival, Evasion, Resistance, Escape (SERE). The GA FoS is comprised of nine critical mission areas: Precision Aerial Insertion, Information Management, Force Application, Visual Augmentation, Maritime Recovery, Ground Mobility, Technical Rescue, Medical, and SERE. GA focus is on maintaining legacy weapon system capability while modernizing/improving subsystems for better mission effectiveness.

Funds will be used to obtain significant improvements in operational capability and develop items within the GA FoS to include but not limited to: Sound Navigation and Ranging (SONAR), Maritime Recovery, Ground Mobility, Technical Recovery, Oxygen Systems, Medical Monitoring, Aerial Insertion, Information Management (including Preservation of the Force and Family (POTFF) Tracking System), and include GA requirements in the Battlefield Air Operations Kit. This may be conducted through industry technology demonstrations, prototypes and associated engineering support to posture the GA program for technology insertion. The Guardian Angel weapon system development activities also include studies, analysis, requirements development and developmental testing to support both current and future program planning and execution. Funding will deliver enhanced capability for the dismounted Guardian Angel soldier in terms of dramatic weight reduction and increased mission effectiveness across the conflict spectrum. This funding request will support potential DMS and obsolescence solutions, to include if optimal, life of type buys or bridge buys limited to the program of record quantity.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Guardian Angel weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207227F / <i>Combat Rescue - Pararescue</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.647	0.281	0.670	0.000	0.670
Current President's Budget	0.623	0.281	0.669	0.000	0.669
Total Adjustments	-0.024	0.000	-0.001	0.000	-0.001
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.024	0.000			
• Other Adjustments	0.000	0.000	-0.001	0.000	-0.001

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Guardian Angel Family of Systems (FoS)	0.623	0.281	0.669
Description: Standardize, modernize and develop additional capability for the Guardian Angel (GA) weapon system used by Combat Rescue Officers and Pararescuemen. Development efforts provide enhanced and improved capabilities for execution of Air Force combat search and rescue and personnel recovery. This weapon system is utilized across the full spectrum of Personnel Recovery (PR) military operations to include patient treatment, extrication, surface/underwater search and recovery, airborne infil/exfil, and ground recovery operations.			
FY 2020 Plans:			
-Will continue to complete studies, strategic planning, and development activities for increased capability.			
-Will continue necessary software upgrades to Special Warfare Assault Kit (SWAK) information management system.			
-Will conduct oxygen system testing for parachutist oxygen system.			
-Will conduct development and system enhancements on existing and future systems through incorporating test feedback and user inputs into subsequent iterations for better capability and mission success.			
-Will work with AFRL (711 HPW) to determine if additional funding is required to mature the Preservation of the Force and Family (POTFF) Tracking System.			
-Will meet with AFRL periodically to monitor ongoing RDT&E efforts and determine the best use of such funds.			
FY 2021 Plans:			
-Will continue to complete studies, strategic planning, and development activities for increased capability.			
-Will continue necessary software upgrades to Special Warfare Assault Kit (SWAK) information management system.			
-Will conduct oxygen system testing for parachutist oxygen system.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207227F / <i>Combat Rescue - Pararescue</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
-Will conduct development and system enhancements on existing and future systems through incorporating test feedback and user inputs into subsequent iterations for better capability and mission success. -Will work with AFRL (711 HPW) to determine if additional funding is required to mature the Preservation of the Force and Family (POTFF) Tracking System. -Will meet with AFRL periodically to monitor ongoing RDT&E efforts and determine the best use of such funds.			
FY 2020 to FY 2021 Increase/Decrease Statement: Increased due to POTFF and family of systems contract awards			
Accomplishments/Planned Programs Subtotals	0.623	0.281	0.669

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 842990: <i>Items Less than \$5M (Safety)</i>	21.915	22.295	22.695	-	22.695	23.105	23.509	23.932	24.370	Continuing	Continuing
• OPAF 02 Line Item 823230: <i>Security and Tactical Vehicles</i>	0.061	0.131	0.205	-	0.205	0.281	0.287	0.292	0.298	Continuing	Continuing
• WPN test: <i>test</i>	1.000	-	-	-	-	-	-	-	-	0.000	1.000

Remarks

E. Acquisition Strategy

The Guardian Angel (GA) program will address warfighter immediate needs to standardize, modernize, and develop additional capability for the weapon system used by Combat Rescue Officers and Pararescuemen. The program will also address future requirements for the weapon system that will encompass the needs of all three GA career fields.

The GA program is an incremental evolutionary acquisition effort in which requirements are fulfilled through further sub-system development and integration. These are being identified through updates to the Core Function Support Plan and GA Concept of Employment by HQ Air Combat Command. The program has been divided into phases to more rapidly meet the user's immediate need to standardize and modernize the weapon system.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207227F / <i>Combat Rescue - Pararescue</i>	Project (Number/Name) 675352 / <i>Guardian Angel RDT&E</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Events By Sub Project																												
BAO Kit (G) Software																												
Test Support																												
GA Equipment Upgrades																												
Human Performance Organization Support (POTFF)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207227F / <i>Combat Rescue - Pararescue</i>	Project (Number/Name) 675352 / <i>Guardian Angel RDT&E</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Events By Sub Project				
BAO Kit (G) Software	1	2019	4	2025
Test Support	1	2019	2	2025
GA Equipment Upgrades	2	2019	2	2025
Human Performance Organization Support (POTFF)	2	2019	1	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207247F / AF TENCAP
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	21.365	21.644	0.000	21.644	22.100	22.495	22.897	23.318	Continuing	Continuing
670001: <i>Air Force TENCAP</i>	-	0.000	21.365	21.644	0.000	21.644	22.100	22.495	22.897	23.318	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2020, PE 1202247F, Air Force TENCAP efforts were transferred to PE 0207247F, Air Force TENCAP, in order to return program to the Major Force Program for General Purpose Forces.

A. Mission Description and Budget Item Justification

Air Force TENCAP increases warfighter effectiveness through the exploitation of national capabilities and promotes cross-domain integration of these capabilities into military operations/training and intelligence, surveillance and reconnaissance (ISR) activities.

AF TENCAP exploits existing air, space, cyber, national and global ISR, and Non-Traditional ISR (NTISR) for operational and tactical applications by rapidly prototyping and providing capability demonstrations. Projects are designed to transition to warfighters or national intelligence agencies for operational use, and to appropriate acquisition Programs of Record for sustainment and further development. AF TENCAP projects influence the design and operation of current and future air, space, cyber, national and global ISR, and NTISR systems while providing situational awareness to warfighters, national intelligence agency organizations, and units. AF TENCAP projects will begin an evolution to demonstrate prototype capabilities to accelerate multi-domain awareness data ingestion for Thresher Air/Maritime in a single common operational picture.

The program consists of multiple small projects supporting one of the Air Force Core Function Mission Areas (CFMAs). Projects are executed to provide continued support to Special Operations Forces and the warfighter, with impacts at the national, operational, and tactical levels.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AF TENCAP capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207247F / AF TENCAP
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	21.365	21.683	0.000	21.683
Current President's Budget	0.000	21.365	21.644	0.000	21.644
Total Adjustments	0.000	0.000	-0.039	0.000	-0.039
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.039	0.000	-0.039

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Exploitation Applications</p> <p>Description: Exploiting existing air, space, cyber, national and global ISR, and Non-Traditional ISR (NTISR) for operational and tactical applications by rapidly prototyping and demonstrating capabilities. Activities also influence the design and operation of future space, cyber, national and global ISR, and NTISR systems for tactical users.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Rapidly prototype projects and focus warfighter support and resource allocation based on AF TENCAP mission/investment areas - Execute projects which provide continued support to Special Operations Forces and the warfighter, with impacts at the national, operational, and tactical levels - Focus effort to increase Air Domain Awareness to Air Force and Joint Warfighters <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Will continue to rapidly prototype projects and focus warfighter support and resource allocation based on AF TENCAP mission/investment areas 	0.000	16.062	15.551	0.000	15.551

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207247F / AF TENCAP
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>- Will continue to execute projects which provide continued support to Special Operations Forces and the warfighter, with impacts at the national, operational, and tactical levels</p> <p>- Will continue focused effort to increase Air Domain Awareness to Air Force and Joint Warfighters</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to project completions.</p>					
<p>Title: Talon Omnia</p> <p>Description: Talon OMNIA will integrate all domain pictures in a single interface and demonstrate a prototype of capabilities.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Talon OMNIA accelerates existing multi-domain ingestion with the threshold to show Thresher Maritime/Thresher Air in a single common operational picture - Performs multi-domain data ingest of land and space to include discovery and identification of land track data capable of near/mid-term ingestion into a test environment to explore fusion of blue force tracker (BFT) and moving target indicator data - Will demonstrate remotely piloted aircraft control and data link health and status from over head <p>FY 2021 Base Plans: Talon OMNIA will continue to accelerate existing multi-domain ingestion with the threshold to show Thresher Maritime/Thresher Air in a single common operational picture</p> <ul style="list-style-type: none"> - Will continue perform multi-domain data ingest of land and space to include discovery and identification of land track data capable of near/mid-term ingestion into a test environment to explore fusion of blue force tracker (BFT) and moving target indicator data 	0.000	5.303	2.600	0.000	2.600

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0207247F I AF TENCAP
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Will continue demonstrate remotely piloted aircraft control and data link health and status from over head FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to project completions.					
Title: Talon TACET AVIS Description: Talon TACET AVIS is an effort to develop a Wide-band Beyond Line of Sight communication capability for 5th Generation platform. Delivered prototype with advance the technology to enable exchange of sensor data outside the tactical network FY 2020 Plans: N/A FY 2021 Base Plans: - Will Design prototype 5th generation aircraft representative Beyond Line of Sight Antenna technology - Will Support integration of a multi-beam electronically scanned array antenna design capable of connecting to 5th generation tactical platforms with national assets and increase technology readiness levels FY 2020 to FY 2021 Increase/Decrease Statement: Increase for Talon TACET AVIS program kick off and increased development activities.	-	0.000	3.493	-	3.493
Accomplishments/Planned Programs Subtotals	0.000	21.365	21.644	0.000	21.644

D. Other Program Funding Summary (\$ in Millions)			FY 2021 Base	FY 2021 OCO	FY 2021 Total					FY 2025 Complete	Cost To Total Cost
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>				<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>		
• RDTE 07 1202247F: AF TENCAP	31.986	0.000	0.000	-	0.000	0.000	0.000	0.000	-	-	Continuing Continuing
Remarks	N/A										

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207247F / AF TENCAP	
E. Acquisition Strategy Projects are selected based upon needs identified by the program's customers - DOD Departments, Combatant Commands, Components, MAJCOMs, and/or National Intelligence Agencies. Many projects are executed via existing contracts maintained by other agencies; others are executed via AF TENCAP contracts established with vendors responding to annual Broad Agency Announcements. The U.S. Government organization sponsoring a project is responsible for assuming acquisition, deployment, logistics, sustainment and budgetary responsibilities for the developed capability after it has been successfully demonstrated by AF TENCAP. AF TENCAP projects typically use an incremental acquisition strategy. AF TENCAP utilizes a disciplined systems engineering approach that allows program teams to solve problems through a series of segments. Each increment has to be successful to pursue the following segment which mitigates cost and schedule risk. Contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.		

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207247F / AF TENCAP	Project (Number/Name) 670001 / Air Force TENCAP
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AF TENCAP Projects				
FY 2020 Exploitation Applications Developed, Evaluated, and Released	1	2020	3	2021
FY 2021 Exploitation Applications Developed, Evaluated, and Released	1	2021	3	2022
FY 2022 Exploitation Applications Developed, Evaluated, and Released	1	2022	3	2023
FY 2023 Exploitation Applications Developed, Evaluated, and Released	1	2023	3	2024
FY 2024 Exploitation Applications Developed, Evaluated, and Released	1	2024	4	2024
FY2025 Exploitation Applications Developed, Evaluated, and Released	1	2025	4	2025
Talon OMNIA System Design/Software Development	1	2020	3	2020
Talon OMNIA Testing/Operational Utility Assessment	2	2020	3	2021
Talon TACET AVIS	1	2021	3	2022

Note

Most project selection activities occur approximately per the timelines shown, but some projects are initiated on a rolling basis throughout each year in response to time-sensitive operational requirements.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207249F / <i>Precision Attack Systems Procurement</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	14.346	10.696	9.261	0.000	9.261	12.264	12.484	12.708	12.942	Continuing	Continuing
675347: <i>Advanced Targeting Pod</i>	-	14.346	10.696	9.261	0.000	9.261	12.264	12.484	12.708	12.942	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Targeting Pods (ATPs) provide long-range target acquisition and expanded weapon delivery envelopes for greater aircraft survivability. ATPs feature an infrared (IR) sensor, charged coupled device television (CCD-TV), laser designator, eye-safe laser, laser spot tracker, infrared marker, and real-time video data link for connectivity with ground forces. As non-developmental items, the majority of improvements to ATPs are the result of investments made by industry Internal Research and Development (IRAD). In addition to operational flight program (OFP) development, this funding provides for the development and integration of capabilities which are either above the capabilities of the industrial base or that require accelerated development timelines in order to meet operational requirements. It also includes program management support, technical analysis, studies and assessments necessary to support the development and integration of future capabilities. Data-linking is one such area where there is an identified gap between industrial capabilities and operational requirements. Additional development efforts will be structured to support the documented ATP requirements as well as urgent operational needs (UONs) as they become known.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver precision attack weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

The FY 2021 funding request was reduced by \$1.826 million to account for the availability of prior year execution balances.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207249F / <i>Precision Attack Systems Procurement</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	14.891	10.696	11.104	0.000	11.104
Current President's Budget	14.346	10.696	9.261	0.000	9.261
Total Adjustments	-0.545	0.000	-1.843	0.000	-1.843
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.545	0.000			
• Other Adjustments	0.000	0.000	-1.843	0.000	-1.843

Change Summary Explanation

The FY 2021 funding request was reduced by \$1.826 million to account for the availability of prior year execution balances. Additional adjustments are due to inflation fluctuation.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Advanced Targeting Pod - Sensor Enhancement (ATP-SE) Requirements</p> <p>Description: ATP-SE technology improvements, requirements definition (studies, analysis and assessments).</p> <p>FY 2020 Plans: Accomplish ATP-SE Operational Flight Program (OFP) requirements, and further technology improvements, requirements definition, studies, analysis and assessments.</p> <p>As the pod fleet meets the user requirement and the updates near completion, the funding for aircraft OFP updates redirects from APAF to RDT&E funding.</p> <p>FY 2021 Plans: Accomplish ATP-SE Operational Flight Program (OFP) requirements, and further technology improvements, requirements definition, studies, analysis and assessments.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to realignment of funding to meet higher service priorities.</p>	14.346	10.696	9.261
Accomplishments/Planned Programs Subtotals	14.346	10.696	9.261

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207249F / <i>Precision Attack Systems Procurement</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item 057: <i>Other Aircraft, Precision Attack Systems Modifications</i>	71.689	43.482	44.413	-	44.413	15.129	15.879	52.852	53.820	Continuing	Continuing
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts</i>	3.310	3.367	3.427	-	3.427	3.497	3.559	3.623	3.689	Continuing	Continuing

Remarks

E. Acquisition Strategy

Current OFP development contract utilizes a firm-fixed price contract.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207249F / Precision Attack Systems Procurement	Project (Number/Name) 675347 / Advanced Targeting Pod

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ATP-SE																												
Sniper ATP-SE Digital Video																												
Future ATP-SE Enhancements																												
FY19 OFP Integration																												
FY20 OFP Integration																												
FY21 OFP Integration																												
FY22 OFP Integration																												
FY23 OFP Integration																												
FY24 OFP Integration																												
FY25 OFP Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207249F / <i>Precision Attack Systems Procurement</i>	Project (Number/Name) 675347 / <i>Advanced Targeting Pod</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
ATP-SE				
Sniper ATP-SE Digital Video	1	2020	3	2021
Future ATP-SE Enhancements	1	2020	4	2024
FY19 OFP Integration	2	2019	1	2020
FY20 OFP Integration	2	2020	1	2021
FY21 OFP Integration	2	2021	1	2022
FY22 OFP Integration	2	2022	1	2023
FY23 OFP Integration	2	2023	1	2024
FY24 OFP Integration	2	2024	1	2025
FY25 OFP Integration	1	2025	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	43.466	31.888	15.854	0.000	15.854	15.900	16.186	16.475	20.452	Continuing	Continuing
674804: <i>Compass Call</i>	-	43.466	31.888	15.854	0.000	15.854	15.900	16.186	16.475	20.452	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

COMPASS CALL is the Air Force's wide-area, Airborne Electronic Attack (AEA) Command and Control Warfare/Information Operations (C2W/IO) weapon system. The employment of this weapon system interrupts adversary's use of the electronic battlespace and is a key active component in the information battlespace and prosecution of Overseas Contingency Operations (OCO). COMPASS CALL's sophisticated electronic attack system is capable of surgical denial and/or disruption of adversary Radio Frequency (RF) communications, radar and sensor systems. The system was fielded in 1983 and to date has evolved through a series of incremental upgrades. The Baseline 2 (BL2) configuration and the mid-Baseline 2 (MBL2) enhancements are the latest in a line of mission system upgrades to the EC-130H. The BL2 configuration and MBL2 enhancements currently fielded have advanced COMPASS CALL's electronic attack capabilities significantly over the two previously fielded baselines. Baseline 3 (BL3) activities address new target-specific techniques, selective capability against advanced commercial communications, digital voice recognition and digital mission crew systems. Due to the rapid advances in electronic attack techniques and technology, COMPASS CALL was designed to be adaptable and must continuously modernize and evolve to keep pace with adversary tactics and emerging technologies. Continuous system development is required to maintain battlespace superiority. The two COMPASS CALL Mission Crew Simulators (CCMCS #1 and CCMCS #2) are upgraded per the mission system Baseline schedule to ensure training capacity keeps pace and matches the operational and technological upgrades delivered in the fielded aircraft. The Weapons System Trainer (WST) mirrors the capabilities of the fielded aircraft's cockpit avionics and communications equipment as well to ensure training provides the worldwide operational proficiency needed to comply with evolving Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) enhancements, parameters, and guidance.

The COMPASS CALL program employs an incremental development and fielding strategy that puts capability into the warfighter's hands as soon as practical and ensures each iteration of the weapon system is effective against the highest priority threats. To sustain that process requires a steady stream of system development funds. Development funds are required to accomplish subsystem additions and improvements such as Counter Radar technologies, Counter Communications, new target-specific techniques, new modern communications receiver technologies, further weight reduction, repackaged transmit antennas, the next generation of Special Purpose Emitter Array (SPEAR), Human-to-Machine Interface (HMI), and other classified hardware, firmware and software developments necessary to counter military and commercial communications evolutions, command and control operations enhancements, and new/emerging sensor developments.

FY 2021 RDT&E efforts will concentrate on Baseline 4 (BL4) and future baseline initiatives for Prime Mission Equipment (PME) upgrades and integration. The programmed BL4 upgrades will advance the PME capabilities as the FY 2021 development efforts address the evolving electronic attack requirement for the foreseeable future. Obsolescence and Diminishing Manufacturing Sources (DMS)/Vanishing Vendor Items (VVI) are addressed with each baseline upgrade/enhancement as well as annually as part of the sustainment responsibilities. FY 2021 RDT&E efforts include studies and analyses to support current program planning and execution including, but not limited to development efforts for future baseline capability planning to include low-band transmit capability, transition to open architecture and increased

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>
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Software-Defined Radio (SDR) capability, subsystem upgrades, power expansion, transmit and receive development, Size/Weight/Power and Cooling (SWAP-C) reductions and Quick Reaction Capability (QRC) clip-ins.

Due to the rapidly changing threat environment encountered during COMPASS CALL's prolonged commitment to overseas operations, the acquisition program manager has the authority to redirect funding as necessary to meet current stated and emerging requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver COMPASS CALL capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	43.901	15.888	15.883	0.000	15.883
Current President's Budget	43.466	31.888	15.854	0.000	15.854
Total Adjustments	-0.435	16.000	-0.029	0.000	-0.029
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	16.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.422	0.000			
• Other Adjustments	-0.013	0.000	-0.029	0.000	-0.029

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 674804: *Compass Call*

Congressional Add: *EC-37B Compass Call Re-host Congressional Add*

Congressional Add Subtotals for Project: 674804

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	30.000	16.000
	30.000	16.000
	30.000	16.000

Change Summary Explanation

Project: 674804: *Compass Call*

FY19: Congressional Add: \$30M *EC-37B Compass Call Re-host Congressional Add*

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>
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FY20: Congressional Add: \$16M EC-37B Compass Call Re-host Congressional Add BL4 acceleration

FY19: Other Adjustments of \$0.013M is payment for a Compass Call prior year RDT&E bill.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Baseline Upgrade Development</p> <p>Description: Supports development of new PME baseline, other subsystem, and platform upgrades in order to ensure COMPASS CALL capabilities remain ahead of emerging adversary tactics and technologies.</p> <p>FY 2020 Plans: Continuing efforts for BL3 and BL4 development on upgraded platform for:</p> <ul style="list-style-type: none"> • Low Band antenna design • Advanced Military & Commercial Communications Offensive capabilities • Emerging and Modern Targets • Platform integration for future capabilities • Updates to BL4 PME infrastructure • Platform upgrades and associated non-recurring engineering • Studies and analysis for current/future baseline development planning <p>FY 2021 Base Plans: Will continue efforts for BL4 development on upgraded platform and address BL3 anomalies, as required. BL4 efforts as follows:</p> <ul style="list-style-type: none"> • Low Band antenna design • Advanced Military & Commercial Communications Offensive capabilities • Emerging and Modern Targets • Platform integration for future capabilities • Updates to BL4 PME infrastructure • Platform upgrades and associated non-recurring engineering • Studies and analysis for current/future baseline development planning • Open Mission System Architecture • Software Defined Receiver/Transmit <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>	13.466	15.888	15.854	-	15.854
Accomplishments/Planned Programs Subtotals	13.466	15.888	15.854	-	15.854

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>
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	FY 2019	FY 2020
Congressional Add: EC-37B Compass Call Re-host Congressional Add	30.000	16.000
FY 2019 Accomplishments: Continued efforts for baseline acceleration to support aircraft compressed schedule. Efforts included: <ul style="list-style-type: none"> • Accelerate low-band capability • Platform upgrades and associated non-recurring engineering (installation/mounting concepts for h/w) • PME Development • Maturation of brass-boards • Studies and analysis for current/future baseline development planning; thermal management studies of power amplifiers and transmit antennas 		
FY 2020 Plans: EC-37B Compass Call Re-host Congressional Add to accelerate Baseline 4 BL4 efforts may include but not limited to the follows: <ul style="list-style-type: none"> • Low Band antenna design • Advanced Military & Commercial Communications Offensive capabilities • Emerging and Modern Targets • Platform integration for future capabilities • Updates to BL4 PME infrastructure • Platform upgrades and associated non-recurring engineering • Studies and analysis for current/future baseline development planning • Open Mission System Architecture • Software Defined Receiver/Transmit 		
Congressional Adds Subtotals	30.000	16.000

D. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 04 Line item CALL00: <i>Compass Call Aircraft</i>	216.113	114.095	161.117	-	161.117	132.858	136.848	140.952	185.725	Continuing	Continuing
• APAF 05 Line item CALL00: <i>Compass Call Mods</i>	172.285	110.754	193.389	12.800	206.189	143.387	116.081	100.027	87.496	Continuing	Continuing
• APAF 06 Line item CALL00: <i>Compass Call Mod Spares</i>	10.554	10.805	10.984	-	10.984	66.932	11.409	11.615	19.820	Continuing	Continuing

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

E. Acquisition Strategy

COMPASS CALL maintains operational relevancy through an incremental upgrade strategy in which a new "Baseline" mission system configuration fields approximately every 3-4 years. Urgent upgrades between Baselines is accomplished via Quick Reaction Capabilities (QRC). These efforts are accomplished by the 645th Aeronautical Systems Group (645 AESG) in accordance with their Acquisition Strategy Plan (ASP), Program Management Directive (PMD), and Life Cycle Management Plan (LCMP) and cover the full spectrum of system life cycle management ("cradle to grave" support concept). Due to the rapidly changing threat environment encountered during COMPASS CALL's prolonged commitment to Overseas Contingency Operations (OCO), the acquisition program manager has the authority to redirect funding as necessary to meet current stated and emerging Combatant Commander (CCDR) requirements.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>	Project (Number/Name) 674804 / <i>Compass Call</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Compass Call</i>	
Baseline 3 Development	
Baseline 3 Integration and Test	
Baseline 3 Fielding	
Baseline 4 Development	
Baseline 4 Integration and Test	
Future Baseline Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207253F / <i>Compass Call</i>	Project (Number/Name) 674804 / <i>Compass Call</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Compass Call</i>				
Baseline 3 Development	1	2019	3	2020
Baseline 3 Integration and Test	3	2020	3	2023
Baseline 3 Fielding	2	2023	2	2025
Baseline 4 Development	2	2020	4	2025
Baseline 4 Integration and Test	4	2023	4	2025
Future Baseline Development	3	2025	4	2025

Note
IDECS does not allow dates beyond 2025.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207268F / <i>Aircraft Engine Component Improvement Program</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	116.808	112.505	95.896	0.000	95.896	116.818	118.909	0.000	0.000	Continuing	Continuing
671012: <i>Aircraft Engine Component Improvement Program</i>	-	85.419	79.342	68.334	0.000	68.334	82.433	83.908	0.000	0.000	Continuing	Continuing
675365: <i>F135 Aircraft Engine Component Improvement Program</i>	-	31.389	33.163	27.562	0.000	27.562	34.385	35.001	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Aircraft Engine Component Improvement Program (CIP) provides the only source of critical sustaining engineering support for in-service Air Force engines to maintain flight safety (highest priority) to correct deficiencies, improve system operational readiness (OR) and reliability & maintainability (R&M), reduce engine Life Cycle Cost (LCC), and sustain engines throughout their service life.

Changes in aircraft operational parameters caused by changing missions and tasks accelerate new engine problems; Engine CIP provides the means to develop fixes for these problems. Engine CIP funding is driven by field events and types/maturity of engines, not by the total engine quantity. The program starts with government acceptance of the first procurement-funded engine and continues over the engine's life, gradually decreasing to a minimum level (safety/depot repairs) sufficient to keep older engines operational. Engine CIP testing identifies and fixes engine-related problems ahead of operational impacts. R&M related Engine CIP efforts significantly reduce out year Operations and Maintenance (O&M) and spares costs.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CIP Program weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207268F / <i>Aircraft Engine Component Improvement Program</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	121.203	112.505	114.617	0.000	114.617
Current President's Budget	116.808	112.505	95.896	0.000	95.896
Total Adjustments	-4.395	0.000	-18.721	0.000	-18.721
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.076	0.000			
• SBIR/STTR Transfer	-4.347	0.000			
• Other Adjustments	0.028	0.000	-18.721	0.000	-18.721

Change Summary Explanation

The FY21 -\$18.721M adjustment is based on prior year execution.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program				Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
671012: Aircraft Engine Component Improvement Program	-	85.419	79.342	68.334	0.000	68.334	82.433	83.908	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Aircraft Engine Component Improvement Program (CIP) provides the only source of critical sustaining engineering support for in-service Air Force engines to maintain flight safety (highest priority) to correct deficiencies, improve system operational readiness (OR) and reliability & maintainability (R&M), reduce engine Life Cycle Cost (LCC), and sustain engines throughout their service life. Engine CIP directly addresses engine related causes to aircraft Non-Mission-Capability rates.

Changes in aircraft operational parameters and/or missions and task missions and tasks accelerating the discovery of new engine issues and the need to resolve issues; Engine CIP provides the only means to develop fixes for these problems. Engine CIP funding is driven by field events and types/maturity of engines, not by the total engine quantity. The program starts with government acceptance of the first procurement-funded engine and continues over the engine's life, gradually decreasing to a minimum level (safety/depot repairs) sufficient to keep older engines operational. Engine CIP testing identifies and fixes engine-related problems ahead of operational impacts. R&M related Engine CIP efforts significantly reduce out year Operations and Maintenance (O&M) and replacement spares costs.

Service-related engine deficiencies occur throughout the engine lifecycle. Given the uncertainty with regard to the number and timing of engine-related deficiencies, it is essential for the USAF to have adequate engineering capability, test capacity to rapidly respond to problems as they occur and absolutely paramount to reach SecDef directed 80% mission capability rate for F-35, F-22, F-16, and F-15 aircraft.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the CIP Program weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: F100 Aircraft Engine Component Improvement Program	10.680	9.920	8.544
Description: The F100-220 and F100-229 Engine CIP provides critical developmental engineering support for approximately 4085 engines (including foreign military sales [FMS]) to maintain flight safety (highest priority), to address parts obsolescence, to improve system operational readiness (OR) and reliability & maintainability (R&M), to reduce engine Life Cycle Cost (LCC), in order for engines to be sustainable throughout their service life. Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: F100-220 and F100-229: - Will execute 35+ tasks. Budget will address engine issues associated with the F-15 and F-16 aircraft. - Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis. - Validate redesigned parts and new repair procedures. - Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2021 Plans: F100-220 and F100-229: - Will execute 35+ tasks. Budget will address engine issues associated with the F-15 and F-16 aircraft. - Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis. - Validate redesigned parts and new repair procedures. - Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 decrease due to reduction of FY21 budget to reflect early to need execution and re-phased in out years.</p>				
<p>Title: F110 Aircraft Engine Component Improvement Program</p> <p>Description: The F101, F110-100, F110-129, F118-100, and F118-101 Engine CIP provides critical developmental engineering support for approximately 2732 engines (including foreign military sales [FMS]) to maintain flight safety (highest priority), to address parts obsolescence, to improve system operational readiness (OR) and reliability & maintainability (R&M), to reduce engine Life Cycle Cost (LCC), and to sustain engines throughout their service life. Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2020 Plans: F101, F110-100, F110-129, F118-100, and F118-101: - Will execute 45+ tasks. The budget will address engine issues associated with the B1, B-2, F-15, F-16, and U-2 aircraft. - Address safety of flight, engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis. - Validate redesigned parts and new repair procedures.</p>		15.432	14.334	12.345

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</p> <p>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2021 Plans: F101, F110-100, F110-129, F118-100, and F118-101:</p> <p>- Will execute 45+ tasks. The budget will address engine issues associated with the B1, B-2, F-15, F-16, and U-2 aircraft.</p> <p>- Address safety of flight, engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</p> <p>- Validate redesigned parts and new repair procedures.</p> <p>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</p> <p>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 decrease due to reduction of FY21 budget to reflect early to need execution and re-phased in out years.</p>				
<p>Title: F119 Aircraft Engine Component Improvement Program</p> <p>Description: The F119 Engine CIP provides critical developmental engineering support for approximately 475 engines to maintain flight safety (highest priority), to address parts obsolescence, to improve system operational readiness (OR) and reliability & maintainability (R&M), to reduce engine Life Cycle Cost (LCC), and to sustain engines throughout their service life. Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2020 Plans: F119:</p> <p>- Will execute 35+ tasks. The budget will address engine issues associated with the F-22 aircraft.</p> <p>- Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</p> <p>- Validate redesigned parts and new repair procedures.</p> <p>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</p> <p>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2021 Plans:</p>		28.915	24.338	20.536

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>F119:</p> <ul style="list-style-type: none"> - Will execute 35+ tasks. The budget will address engine issues associated with the F-22 aircraft. - Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis. - Validate redesigned parts and new repair procedures. - Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues. <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 decrease due to reduction of FY21 budget to reflect early to need execution and re-phased in out years.</p>				
<p>Title: Other Aircraft Engine Component Improvement Program</p> <p>Description: The Other Engines (e.g., T56, T700, T400, J85, F107, APUs) CIP provides critical developmental engineering support for approximately 13000 engines (including foreign military sales [FMS]) to maintain flight safety (highest priority), to address parts obsolescence, to improve system operational readiness (OR) and reliability & maintainability (R&M), to reduce engine Life Cycle Cost (LCC), and to sustain engines throughout their service life. Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p>FY 2020 Plans: Other Engines (e.g., T56, T700, T400, J85, APUs, F107, TF-34, TF-33):</p> <ul style="list-style-type: none"> - Will execute 65+ tasks. The budget will address engine issues associated with the C-130, T38, UH-1N, UH/MH-60/60G, A-10, B-52 aircraft, cruise missiles and aircraft APUs. - Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis. - Validate redesigned parts and new repair procedures. - Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues. - Funds will also be used to stand up any new Engine CIP TMS programs <p>FY 2021 Plans: Other Engines (e.g., T56, T700, T400, J85, APUs, F107, TF-34, TF-33):</p> <ul style="list-style-type: none"> - Will execute 65+ tasks. The budget will address engine issues associated with the C-130, T38, UH-1N, UH/MH-60/60G, A-10, B-52 aircraft, cruise missiles and aircraft APUs. 		30.392	30.750	26.909

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis. - Validate redesigned parts and new repair procedures. -Address issues leading to increased UERs and decreased flight safety. - Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability & maintainability (R&M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues. - Funds will also be used to stand up any new Engine CIP TMS programs <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 decrease due to reduction of FY21 budget to reflect early to need execution and re-phased in out years.</p>			
Accomplishments/Planned Programs Subtotals	85.419	79.342	68.334

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 07 0205633N: <i>Aviation Improvements</i>	2.025	-	-	-	-	-	-	-	-	-	Continuing Continuing

Remarks
Other APPN RELATED ACTIVITIES

(U) - PEs 0203752A and 0205633N, Army/Navy Aircraft Engine CIPs

D. Acquisition Strategy
Sole Source Indefinite Delivery/Indefinite Quantity (IDIQ) contracts to 3 Original Equipment Manufacturers (OEMs), and DoD agencies with a 5-year ordering period and 7-year delivery period. Supports multiple tasks to accomplish CIP for more than 23 engine models.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)					
3600 / 7				PE 0207268F / Aircraft Engine Component Improvement Program						671012 / Aircraft Engine Component Improvement Program					
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements - F110/F101/F118	SS/CPFF	GE : Evendale, OH	-	15.432	Dec 2018	14.334	Dec 2019	12.345	Dec 2020	-		12.345	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements-F100/F119/TF33/T400	SS/CPFF	Pratt & Whitney : Hartford, CT	-	45.421	Dec 2018	39.670	Dec 2019	33.740	Dec 2020	-		33.740	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements-TF34/J85/T700	SS/CPFF	GE : Lynn, MA	-	4.047	Dec 2018	3.759	Dec 2019	3.238	Dec 2020	-		3.238	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements-T56	SS/CPFF	Rolls Royce : Indianapolis, IN	-	2.330	Dec 2018	2.164	Dec 2019	1.864	Dec 2020	-		1.864	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft auxiliary power unit improvements/ T53	SS/CPFF	Honeywell : Phoenix, AZ	-	6.023	Dec 2018	5.595	Dec 2019	4.818	Dec 2020	-		4.818	Continuing	Continuing	-
Aircraft Engine CIP: Develop engine improvements-F107-Teledyne	SS/CPFF	Teledyne : Toledo, OH	-	2.261	Dec 2018	2.100	Dec 2019	1.809	Dec 2020	-		1.809	Continuing	Continuing	-
Aircraft Engine CIP: Develop engine improvements-F107-Williams	SS/CPFF	Williams : Walled Lake, MI	-	0.050	Dec 2018	0.046	Dec 2019	0.040	Dec 2020	-		0.040	Continuing	Continuing	-
Subtotal			-	75.564		67.668		57.854		-		57.854	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: Non-OEM CIP Tasks	Various	Various : Various	-	3.344	Oct 2018	3.106	Dec 2019	2.675	Dec 2020	-		2.675	Continuing	Continuing	-
Subtotal			-	3.344		3.106		2.675		-		2.675	Continuing	Continuing	N/A

Remarks
Non-OEM CIP Tasks refer to work in support of Engine CIP.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: Ground test and validate engine improvements	PO	AEDC : Arnold AFB, TN	-	0.000		2.520	Dec 2019	2.596	Dec 2020	-		2.596	Continuing	Continuing	-
Subtotal			-	0.000		2.520		2.596		-		2.596	Continuing	Continuing	N/A

Remarks
Fuel costs for contractor-performed T&E are included in the applicable contract.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: PMA	Various	Various : Various	-	2.092	Oct 2018	1.943	Dec 2019	1.674	Dec 2020	-		1.674	Continuing	Continuing	-
Aircraft Engine CIP: In House Support/Misc	Various	Various : Various	-	4.419	Oct 2018	4.105	Dec 2019	3.535	Dec 2020	-		3.535	Continuing	Continuing	-
Subtotal			-	6.511		6.048		5.209		-		5.209	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
PMA Description: Program Management support, travel, and A&AS.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	85.419	79.342	68.334	-	68.334	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 671012 / Aircraft Engine Component Improvement Program

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>CIP Legacy Activities</i>				
F-100 Engine CIP activities	1	2019	4	2025
F-110 Engine CIP Activities	1	2019	4	2025
F-119 Engine CIP Activities	1	2019	4	2025
Other Legacy Engine CIP Activities	1	2019	4	2025

Note

Traditional schedule does not lend itself to Engine CIP activities.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program				Project (Number/Name) 675365 / F135 Aircraft Engine Component Improvement Program			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675365: F135 Aircraft Engine Component Improvement Program	-	31.389	33.163	27.562	0.000	27.562	34.385	35.001	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The F135 Aircraft Engine Component Improvement Program (CIP) supports F-35 single-engine fighter propulsion system. It provides the only source of critical developmental engineering support for the F135 propulsion system. F135 CIP maintains flight safety (highest priority), corrects service revealed deficiencies, improves system Operational Readiness (OR) and Reliability & Maintainability (R&M), reduces propulsion system Life Cycle Cost (LCC), and sustains the propulsion system throughout its service life. Historically, aircraft systems change missions, tactics, and environment (including new fuels) and meet changing threats throughout their lives. New technical problems can develop in the propulsion system through actual use and the F135 CIP provides the means to develop fixes for these problems. F135 CIP funding is driven by field events and type/maturity of the propulsion system, not by the total quantity of engines. The program starts with government acceptance of the first procurement-funded engine and continues over the propulsion system's life, gradually decreasing to a minimum level (safety/depot repairs) sufficient to keep older engines operational. F135 CIP, through "Lead the Fleet" operational use and accelerated mission testing, identifies and fixes propulsion-related problems ahead of operational impacts. F135 CIP ensures continued improvements in R&M, which reduce out year support costs. Historically, R&M related CIP efforts significantly reduce out year O&M and spares costs.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CIP Program weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: F135 Aircraft Engine Improvement Program	31.389	33.163	27.562
Description: The Aircraft Engine Component Improvement Program (CIP) provides the only source of critical developmental engineering support for F-35 propulsion systems to maintain flight safety (highest priority) for this single-engine fighter, correct service revealed deficiencies, improve system operational readiness (OR) and reliability & maintainability (R&M), reduce engine Life Cycle Cost (LCC), and sustain engines throughout their service life. Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.			
FY 2020 Plans:			
- Execute approximately 35+ AF-funded F135 engine tasks supporting F-35 flying operations.			
- Conduct accelerated mission test and analytical condition inspection.			
- Address safety of flight, engine component redesign, repair/rework procedures and life limit/mission analysis.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 675365 / F135 Aircraft Engine Component Improvement Program
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Validate redesigned parts and new repair procedures. - Maintain/improve engine flight safety, improve system operational readiness and reliability & maintainability, reduce engine life cycle cost, and sustain engine throughout service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues. <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Execute approximately 35+ AF-funded F135 engine tasks supporting F-35 flying operations. - Conduct accelerated mission test and analytical condition inspection. - Address safety of flight, engine component redesign, repair/rework procedures and life limit/mission analysis. - Validate redesigned parts and new repair procedures. - Maintain/improve engine flight safety, improve system operational readiness and reliability & maintainability, reduce engine life cycle cost, and sustain engine throughout service life. - Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues. <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 decrease due to reduction of FY21 budget to reflect early to need execution and re-phased in out years.</p>			
Accomplishments/Planned Programs Subtotals	31.389	33.163	27.562

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0205633N: <i>Aviation Improvements</i>	-	-	-	-	-	-	-	-	-	-	-

Remarks
Program Element 0205633N provides US Navy funding support for the F135 propulsion system.

D. Acquisition Strategy
Contracts within this program are projected to be awarded sole source to engine manufacturer. F-135 Engine CIP tasks are generally assigned to the original engine manufacturer based on available funding and prioritization of candidates.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 675365 / F135 Aircraft Engine Component Improvement Program
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: Develop F135 engine improvements	SS/CPFF	Pratt & Whitney : Hartford, CT	-	25.838	Jan 2019	25.929	Jan 2020	22.688	Jan 2021	-		22.688	Continuing	Continuing	-
Subtotal			-	25.838		25.929		22.688		-		22.688	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: Ground test and validate engine improvements	PO	AEDC : Arnold AFB, TN	-	5.266	Oct 2018	6.875	Oct 2019	4.624	Oct 2020	-		4.624	Continuing	Continuing	-
Subtotal			-	5.266		6.875		4.624		-		4.624	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft Engine CIP: PMA	Various	Various : Various	-	0.285	Oct 2018	0.359	Oct 2019	0.250	Oct 2020	-		0.250	Continuing	Continuing	-
Subtotal			-	0.285		0.359		0.250		-		0.250	Continuing	Continuing	N/A

Remarks

PMA Description: Program Management support, travel, and A&AS.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	31.389	33.163	27.562	-	27.562	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 675365 / F135 Aircraft Engine Component Improvement Program

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

CIP JSF Activities	
F-135 Engine CIP Tasks	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207268F / Aircraft Engine Component Improvement Program	Project (Number/Name) 675365 / F135 Aircraft Engine Component Improvement Program

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>CIP JSF Activities</i>				
F-135 Engine CIP Tasks	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207325F / <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	266.077	40.933	78.498	70.792	0.000	70.792	115.792	33.374	20.554	20.933	109.735	756.688
675356: <i>JASSM Extended Range (JASSM-ER)</i>	266.077	40.933	78.498	70.792	0.000	70.792	115.792	33.374	20.554	20.933	109.735	756.688
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 555

Note
 This program, BA 7, PE 0207325F, project 675356, Weapon Data Link (WDL), is a new start.

A. Mission Description and Budget Item Justification
 The Joint Air-to-Surface Standoff Missile (JASSM) family of missiles includes: JASSM Baseline (JASSM-BL/AGM-158A) and JASSM Extended Range (JASSM-ER/AGM-158B and JASSM-ER/AGM-158D). JASSM-ER provides a long range (over twice the range of JASSM-BL), conventional air-to-surface, autonomous, precision-guided, low observable, standoff cruise missile compatible with fighter and bomber aircraft. JASSM-ER provides the capability to attack a variety of high value fixed or relocatable targets with precision, through preplanned missions or target-of-opportunity, deeper into enemy territory than JASSM-BL, all while minimizing the threat to launch aircraft. The Air Force developed JASSM-ER based on a contractor-developed, government-approved System Performance Specification (SPS). The requirement is in the JASSM-ER Capability Production Document (CPD), dated 16 April 2010. Aircraft integration of JASSM-ER/AGM-158B is complete on the B-1, F-15E, and B-52. Objective aircraft are B-52, F-16, B-2, and F-15E. JASSM-ER/AGM-158D is an upgrade to the existing JASSM-ER/AGM-158B, incorporating multiple development initiatives into a single, system-level update to respond to rapidly changing threats and parts obsolescence issues. The program continues development and integration efforts to improve lethality, lengthen operational life and adjust/incorporate emerging technologies. The 2018 National Defense Strategy (NDS) increased the JASSM inventory objective by 48% which resulted in the monitoring/resolution of obsolescence on 13 subsystems. The program is also evaluating Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver JASSM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0207325F I Joint Air-to-Surface Standoff Missile (JASSM)
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	42.472	78.498	36.210	0.000	36.210
Current President's Budget	40.933	78.498	70.792	0.000	70.792
Total Adjustments	-1.539	0.000	34.582	0.000	34.582
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.539	0.000			
• Other Adjustments	0.000	0.000	34.582	0.000	34.582

Change Summary Explanation

FY2019: Small Business Innovation Research -\$1.539M

FY2021: AGM-158D development effort \$34.582M

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Warfighting Capability Enhancement	5.120	12.270	17.310	-	17.310
Description: Design and development of software and mission planning changes to enable the missile to maintain operational effectiveness in classified scenarios.					
FY 2020 Plans: Begin flight tests and update classified software accordingly based on flight test results. Begin modification of additional classified software to enable the missile to maintain operational effectiveness in classified scenarios.					
FY 2021 Base Plans: Continue flight tests and update classified software accordingly based on the flight test results. Continue modification of classified software to enable the missile to maintain operational effectiveness in classified scenarios.					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to additional classified software being developed to increase operational effectiveness in classified scenarios.					
Title: Wing Replacement/Chine Development, survivability enhancement, and integration	27.231	49.758	25.426	-	25.426

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force				Date: February 2020	
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207325F <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>			
C. Accomplishments/Planned Programs (\$ in Millions)					
Description: Provides increased standoff range, survivability, and improved vehicle stability/control.					
FY 2020 Plans: Continue design and development efforts for wing sub-systems to include B-1 integration.					
FY 2021 Base Plans: Begin AGM-158D flight test program to include flying test beds, ground mounts, fit checks, captive carry, free flight releases, wind tunnel tests, and other tests as required.					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to a shift from primarily development activities to Test and Integration.					
Title: Electronic Safe and Arm Fuze (ESAF)					
Description: ESAF will resolve FMU-156 obsolescence and reliability issues, improve yield, and potentially lower costs.					
FY 2020 Plans: Continue ESAF environmental, safety, and qualification testing via first set of Sled Tests.					
FY 2021 Base Plans: Continue ESAF environmental, safety, and qualification testing to include additional Sled and the start of flight testing.					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to Cannon Test completion and qualification wrap-up.					
Title: M-Code and Related Development Efforts					
Description: Development and integration of a GPS receiver capable of receiving M-Code					
FY 2020 Plans: Realignment of funds to Common M-Code PE 0604201F.					
FY 2021 Base Plans: Realignment of funds to Common M-Code PE 0604201F.					
FY 2020 to FY 2021 Increase/Decrease Statement:					
	4.342	10.882	7.900	-	7.900
	4.073	0.000	0.000	-	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force			Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207325F <i>I Joint Air-to-Surface Standoff Missile (JASSM)</i>			
C. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
<p>Title: Weapon Data Link (WDL)</p> <p>Description: Provides capability to re-target the missile post-launch against time sensitive targets that have moved during mission execution or to attack critical emerging targets.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Base Plans: Begin missile data link interface control documentation, AGM-158D specification update, and a System Requirements Review to define technical performance parameters. Start initial trade study to physically integrate the data link in the missile.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to first year of WDL effort.</p>	-	0.000	10.400	-	10.400
<p>Title: Other Development/Safety/Survivability</p> <p>Description: Develop and integrate advanced Precision, Navigation, and Timing (PNT) capabilities (e.g. GPS, non-GPS, optical, passive, active, etc.), evaluations (study analysis), survivability enhancements to include safety certification, flight testing, DMSMS, improved Guidance, Navigation, Control (GNC), and obsolescence issues.</p> <p>FY 2020 Plans: Continue evaluation activity addressing JASSM's obsolescence plan directed activities to include Non-GPS Nav Joint Capability Technology Demonstration (JCTD).</p> <p>FY 2021 Base Plans: Continue evaluation activity addressing JASSM's obsolescence plan directed activities to include Non-GPS Nav JCTD. Update Inertial Measurement Unit (IMU) subsystem specification, begin GNC and auto pilot software allocations and updates.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to start of IMU efforts.</p>	0.167	5.588	9.756	-	9.756
Accomplishments/Planned Programs Subtotals	40.933	78.498	70.792	-	70.792

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207325F <i>I Joint Air-to-Surface Standoff Missile (JASSM)</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 02 0207325F: <i>JASSM</i>	602.828	483.425	475.949	30.000	505.949	750.653	758.290	758.396	761.885	1,188.000	5,809.426

Remarks

Lease temporary work space/seating for development and test management personnel, as required to support mission needs.

E. Acquisition Strategy

The JASSM Acquisition Strategy was amended and approved on September 8, 2017. This amendment enables the JASSM program to introduce upgrades which ensure its viability as the threat environment evolves. All current development contracts use a Cost Plus type contract.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020				
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207325F / Joint Air-to-Surface Standoff Missile (JASSM)				Project (Number/Name) 675356 / JASSM Extended Range (JASSM-ER)							

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Warfighting Capability Enhancement	SS/CPAF	Lockheed Martin : Orlando, FL	4.427	5.120	Nov 2018	12.270	Nov 2019	17.310	Nov 2020	-		17.310	29.760	68.887	67.724
Wing Replacement/Chine Development, survivability enhancements, and Integration	SS/CPFF	Lockheed Martin : Orlando, FL	7.431	27.231	Jan 2019	49.758	Nov 2019	25.326	Nov 2020	-		25.326	71.474	181.220	136.000
ESAF	SS/CPFF	Lockheed Martin : Orlando, FL	16.167	4.342	Nov 2018	10.882	Nov 2019	7.900	Nov 2020	-		7.900	0.000	39.291	18.872
M-code and Related Development Efforts	SS/CPFF	Lockheed Martin : Orlando, FL	7.466	4.073		-		-		-		-	36.974	48.513	74.610
Weapon Data Link (WDL)	C/CPAF	Lockheed Martin : Orlando, FL	0.000	-		-		10.400	Nov 2020	-		10.400	51.900	62.300	62.300
JASSM-ER Phase I/ II development Test Missile Procurement (for DT/IT), parts upgrade, software updates, product improvements, survivability enhancements, LTIK, ITIK, and obsolescence.	Various	Lockheed Martin : Orlando, FL	158.266	0.000	Mar 2018	5.488	Nov 2019	9.756	Jan 2021	-		9.756	110.072	283.582	254.909
Subtotal			193.757	40.766		78.398		70.692		-		70.692	300.180	683.793	N/A

Remarks
 -Intelligent Telemetry Instrumentation Kit (ITIK)
 -Legacy Telemetry Instrumentation Kits (LTIK)
 -Electronic Safe and Arm Fuze (ESAF)

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Test Support. Includes flight test equipment, targets,	Various	96 TW : Eglin AFB, FL	32.993	-		-		-		-		-	0.000	32.993	31.644

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020		
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207325F / Joint Air-to-Surface Standoff Missile (JASSM)				Project (Number/Name) 675356 / JASSM Extended Range (JASSM-ER)					

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
96th Test Wing and Range support, AEDC test support, and other ground/flight test support as necessary.															
6 IT/6 OT assets	SS/CPAF	Lockheed Martin : Orlando, FL	12.733	-		-		-		-		-	0.000	12.733	12.733
12 Operational Test (OT) assets	SS/FFP	Lockheed Martin : Orlando, FL	24.642	-		-		-		-		-	0.000	24.642	24.643
Subtotal			70.368	-		-		-		-		-	0.000	70.368	N/A

Remarks
Test and Evaluation in FY19 and beyond will be incorporated into each separate development effort rather than broken out into its own category

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA). Provides program office oversight of development and upgrade activities.	Various	PMA : Eglin AFB, FL	1.952	0.167	Mar 2019	0.100	Mar 2020	0.100	Mar 2021	-		0.100	0.500	2.819	3.771
Subtotal			1.952	0.167		0.100		0.100		-		0.100	0.500	2.819	N/A

Project Cost Totals	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	266.077	40.933	78.498	70.792	-	70.792	300.680	756.980	N/A

Remarks
Test and Evaluation is incorporated within the respective RDT&E categories rather than being broken out as a separate cost.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207325F / <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>	Project (Number/Name) 675356 / <i>JASSM Extended Range (JASSM-ER)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>RDT&E Schedule Details</i>				
Warfighting Capability Enhancement	3	2019	4	2023
Wing Replacement/Chine Development, survivability enhancements, and Integration	1	2019	2	2023
ITIK Battery Development and Qualification (Phase 1,2, and 3)	1	2019	1	2020
ITIK Integration with JASSM and Test Equipment Development	1	2019	3	2019
Electronic Safe and Arm Fuze (ESAF)	1	2019	4	2021
ESAF Production Readiness Review (PRR)	3	2021	3	2021
M-Code Pre-EMD	1	2019	2	2022
M-Code Engineering and Manufacturing Development (EMD)	2	2021	4	2025
Weapon Data Link (WDL)	1	2021	4	2024
Diminishing Manufacture Sources and Obsolescence Evaluation/Development	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	98.854	114.864	51.187	0.000	51.187	112.232	112.888	103.946	90.182	Continuing	Continuing
674596: <i>AOC WS Modifications</i>	0.000	98.854	114.864	51.187	0.000	51.187	112.232	112.888	103.946	90.182	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Operations Center Weapon System (AOC WS), AN/USQ-163 Falconer, the senior element of the Theater Air Control System (TACS), is the weapon system that the Commander, Air Force Forces (COMAFFOR) provides the Combined/Joint Force Air Component Commander (C/JFACC) for planning, executing, and assessing theater-wide air and space operations. The C/JFACC provides air, space and cyber support to the Combined/Joint Forces Commander (C/JFC) by coordinating, deconflicting and assessing the progress of various weapon systems to advance the C/JFC's campaign. The AOC WS develops operations strategy and planning documents. The weapon system also disseminates tasking orders; executes day-to-day peacetime and combat air, space and cyber operations; and provides rapid reaction to immediate situations by exercising positive control of friendly forces.

In FY 2021, funding supports continued software engineering capacity required for AOC WS Modifications to enable the retirement of Theater Battle Management Core System - Force Level (TBMCS FL) and AOC 10.1 while enabling an extensible cloud-based Infrastructure and Platform as a Service (IaaS/PaaS) hosting platform. Additionally, the continued software engineering capacity delivers air operations capabilities improving speed and automation of the full air tasking cycle, including unit-level sortie generation capabilities that feed friendly order of battle information to the Master Air Attack Plan process. AOC WS Modifications are required for the AOC to keep pace with evolving COTS/GOTS components, DoD directives, changes in the underlying IT environment, and to remain interoperable, certified, supportable, and compliant through software engineering solutions, integration, testing, fielding, training, and sustainment of new capabilities and upgrades to the AOC WS. This includes utilization of managed cloud IaaS/PaaS hosting platform. Also in FY 2021, AOC WS Modifications activities evolve the AOC utilizing Agile Methodologies, including User Centered Design, and embracing DevOps practices to deliver improved capabilities in support of mission requirements at Geographic and Global (formerly Functional) AOCs, as well as Support and Manpower Augmentation units, keeping the AOC current and interoperable with the Combatant Commands (CCMDs), cyber requirements, and next generation weapon systems/weapons.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AOC weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	104.954	114.864	116.000	0.000	116.000
Current President's Budget	98.854	114.864	51.187	0.000	51.187
Total Adjustments	-6.100	0.000	-64.813	0.000	-64.813
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-2.450	0.000			
• SBIR/STTR Transfer	-3.650	0.000			
• Other Adjustments	0.000	0.000	-64.813	0.000	-64.813

Change Summary Explanation

FY 2019: Decreased \$2.45M for Below Threshold Reprogramming.

FY 2021: Realigned \$52M to O&M to maintain AOC 10.1 baseline; funding request was reduced by \$12.7M to account for the availability of prior year execution balances.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: AOC WS Modifications Development	77.699	84.798	39.533	0.000	39.533
Description: Conduct AOC WS infrastructure software engineering solutions and mission capability software engineering solutions as a National Defense Authorization Act for 2016, Section 804, Middle Tier of Acquisition for Rapid Prototyping/Rapid Fielding effort. Leverage agile engineering solution methodologies to engineer, integrate, and test modification updates to the AOC WS leveraging test-driven development. Provide engineering solutions, test, and deliver effective operational capabilities utilizing continuous integration and continuous delivery (CI/CD) processes.					
FY 2020 Plans:					
- Modify the AOC 10.1 legacy system to achieve cloud-enabled operations; develop applications to perform in the cloud environment					
- Evolve the AOC through Agile DevOps engineering solutions, integration, and test of progressively improving capabilities in support of mission requirements					
FY 2021 Base Plans:					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Will continue rapid fielding of software capabilities to enable the retirement of Theater Battle Management Control System - Force Level (TBMCS FL) and Master Air Attack Plan Tool Kit (MAAPTK) - Will continue development and establishment of an enterprise infrastructure baseline to support hosting a virtual private cloud FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to funding realignment to O&M to maintain AOC 10.1 baseline and reduction to account for the availability of prior year execution balances.					
Title: AOC WS Modifications Direct Mission Support Description: Plan and execute strategies to adopt commercial best practices for software development, scale out a modern IaaS/PaaS solution to the AOC WS enterprise, implement improved solutions for platform architecture and CI/CD pipeline, and maintain continuous Authority to Operate (ATO). FY 2020 Plans: - Develop virtual private cloud architecture and execute platform scaling strategy to AOC enterprise - Enable scaling software product teams and provide the necessary competencies to adopt commercial best practices for agile software development FY 2021 Base Plans: - Will continue to provide the competencies necessary to scale software development capacity and enable retirement of TBMCS FL - Will continue to enable development and establishment of extensible cloud-based IaaS/PaaS hosting platform/enterprise architecture baseline environment FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to funding realignment to O&M to maintain AOC 10.1 baseline and reduction to account for the availability of prior year execution balances.	7.417	30.066	11.654	0.000	11.654
Title: Multi-Domain Command and Control (MDC2) Development	13.738	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Development of enduring capability for a scalable operational infrastructure and data architecture to acquire and develop MDC2 capability; procure/lease a virtualized (cloud-based) data structure for all relevant information (mission data, business data, applications, enterprise services, etc.). Experiment, explore, and develop innovative C2 tools designed for multi-domain; multi-level security tools and capabilities to enhance C2 interoperability and data sharing for the 2030 and beyond fight. Utilize for program support and other activities that may include, but are not limited to experiments, infrastructure/architecture needs, coding, technical analysis, etc.</p> <p>FY 2020 Plans: See PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.</p> <p>FY 2021 Base Plans: See PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>					
Accomplishments/Planned Programs Subtotals	98.854	114.864	51.187	0.000	51.187

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Line Item 834520: <i>Theater Battle Mgt C2 System</i>	2.923	5.514	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.437
• OPAF 03 Line Item 834530: <i>Air and Space Operations Ctr-WPN SYS</i>	38.589	33.243	24.983	0.000	24.983	13.593	18.185	17.313	32.315	Continuing	Continuing

Remarks

E. Acquisition Strategy
 The acquisition strategy builds on agile software engineering solutions and modification of existing capabilities using evolutionary acquisition to standardize and modify the AOC WS. The initial capability was AOC WS Increment 10.0, which fielded the 10.0 configuration to five operational sites, plus a Help Desk and a Formal Training

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>
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Unit. The second increment, Increment 10.1, upgraded these locations to an integrated baseline and fielded the baseline to additional operational and reserve units worldwide. The AOC 10.2 sought to evolve the AOC to a Net-Centric environment compliant with DoD Services Oriented Architecture standards but proved late to need using legacy approaches, so the contract was terminated in July 2017 and Program of Record was canceled in January 2018. AOC WS Modifications will utilize FY16 NDAA Section 804, Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding, leveraging commercial best practices of Agile DevOps to scale out a modern virtual private cloud to the AOCs and scale up additional software product teams in support of retiring TBMCS FL and other legacy mission critical applications allowing for eventual disposal of the AOC 10.1 infrastructure. Using Sec 804 authority, time lines are reduced by modularizing both the development work and the associated contracting and funding strategies. This enables dynamic resource allocation based on current warfighter needs. The desired end state is continuous delivery of all AOC WS software.

AOC WS Modifications will leverage the AOC WS Long-Term Modification and Sustainment (LTM&S) contract which will provide support to government led integration of the AOC WS enterprise. AOC WS Modifications will also use Other Transaction Authority (OTA) to adopt commercial best practices for software development and to scale out a modern Infrastructure as a Service/Platform as a Service (IaaS/PaaS) solution. Activities are also accomplished via Military Interdepartmental Purchase Requests (MIPR). Additionally, significant technical expertise will be sought after via modular contracting approach and provided by Government Agencies, DoD Laboratory, Federally Funded Research and Development Centers (FFRDC), Academia, and Engineering & Professional Acquisition Support Services contractors as well as commercial industry partners.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207410F / Air & Space Operations Center (AOC)	Project (Number/Name) 674596 / AOC WS Modifications
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AOC WS Modifications Development	C/Various	Various : Multiple	0.000	50.757	Dec 2018	64.758	Dec 2019	23.982	Dec 2020	0.000		23.982	Continuing	Continuing	-
AOC WS Modifications Other Transaction	Various	Pivotal : Multiple	0.000	13.688	Dec 2018	7.483	Dec 2019	4.069	Dec 2020	0.000		4.069	Continuing	Continuing	-
Multi-Domain Command and Control (MDC2)	MIPR	Various : Multiple	0.000	13.738	Apr 2019	0.000		0.000		0.000		0.000	0.000	13.738	-
Subtotal			0.000	78.183		72.241		28.051		0.000		28.051	Continuing	Continuing	N/A

Remarks
MDC2 funding transferred to PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AOC WS Modifications Direct Mission Support	C/TBD	Various : Various	0.000	7.417	Oct 2018	30.066	Oct 2019	11.654	Dec 2020	0.000		11.654	Continuing	Continuing	-
Subtotal			0.000	7.417		30.066		11.654		0.000		11.654	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AOC WS Modifications Engineering Services	Various	Various : Various	0.000	4.015	Oct 2018	3.297	Oct 2019	6.713	Dec 2020	0.000		6.713	Continuing	Continuing	-
AOC WS Modifications Program Support	C/Various	Various : Various	0.000	9.239	Nov 2018	9.260	Nov 2019	4.769	Dec 2020	0.000		4.769	Continuing	Continuing	-
Subtotal			0.000	13.254		12.557		11.482		0.000		11.482	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force								Date: February 2020			
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207410F / Air & Space Operations Center (AOC)				Project (Number/Name) 674596 / AOC WS Modifications			
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals	0.000	98.854	114.864	51.187	0.000	51.187	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207410F / Air & Space Operations Center (AOC)	Project (Number/Name) 674596 / AOC WS Modifications

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
AOC WS Modifications																												
AOC WS Modifications Kessel Run																												
AOC WS Modifications Engineering Solutions																												
Multi-Domain Command and Control (MDC2)																												
MDC2 Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>	Project (Number/Name) 674596 / <i>AOC WS Modifications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AOC WS Modifications</i>				
AOC WS Modifications Kessel Run	1	2019	4	2025
AOC WS Modifications Engineering Solutions	4	2019	4	2025
<i>Multi-Domain Command and Control (MDC2)</i>				
MDC2 Development	3	2019	4	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207412F <i>I Control and Reporting Center (CRC)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	6.216	8.109	16.041	0.000	16.041	10.546	10.459	17.119	17.434	Continuing	Continuing
67485L: <i>Theater Air Control System Imp (TACSI)</i>	-	6.216	8.109	16.041	0.000	16.041	10.546	10.459	17.119	17.434	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

CONTROL AND REPORTING CENTER (CRC)

The CRC is a mobile, ground-based theater air control system (TACS) surveillance and battle management command and control (BMC2) element. It is a customizable, modular, transportable, and persistent weapon system employed at the tactical level to support air and surface operations to provide direct command and control to all air assets in an assigned Area of Responsibility (AOR) and to report back to the Joint Force Air Combat Commander (JFACC). The CRC is a family of systems which include: AN/TYQ-23A(V)1 Tactical Air Operations Module (TAOM), AN/TSC-147, AN/TRC-213/214 Remote Radio Secure Voice System (RRSVS), and the AN/TPS-75 radar, CRC's organic radar. Air Combat Command (ACC) CRC Capability Road map provides for the modernization of this family of systems and will be programmed into phased updates through 2037.

CRC is part of the AF's Advanced Battle Management System (ABMS) initiative, to which CRC will provide a tactical C2 capability. A CRC Bridge to ABMS strategy in FY21 will consolidate previous modernization efforts into a larger initiative that continues the upgrading of battle management command and control, sensors, and communications systems. These continuing modernization efforts will allow CRC to update and improve software, ingest and disseminate Ground Moving Target Indicator feeds and tracks, enable efforts for OMS/UCI compliance, and integrate Top Secret hardware and software capability solutions.

CRC development efforts support CRC Bridge to ABMS include, but are not limited to: AN/TRC-213/214 RRSVS radio modernization upgrades (Saturn/MUOS/EOIP), continuous software development, Mode 5 Implementation, Ground Moving Target Indicator (GMTI) tracker, Top Secret (TS)/Joint Worldwide Intelligence Communication System (JWICS) and Talon Thresher, continue to pursue emerging technology for Open Mission System(OMS)/Open System Architecture (OSA) advancements, TPS-75 modernization, along with possible hardware changes to support ABMS architecture and L/V/C Operations capability. Also, CRC modifications are required for the system to keep pace with evolving COTS/GOTS components, DoD directives, changes in the underlying IT environment, and to remain interoperable, certified, supportable, and compliant through the development, integrations, testing, fielding, training and related equipment of new capabilities and upgrades to the CRC.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207412F / <i>Control and Reporting Center (CRC)</i>
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This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	6.413	8.109	16.070	0.000	16.070
Current President's Budget	6.216	8.109	16.041	0.000	16.041
Total Adjustments	-0.197	0.000	-0.029	0.000	-0.029
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.197	0.000			
• Other Adjustments	0.000	0.000	-0.029	0.000	-0.029

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: CRC Bridge to ABMS	0.000	0.000	16.041	-	16.041
Description: CRC Bridge to ABMS efforts will incorporate all future modernization efforts. The following efforts will continue and/or begin in FY21:					
-- Radio Modernization: Upgrading existing radio configuration to include new software and hardware capable of Mobile User Objective System (MUOS) and Second-generation Anti-Jam Tactical Ultra high frequency Radio for NATO (SATURN)					
-- Bridge to ABMS: Open Mission System / Universal Command and Control Interface (OMS/UCI) development/integration, organic system software development and upgrades, Mode 5 Implementation, Joint Worldwide Intelligence Communication System (JWICS) integration, Ground Moving Target Indicator (GMTI) tracker integration, Multi-Level Security/ Cross Domain Solution (MLS/CDS)Implementation, Live Virtual Construct (L/V/ C) Operations Capability, and TPS-75 modernization efforts.					
FY 2020 Plans: N/A					
FY 2021 Base Plans:					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force			Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207412F <i>I Control and Reporting Center (CRC)</i>			
C. Accomplishments/Planned Programs (\$ in Millions)					
-- Complete Radio Modernization prototypes and perform DT/OT testing activities (JITC and AFSIT). This effort was consolidated into 'CRC Bridge to ABMS' program narrative in FY21 as defined above.					
-- Develop, test, & integrate GMTI prototypes.					
-- Pursue efforts related to, but not excluded to, OMS/UCI development/integration, continuous software development, Mode 5 Implementation, JWICS integration, MLS/CDS Implementation, L/V/C Operations Capability, and TPS-75 modernization.					
FY 2020 to FY 2021 Increase/Decrease Statement: FY21 begins CRC Bridge to ABMS thrust.					
Title: CRC AN/TRC-213/214 RRSVS Radio Modernization Upgrade					
Description: RRSVS radio modernization upgrade includes, but is not limited to: upgrade software located in AN/TRC-213 (V) 3 in order to operate with upgraded AN/TRC-214. This will allow AN/TRC-214 to utilize the Mobile User Objective System (MUOS) constellation of satellites, support Integrated Waveform (IW), Second generation Anti-jam Tactical Ultra high frequency Radio for NATO (SATURN), Ensure sufficient channel capacity for remote radio interface, interoperability with required crypto equipment, combine channel inputs, enable operators to use J-voice, full IP capability, and allow for external VoIP/VoSIP connectivity.					
FY 2020 Plans: -- Continue development of AN/TRC-214 RRSVS radio prototypes, and commence testing process. Begin AN/TRC-213 RRSVS radio software upgrade development. -- Continue development of GMTI design, development, integration and testing.					
FY 2021 Base Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY20 to FY21 as effort re-aligns under the "CRC Bridge to ABMS" program thrust.					
Title: Multiple Source Correlator Tracker Software Solutions Upgrade					
Description: Prior to FY20, the MSCT 5.9 software upgrade was to incorporate increments 2 & 3 from CRC Functional Capabilities Document (FCD) v1.1. The intent of this upgrade is to ingest GMTI data into the CRC.					
	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
	4.793	6.109	0.000	-	0.000
	1.183	1.500	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force				Date: February 2020	
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207412F <i>I Control and Reporting Center (CRC)</i>			
C. Accomplishments/Planned Programs (\$ in Millions)					
CRC's software strategy has changed effective FY20 and MSCT will no longer be pursued; CRC's software development efforts will commence in FY21 as part of the CRC Bridge to ABMS thrust.					
FY 2020 Plans: - MSCT 5.9 commercial software development cancelled in FY20. CRC software requirements have been included in software solutions development in 'CRC Bridge to ABMS' thrust in FY21.					
FY 2021 Base Plans: N/A					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY20 to FY21 as effort re-aligns under the "CRC Bridge to ABMS" program thrust.					
Title: Ground Moving Target Indicator (GMTI) Tracker					
Description: The GMTI tracker will allow Battle Managers in the CRC TOC to follow ground vehicles in the same manner current Battle Managers track aircraft enabling an entire site picture of the battle space.					
FY 2020 Plans: Award contract and begin development GMTI tracker incorporation into the CRC.					
FY 2021 Base Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY20 to FY21 as effort re-aligns under the "CRC Bridge to ABMS" program thrust.					
Title: CRC Modernization Phase 1					
Description: MSCT software upgrades, 3 Dimensional Expeditionary Long Range Radar (3 DELRR) Integration, Secret Internet Protocol Network (SIPR Integration), and Multi Functional Information Distribution System Joint Tactical Radio System (MIDS JTRS Link 16 Upgrade)is completed.					
FY 2020 Plans:					
	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
	0.000	0.500	0.000	-	0.000
	0.240	0.000	0.000	-	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207412F <i>I Control and Reporting Center (CRC)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
FY 2021 Base Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	6.216	8.109	16.041	0.000	16.041

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 833040: <i>Theater Air Control Sys Improvements</i>	7.346	0.000	13.374	-	13.374	18.861	20.404	8.722	215.679	Continuing	Continuing

Remarks

E. Acquisition Strategy
The CRC Capability Roadmap provides for the modernization of the CRC family of systems and will be programmed into phased updates through 2024 to further advance current and future battlespace awareness and tactical battle management command and control capabilities. A variety of contract and organic vehicles will be used depending on type of effort and skills required. Management strategy relies on Air Force Program Executive Office for Digital (AFPEO BM) as the Milestone Decision Authority and the Air Force Life Cycle Management Center (AFLCMC) as the Contracting Authority.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207412F / Control and Reporting Center (CRC)	Project (Number/Name) 67485L / Theater Air Control System Imp (TACSI)
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development - CRC Bridge to ABMS	C/Variou	Various : Various, UT	-	-		-		11.178	Jun 2021	-		11.178	Continuing	Continuing	-
AN/TRC-213/214 RRSVS Radio Modernization Upgrade	C/Variou	Various : Various, MD	-	2.223	Aug 2019	3.487	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Multiple Source Correlator Tracker Software Solutions Upgrade	C/Variou	Various : Various, UT	-	0.500	Feb 2020	-		-		-		-	Continuing	Continuing	-
a Ground Moving Target Indicator (GMTI) Tracker	C/Variou	Various : Various, UT	-	-		2.609	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Subtotal			-	2.723		6.096		11.178		-		11.178	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Direct Cite Authority - Additional 16 Civilian Positions	TBD	Various : Hill AFB, UT	-	-		-		2.128	Oct 2020	-		2.128	Continuing	Continuing	-
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Subtotal			-	-		-		2.128		-		2.128	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support - CRC Bridge to ABMS	PO	Various : Various, FL	-	-		-		1.240	Aug 2021	-		1.240	Continuing	Continuing	-
Test Support - CRC Modernization Phase 1	Variou	Various : Various, IA	-	0.240	Mar 2020	-		-		-		-	Continuing	Continuing	-
Test Support-Radio Modernization	PO	Various : Various, FL	-	0.736	Jan 2020	0.640	Aug 2020	-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207412F / <i>Control and Reporting Center (CRC)</i>	Project (Number/Name) 67485L / <i>Theater Air Control System Imp (TACSI)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>AN/TRC-213/214 RRSVS Radio Modernization Upgrade</i>																												
Design & Development																												
Integration & Testing																												
<i>Multiple Source Correlator Tracker Software Solution Upgrade</i>																												
Design & Development																												
Integration & Testing																												
<i>Ground Moving Target Indicator (GMTI) Tracker</i>																												
Research and contract award																												
Design & Development																												
Integration & Testing																												
<i>CRC Bridge to ABMS</i>																												
Development & Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207412F / <i>Control and Reporting Center (CRC)</i>	Project (Number/Name) 67485L / <i>Theater Air Control System Imp (TACSI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AN/TRC-213/214 RRSVS Radio Modernization Upgrade</i>				
Design & Development	2	2019	4	2020
Integration & Testing	4	2020	1	2022
<i>Multiple Source Correlator Tracker Software Solution Upgrade</i>				
Design & Development	2	2019	2	2020
Integration & Testing	2	2020	4	2020
<i>Ground Moving Target Indicator (GMTI) Tracker</i>				
Research and contract award	2	2019	2	2020
Design & Development	3	2020	2	2021
Integration & Testing	3	2021	1	2022
<i>CRC Bridge to ABMS</i>				
Development & Integration	3	2021	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	108.795	67.996	138.303	0.000	138.303	173.584	128.803	126.159	119.539	Continuing	Continuing
67411L: <i>Airborne Warning & Control System (AWACS)</i>	-	108.795	67.996	138.303	0.000	138.303	173.584	128.803	126.159	119.539	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
"The R-1 line #203 was rescinded in the amount of -\$11.6M FY19 of the FY20 HR1158 Appropriations Bill and is not reflected in this document"

A. Mission Description and Budget Item Justification

Mission: E-3 Airborne Warning and Control System (AWACS) is the premier airborne platform providing Battle Management (BM)/Command and Control (C2) for Commander In Chief and combatant commander tasking in joint, allied, and coalition operations, humanitarian relief, and homeland defense. AWACS provides a real-time picture of friendly, neutral, and hostile air activity. Its capabilities include all-altitude/all-weather surveillance of the battle space; early warning of enemy actions; a real-time ability to find, fix, track, and assess airborne or maritime threats; and detection, location, and identification of electronic emitters.

1. E-3 DMS Replacement of Avionics for Global Operations and Navigation (DRAGON): DRAGON completes the Federal Aviation Administration (FAA), International Civil Aviation Organization (ICAO), and European Organization for the Safety of Air Navigation (EUROCONTROL) air traffic control mandated safety of flight capabilities. This program will provide the E-3 fleet with the flight instruments and other avionics for the Required Navigation Performance (RNP), and the surveillance and communication capabilities necessary to maintain continued critical unrestricted access to global airspace. Non-compliance will result in airspace restrictions and denials that will impact AWACS ability to support worldwide responses to situations requiring immediate on-scene BM/C2. DRAGON replaces the existing Diminishing Manufacturing Sources (DMS) Global Positioning System (GPS) Integrated Navigation System (GINS) with a modern Flight Management System (FMS) that will accommodate new capabilities including Mode 5 Identification Friend or Foe (IFF) and Joint Mission Planning System (JMPS). Also included as part of the modification is the addition of data link communications, voice and data link digital radios, and improved visual displays. Additionally, the acquisition of DRAGON flight simulators also contains DMS efforts which include removal of end-of-life software/hardware within simulator systems and move to a modular, common open system architecture that is sustainable and cyber resilient. The simulator effort also implements requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative. Emphasis on employment of Commercial-Off-The-Shelf (COTS) avionics is expected to lower cost, reduce the tech refresh cycle, and enhance life cycle management. DRAGON will provide development of support and test equipment needed for DRAGON production; DRAGON will also provide initial DMS and Initial Contractor Support (ICS) needed to support the first US developmental test aircraft (i.e., D-1) prior to the contract award of the DRAGON production effort. The Engineering and Manufacturing Development (EMD) phase of DRAGON was being executed as a Cooperative Program between the US and NATO.

2. E-3 Electronic Protection (EP): EP will provide improved radar processing in a specific flight environment to meet a classified requirement. EP will replace the radar controller, exciter, receiver, and data processor in the current Radar System Improvement Program (RSIP) system. The EP-processed radar picture will appear on the battle manager's display and is intended to provide APY-2 radar quality to the entire U.S. AWACS fleet. This program element may include necessary civilian pay

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>	
<p>expenses required to manage, execute, and deliver EP's weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>3. E-3 Training, Support, and Infrastructure (TSI): TSI provides continuing lab operations and maintenance support for AWACS modernization and enhancement across the enterprise. These activities include managing the AWACS Development Test and Evaluation (DT&E) infrastructure and tracking and monitoring the AWACS support equipment and program Government Furnished Property. The overall DT&E test infrastructure supports development and production projects and maintains facilities to support AWACS aircraft during system and sub-system testing in Seattle, WA, Baltimore, MD, and Oklahoma City, OK. The TSI assets also support multiple Foreign Military Sales (FMS) projects on a maintenance fee basis, not limited to projects for France, Saudi Arabia and Japan efforts. Key programs include contractual management of the AWACS Avionics Integration Laboratory (AIL) integrated with the Block 40/45 Functional Group configured lab and the AWACS Radar Systems Integration Lab/Software Development Facility (SIL/SDF). These labs provide US, and Foreign Military Sales (FMS) and Direct Commercial Sales customers with a configured development and qualification system and subsystem environment supporting all AWACS system and radar programs. TSI efforts allow new support equipment technologies and test strategies to be analyzed to ensure concurrent capability to sustain existing, modified, and upgraded E-3 equipment. This program element may include necessary civilian pay expenses required to manage, execute, and deliver TSI's weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>4. E-3 Command and Control, Intelligence, Surveillance, and Reconnaissance (C2ISR): C2ISR system improvements investigate and develop future capabilities of the AWACS weapon system. These efforts also include but are not limited to investigation, analysis, and development to ensure that AWACS successfully integrates with joint and coalition forces in a net-centric environment. C2ISR primarily supports pre-systems acquisition in the areas of materiel solution analysis and technology development. This is accomplished by prototyping and demonstrating capabilities required by the warfighter but also includes developing an E-3 Modernization & Sustainment Roadmap that projects user capability needs, as well as materiel solutions for the user needs. C2ISR will also support an analytical comparison of the operational effectiveness, suitability, and life-cycle cost of alternative materiel solutions beyond the current AWACS that satisfy an established capability need identified in an Initial Capabilities Document (ICD).</p> <p>5. E-3 Internet Protocol Enabled Communication (IPEC): IPEC will provide the Block 40/45 E-3 with a medium-bandwidth Internet Protocol (IP) communications capability to connect to the Global Information Grid and will support net-centric operations/warfare. IPEC will provide a reliable IP-enabled communication capability to support a shortened digitized kill-chain of time-sensitive targets. The modification will provide a permanent Inmarsat-based IP-enabled communications package supporting warfighter identified requirements for increased bandwidth Secret Internet Protocol Router Network (SIPRNet) and multi-domain networks.</p> <p>6. E-3 Combat Identification (CID) DMS: AWACS' current CID capability is based upon 1960's era technology that has become unsustainable, and requires an update to retain a significant part of AWACS overall mission capability. AWACS will address C2 CID shortfalls with a modern, persistent Airborne Moving Target Indicator (AMTI) BM/C2 combat ID. CID DMS supports the kill chain and decision superiority.</p> <p>7. E-3 Communication Network Upgrade (CNU): CNU will provide a Link 16 capability with high-jam-resistance, high-speed, crypto-secure computer-to-computer connectivity in support of every type of military platform from Air Force fighters to Navy submarines. The current 20 year old Class 2 terminal has sustainability/DMS</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>	
<p>issues and does not support mandated Crypto Mod (CM) & Freq. Remap (FR). CNU resolves DMS issues, provides CM & FR, Link 16 enhancements & growth for Next Gen Tactical Data Link (TDL). Risk reduction activities are being executed in cooperation with foreign partners.</p> <p>8. E-3 Mode 5 Acceleration: Updates flight deck to address known Air Traffic Management restrictions; upgrades the current flight deck transponder to include the Mode 5 capability since DRAGON's IOC 2022/FOC 2028 does not meet the Mode 5 mandate. This subset accelerates the Mode 5 transponder FOC independent of DRAGON.</p> <p>9. E-3 AWACS Communications Integration Program (ACIP): ACIP will provide Mobile User Objective System (MUOS) and Second Generation Anti-Jam Tactical UHF Radio for NATO (SATURN) capability by replacing the existing Have Quick II and DAMA SATCOM radios with new radios capable of communicating via the existing and additional military waveforms as a combined integration program on AWACS. Provides continued compatibility with US and Allied forces using frequency hopping UHF in support of airborne AMTI & BMC2 to COCOMs for Joint, Allied & Coalition ops by maintaining compatibility with CAF / Sister service C2 nodes and theater assets.</p> <p>10. E-3 GPS Upgrade (M-Code): The GPS upgrade provides E-3G AWACS with robust capability to operate in evolving GPS jamming environment. It incorporates M-Code capability into E-3G. As well as provides continued capabilities in GPS jamming environment in support of airborne AMTI & BMC2 to COCOMs for Joint, Allied & Coalition ops. We are compliant with OSD/NII mandate (2006), Public Law 111-383 and FY11 National Defense Authorization Act.</p> <p>11. E-3 Fifth to Fourth (5th to 4th): 5th generation connectivity on E-3G will be fielded in two phases: 1) The first phase fields the capability for E-3G AWACS to operate on 5th generation Link 16 networks that include data from F-22 and F-35 aircraft participants. This phase will also include the security domain required to integrate the 5th generation data into Mission Computing Software. 2) The second phase fields the full ability to receive/transmit, ingest and process 5th generation sensory data, combining it with onboard sensor data to create the most accurate air-picture, shortening the kill chain. This is not a New Start; in FY 2020 program 0604281F, TDNE, project 655262 efforts were transferred to program 0207417F, Airborne Warning and Control System (AWACS), project 67411L in order to properly align requirement with the correct Weapon System.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver E-3 AWACS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.</p> <p>The FY 2021 funding request was reduced by \$55.2 million to account for the availability of prior year execution balances.</p> <p>This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	112.280	67.996	169.636	0.000	169.636
Current President's Budget	108.795	67.996	138.303	0.000	138.303
Total Adjustments	-3.485	0.000	-31.333	0.000	-31.333
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.485	0.000			
• Other Adjustments	0.000	0.000	-31.333	0.000	-31.333

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: E-3 DMS Replacement of Avionics for Global Operations and Navigation (DRAGON)</p> <p>Description: DRAGON: Provides analog to digital cockpit addressing the Federal Aviation Administration (FAA), International Civil Aviation Organization (ICAO), and European Organization for the Safety of Air Navigation (EUROCONTROL) air traffic control mandated safety of flight capabilities. Provides the E-3 fleet with the flight instruments and other avionics for the Required Navigation Performance (RNP), and the surveillance and communication capabilities necessary to maintain continued critical unrestricted access to global airspace.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continued Development of Motion Trainer Simulator - Completed IOT&E <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Complete Development of Motion Trainer Simulator <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <ul style="list-style-type: none"> - Increase due to completion of Motion Trainer Simulator 	10.121	0.200	2.900
<p>Title: E-3 Electronic Protection (EP)</p> <p>Description: EP: Provides improved radar processing in a specific flight environment to meet a classified requirement. Replaces the radar controller, exciter, receiver, and data processor in the current Radar System Improvement Program (RSIP) system.</p> <p>FY 2020 Plans:</p>	4.915	16.838	30.862

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Awarded rapid prototyping development contracts <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue rapid prototyping <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <ul style="list-style-type: none"> - Increase due to acquisition strategy shift to a mid-tier (Sec. 804) program to accelerate rapid prototyping schedule 				
<p>Title: E-3 Training, Support and Infrastructure (TSI)</p> <p>Description: Training, Support, and Infrastructure (TSI): Provides continuing management support for AWACS modernization and enhancement to include managing the AWACS Development Test and Evaluation (DT&E) and Production infrastructure and tracking and monitoring the AWACS vendor's core mission and aircrew training, support equipment and program Government Furnished Property.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Maintained and provided DT&E labs to AWACS programs - Supported AWACS development and production programs lab integration & test efforts - Provided system lab support, integration, and test to current AWACS programs. - Supported AWACS and other OSD mandated interoperability testing and support mandatory E-3 Operational, Safety, and Suitability and Effectiveness program <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Will continue to maintain and provide DT&E labs to AWACS programs - Will support AWACS development and production programs lab integration & test efforts - Will provide system lab support, integration, and test to current AWACS programs. - Will support AWACS and other OSD mandated interoperability testing and support mandatory E-3 Operational, Safety, and Suitability and Effectiveness program - Will support standup of organic SIL effort <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <ul style="list-style-type: none"> - Increase due to standup of organic SIL 		16.276	10.066	25.468
<p>Title: E-3 Command and Control, Intelligence, Surveillance and Reconnaissance (C2ISR)</p> <p>Description: Command and Control, Intelligence, Surveillance, and Reconnaissance (C2ISR):</p>		32.094	7.669	2.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Investigate and develops future capabilities of the AWACS weapon system to include but are not limited to investigation, analysis, and development to ensure that AWACS successfully integrates with joint and coalition forces in a net-centric environment. Primarily supports pre-systems acquisition in the areas of materiel solution analysis and technology development.				
FY 2020 Plans: - Continued to conduct engineering / integration studies to determine required modifications and associated costs to upgrade and support risk reduction activities for program planning - Continued to execute cooperative Independent Research and Development				
FY 2021 Plans: - Continue to conduct engineering / integration studies to determine required modifications and associated costs to upgrade and support risk reduction activities for program planning - Continue to execute cooperative Independent Research and Development				
FY 2020 to FY 2021 Increase/Decrease Statement: - Decrease of future capability risk reduction requirements				
Title: E-3 Internet Protocol Enabled Communication (IPEC) Description: Internet Protocol Enabled Communication (IPEC): Provides the Block 40/45 E-3 with a medium-bandwidth Internet Protocol (IP) communications capability to connect to the Global Information Grid and supports net-centric operations/warfare. Provides a reliable IP-enabled communication capability to support a shortened digitized kill-chain of time-sensitive targets.		0.169	0.500	0.000
FY 2020 Plans: - Complete EMD effort				
FY 2021 Plans: - N/A				
FY 2020 to FY 2021 Increase/Decrease Statement: - Decrease due to completion of development effort in FY 2020				
Title: E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) Description: Combat Identification (CID) Diminishing Manufacturing Sources (DMS): Addresses C2 CID shortfalls with a modern, persistent Airborne Moving Target Indication (AMTI) BM/C2 combat ID. Supports the kill chain and decision superiority.		18.578	5.689	6.313

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: - Continued risk reduction efforts; began SW and sub-system level development</p> <p>FY 2021 Plans: - Continue SW and sub-system level development; begin sub-system level integration</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: - Increase due to revised program cost estimate and acquisition strategy to accelerate schedule</p>				
<p>Title: E-3 Communication Network Upgrade (CNU)</p> <p>Description: Communication Network Upgrade (CNU): Provides a Link 16 capability with high-jam-resistance, high-speed, crypto-secure computer-to-computer connectivity in support of every type of military platform from Air Force fighters to Navy submarines.</p> <p>FY 2020 Plans: - Continued rapid prototyping and development effort</p> <p>FY 2021 Plans: - Continue rapid prototyping and development effort; AFSI and JIT Testing</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: - Increase due to Phase II development in FY21</p>		17.022	16.411	28.865
<p>Title: Mode 5 Acceleration</p> <p>Description: Mode 5 Acceleration: Updates flight deck to address known Air Traffic Management restrictions; upgrades the current flight deck transponder to include the Mode 5 capability. Accelerates the Mode 5 transponder FOC independent of DRAGON.</p> <p>FY 2020 Plans: - Continued rapid prototyping and development effort</p> <p>FY 2021 Plans: - Continue with rapid prototyping and development effort</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: - Increase due to test requirements in FY 2021</p>		9.620	7.587	9.265
<p>Title: E-3 AWACS Communications Integration Program (ACIP)</p>		0.000	2.036	22.362

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: AWACS Communications Integration Program (ACIP)Development: Provides Mobile User Objective System (MUOS) and Second Generation Anti-Jam Tactical UHF Radio for NATO (SATURN) capability by replacing the existing Have Quick II and DAMA SATCOM radios with new radios capable of communicating via the existing and additional military waveforms as a combined integration program on AWACS.</p> <p>FY 2020 Plans: - Begin risk reduction effort</p> <p>FY 2021 Plans: - Continue risk reduction and begin prototyping development effort</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: - Increase due to risk reduction and prototyping development effort</p>				
<p>Title: E-3 AWACS GPS Upgrade (M-Code)</p> <p>Description: AWACS GPS Upgrade (M-Code): Provides E-3G AWACS with robust capability to operate in evolving GPS jamming environment. Incorporates GPS M-Code capability into E-3G and provides continued capabilities in GPS jamming environment in support of airborne AMTI & BMC2 to COCOMs for Joint, Allied & Coalition ops.</p> <p>FY 2020 Plans: - Risk reduction effort</p> <p>FY 2021 Plans: - Continue risk reduction and begin prototyping development effort</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: - Increase due to risk reduction and prototyping development effort</p>		0.000	1.000	1.000
<p>Title: AWACS Fifth to Fourth (5th to 4th)</p> <p>Description: E-3 Fifth to Fourth (5th to 4th): 5th generation connectivity on E-3G will be fielded in two phases: 1) The first phase fields the capability for E-3G AWACS to operate on 5th generation Link 16 networks that include data from F-22 and F-35 aircraft participants. This phase will also include the security domain required to integrate the 5th generation data into Mission Computing Software. 2) The second phase fields the full ability to receive/transmit, ingest and process 5th generation sensory data, combining it with onboard sensor data to create the most accurate air-picture, shortening the kill chain. This is not a New</p>		0.000	0.000	9.268

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Start; in FY 2020 PE 0604281F, TDNE, BPAC 655262 efforts were transferred to PE 0207417F, Airborne Warning and Control System (AWACS), BPAC 67411L in order to properly align requirement with the correct Weapon System.			
FY 2020 Plans: - N/A			
FY 2021 Plans: - Rapid prototyping and development effort			
FY 2020 to FY 2021 Increase/Decrease Statement: - Increase due to award of rapid prototype contract			
Accomplishments/Planned Programs Subtotals	108.795	67.996	138.303

D. Other Program Funding Summary (\$ in Millions)											Cost To	
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Complete	Total Cost	
• APAF 05 Line Item E00300: <i>E-3</i>	133.199	164.273	153.454	-	153.454	189.547	242.996	302.566	-	Continuing	Continuing	
• APAF 05 Line Item E34045: <i>Airborne Warning and Control System</i>	59.665	34.240	25.604	-	25.604	28.758	0.000	0.000	-	0.000	148.267	
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts</i>	13.563	24.175	21.293	-	21.293	21.720	22.114	22.512	-	Continuing	Continuing	

Remarks

E. Acquisition Strategy
 The modernization of the AWACS weapon system consists of multiple capability upgrades that are developed and fielded on competitive and sole source contracts. Full and open competition is explored for all new efforts where market research indicates opportunities exist.

Air Force Program Executive Officer (PEO) for PEO Digital (AFLCMC HB) is the Milestone Decision Authority (MDA) for all AWACS Programs, with the exception of the E-3 Block 40/45 Upgrade. The E-3 Block 40/45 Upgrade MDA is the Secretary of the Air Force, with authority delegated to the Assistant Secretary of the Air Force (Acquisition) [SAF/AQ]. Of note, E-3 Block 40/45 Upgrade has completed development activities, so it has no 3600 funding and thus not otherwise referenced in this document. Air Force Life Cycle Management Center (AFLCMC) is the Contracting Authority for the AWACS portfolio and provides Contracts, Legal, and Comptroller Support.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207417F / Airborne Warning and Control System (AWACS)	Project (Number/Name) 67411L / Airborne Warning & Control System (AWACS)
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
E-3 DMS Replacement of Avionics for Global Operations and Navigation (DRAGON)	SS/FPIF	L3 : Arlington, TX	-	8.600	Jan 2019	0.200		2.000	Jan 2021	-		2.000	Continuing	Continuing	-
E-3 Electronic Protection (EP)	SS/CPFF	GTRI : Atlanta, GA	-	0.900	Nov 2019	1.287	Apr 2020	-		-		-	Continuing	Continuing	-
E-3 Electronic Protection (EP) Rapid Prototyping Alpha Phase 1A	C/CPAF	AFRL OTA : Rome, NY	-	0.900		-		8.152	Jan 2021	-		8.152	Continuing	Continuing	-
E-3 Electronic Protection (EP) Rapid Prototyping Alpha Phase 1B	TBD	TBD : TBD	-	-		-		16.319	Jul 2021	-		16.319	Continuing	Continuing	-
E-3 Command and Control, Intelligence, Surveillance, and Reconnaissance	SS/ Various	BAH & Various : Washington, DC	-	22.452	Jan 2019	13.933	Jan 2020	5.919	Jan 2021	-		5.919	Continuing	Continuing	-
E-3 Command and Control, Intelligence, Surveillance, and Reconnaissance GTRI Study	SS/CPFF	GTRI : Atlanta, GA	-	5.027	Feb 2019	0.500	Feb 2020	0.500	Feb 2021	-		0.500	Continuing	Continuing	-
E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) Risk Reduction	SS/CPFF	Raytheon : Fort Wayne, IN	-	8.460	May 2019	5.689	Apr 2020	-		-		-	Continuing	Continuing	-
E-3 Internet Protocol Enabled Communication (IPEC)	SS/ Various	Boeing : Oklahoma City, OK	-	0.169	Nov 2019	0.500	Nov 2020	-		-		-	Continuing	Continuing	-
E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) Prototype Development	MIPR	DMEA : McClellan, CA	-	7.362	Oct 2019	-		-		-		-	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207417F / Airborne Warning and Control System (AWACS)	Project (Number/Name) 67411L / Airborne Warning & Control System (AWACS)
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) SW and Sub-System Level Development	TBD	TBD : TBD	-	-		-		12.000	Jan 2021	-		12.000	Continuing	Continuing	-
E-3 Communication Network Upgrade (CNU)	Various	Space & Naval Warfare Sys : San Diego, CA	-	1.484	Jan 2019	1.356	Jan 2020	1.380	Jan 2021	-		1.380	Continuing	Continuing	-
E-3 Communication Network Upgrade (CNU) GTRI	Various	GTRI : Atlanta, GA	-	7.225	Feb 2019	8.612	Feb 2020	4.264		-		4.264	Continuing	Continuing	-
E-3 Communication Network Upgrade (CNU) SW Dev	Various	76th SWES : Tinker AFB, OK	-	4.853	Jan 2019	3.019	Jan 2020	2.320	Jan 2021	-		2.320	Continuing	Continuing	-
Mode 5 Acceleration	MIPR	Raytheon : Aberdeen Prov. Grnds, MD	-	9.000	Oct 2019	4.393	Aug 2020	7.257	Jan 2021	-		7.257	Continuing	Continuing	-
ACIP	TBD	TBD : TBD	-	0.000	Jan 2019	2.036	Jan 2020	12.615		-		12.615	Continuing	Continuing	-
AWACS GPS Upgrade (M-Code)	TBD	TBD : TBD	-	0.000	Jan 2019	-		1.000		-		1.000	Continuing	Continuing	-
Fifth to Fourth (5th to 4th) GTRI	MIPR	GTRI : Atlanta, GA	-	-		-		9.268	Jul 2021	-		9.268	Continuing	Continuing	-
Subtotal			-	76.432		41.525		82.994		-		82.994	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
E-3 Training, Support & Infrastructure (TSI)	SS/ Various	Boeing : Oklahoma City, OK	-	5.731	Jan 2019	9.100	Jan 2020	25.445	Jan 2021	-		25.445	Continuing	Continuing	-
Subtotal			-	5.731		9.100		25.445		-		25.445	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207417F / Airborne Warning and Control System (AWACS)	Project (Number/Name) 67411L / Airborne Warning & Control System (AWACS)

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
AWACS PE 0207417F																												
DRAGON IOT&E																												
EP Alpha Phase																												
EP Beta Decision (Nov 2024)																												
EP DT/OT																												
TSI																												
C2ISR																												
CID DMS Alpha Phase																												
CID DMS Beta Decision (Oct 2024)																												
CID DT/OT																												
CNU Beta Decision (Feb 2020)																												
CNU Development																												
Mode 5 Development																												
Mode 5 Beta Decision (Oct 2021)																												
ACIP Risk Reduction																												
ACIP SOTR																												
GPS Upgrade (M-Code) Risk Reduction																												
Fifth to Fourth (5th to 4th) Risk Reduction																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207417F / Airborne Warning and Control System (AWACS)	Project (Number/Name) 67411L / Airborne Warning & Control System (AWACS)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AWACS PE 0207417F				
DRAGON IOT&E	3	2019	2	2020
EP Alpha Phase	3	2020	4	2025
EP Beta Decision (Nov 2024)	1	2024	1	2024
EP DT/OT	1	2025	1	2025
TSI	1	2019	4	2024
C2ISR	1	2019	4	2025
CID DMS Alpha Phase	4	2020	1	2024
CID DMS Beta Decision (Oct 2024)	1	2024	1	2024
CID DT/OT	4	2022	1	2024
CNU Beta Decision (Feb 2020)	2	2020	2	2020
CNU Development	2	2019	4	2021
Mode 5 Development	1	2019	4	2021
Mode 5 Beta Decision (Oct 2021)	1	2021	1	2021
ACIP Risk Reduction	4	2020	4	2023
ACIP SOTR	2	2023	4	2023
GPS Upgrade (M-Code) Risk Reduction	1	2020	4	2020
Fifth to Fourth (5th to 4th) Risk Reduction	1	2021	1	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	2.562	2.462	4.223	0.000	4.223	5.040	4.727	4.033	4.107	Continuing	Continuing
675234: <i>TACP Support</i>	-	2.562	2.462	4.223	0.000	4.223	5.040	4.727	4.033	4.107	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Terminal Control Training and Rehearsal (JTC TRS) Program, under the Tactical Airborne Control System, funds development necessary to provide a Distributed Mission Operations (DMO) capable, high-fidelity simulator for Battlefield Airmen, to include Joint Terminal Attack Controller (JTAC) operations, Special Tactics Combat Control Team (CCT), and Air Support Operations Center (ASOC) operations.

JTC TRS is essential to provide initial training, mission qualification training, continuation training, and currency control requirements to JTACs and Special Tactics personnel. JTAC control training requirements exceed the ability of live-fly aircraft to meet, and JTC TRS is the only capability enabling JTACs to achieve and maintain minimum required training for both qualification and proficiency in accordance with the U.S and Partner Nation Memorandum of Agreement for JTAC certification and qualification.

The JTC TRS Program provides research and development to facilitate interoperability with joint and sister Service air-ground simulation using industry standards. JTC TRS will provide the capability to network aircrew full mission trainers and training centers in a live-virtual-constructive network. This development effort will also integrate ASOCs with the Joint Theater Air Ground Simulation System (JTAGSS) trainer for Joint Fires integration. The simulator will supplement live field training and live-fly sorties to provide realistic introductory, proficiency, currency, and upgrade training in a simulated battlefield, disaster, or humanitarian relief environment.

b. JTAGSS is a continuation of the ASOC simulation trainer initially funded in 2009 and complements the JTC TRS trainer by providing a total air-ground constructive simulation environment for integrated networked training and mission rehearsal capability that will develop JTAC/CCT and ASOC/Special Operations Forces (SOF) Command and Control (C2) battle staff skills. JTAGSS will provide the ASOC, SOF, and TACP (Tactical Air Control Party) with the vertical and horizontal C2 communications and coordination training and mission rehearsal required for mission effectiveness. There are insufficient exercises and live training events available to meet mandated readiness requirements. The system will include a secure network connection, a constructive simulation environment generator with sharable databases, computer work stations that have synthetic reflex agent applications for each ASOC/SOF crew position to execute the air tasking order.

Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. DMS efforts to include removal of end-of-life software/hardware within simulators systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative. This program element may include necessary civilian pay expenses required to manage, execute, and deliver the JTC TRS weapon system capability.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver JTC TRS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	2.659	2.462	4.231	0.000	4.231
Current President's Budget	2.562	2.462	4.223	0.000	4.223
Total Adjustments	-0.097	0.000	-0.008	0.000	-0.008
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.097	0.000	-0.008	0.000	-0.008

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: JTC TRS Trainer Development	0.319	0.000	0.000	-	0.000
Description: Development and test of Engineering Change Proposals (ECPs) for TACP-Close Air Support System (CASS).					
FY 2020 Plans: No development effort required.					
FY 2021 Base Plans: None					
FY 2020 to FY 2021 Increase/Decrease Statement: None					
Title: JTAGSS Trainer Development	2.243	2.462	4.223	0.000	4.223

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP	

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Develops high fidelity simulation system for ASOC/SOF Command and Control System that supports JTAC training. Currently an AFRL program funded by Air Combat Command					
FY 2020 Plans: Continue JTAGSS 3.0. Integrate TACP Close Air Support System 1.4.4. and internal agents.					
FY 2021 Base Plans: Continue JTAGSS 3.0. Integrate TACP Close Air Support System 1.4.4. and internal agents.					
FY 2021 OCO Plans: No OCO at this time.					
FY 2020 to FY 2021 Increase/Decrease Statement: Development effort will complete mid 2021					
Accomplishments/Planned Programs Subtotals	2.562	2.462	4.223	0.000	4.223

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 837100: <i>Tactical C-E Equipment</i>	6.845	3.870	3.939	-	3.939	4.009	4.080	4.154	4.231	Continuing	Continuing

Remarks

E. Acquisition Strategy

a. The JTC TRS acquisition is a single step to full capability as defined in the CPD. A small business set-aside competitive lowest price technically acceptable source selection was conducted and resulted in the award of a single contract to produce and sustain JTC TRS. The contract includes pre-priced production options for additional JTC TRS production, Emulated Military Equipment (EME) program management, cybersecurity support, Contractor Logistic Support (CLS), Training System Support Center (TSSC), training, relocation, a legacy system compatibility study. The pre-price production options include credit to the government for use of existing equipment when updating current fielded active duty immersive JTAC training systems (Air National Guard (ANG) Advanced JTAC Training System (AAJTS)) to the JTC TRS baseline. The contract structure allows for maintaining concurrency, implementing system improvements/technical refresh, and other modifications as required. JTC TRS awarded a competitive contract in January 2016 to procure up to 32 devices. The JTC TRS received a Full Rate Production (FRP) decision in February 2017 and is currently fielding production units. . Development will be required for engineering changes related to Legacy System Compatibility, TACP-Close Air Support System (TACP-CASS).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP
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b. The acquisition strategy for the JTAGSS trainer will be to field advance technology demonstration units to continue to perform proof of concept and technology validation of mission simulations for all ASOC crew positions including detailed communications planning, asset deconfliction, integration of joint fires, and other critical mission areas required for integrated TACP/ASOC C2 mission success. At the completion of the technology validation, a contract will be competitively awarded to complete JTAGSS development, deployment and integration. Current software is Government or Commercial Off-the-Shelf technologies (GOTS/COTS) allowing almost any training technology development company to compete, which lowers technical risk, schedule risk, and cost.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP	Project (Number/Name) 675234 / TACP Support
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
JTC TRS Trainer Development	C/FFP	AFLCMC/WNS, AFMC : Wright Patterson AFB, OH	-	0.319	Jan 2019	-		4.223	Dec 2020	-		4.223	Continuing	Continuing	-
JTAGSS Development	C/CPFF	AFRL, AFMC : Wright Patterson AFB, OH	-	2.243	Jan 2019	2.462	Jan 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	2.562		2.462		4.223		-		4.223	Continuing	Continuing	N/A

Remarks

JTC TRS 2.0
 - Adds Air Traffic Control and Assault Zone operations for Special Operations Special Tactics personnel and TACP-CASS.

JTAGSS 2.0. This effort: a) Will increase the autonomous functionality and capability using reflex agents; b) improve internal ASOC crew capacity with increased voice recognition capabilities; c) make the JTAGSS system DMO ready and capable; and d) provide joint and coalition full mission rehearsal capability.
 -ASOC/JTAGSS Metric Development.
 -Scenario Authoring Tool.
 -Distributed Mission Operations Ready
 -Internal Reflex Agent Research and Development.
 -Instructor Operator Station.
 -After Action Review.
 -JTAGSS Documentation and Rapid Transition Documentation.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	2.562	2.462	4.223	-	4.223	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP	Project (Number/Name) 675234 / TACP Support
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Tactical Simulators</i>	
JTC TRS RFP - for DACAS	
JTC TRS Contract Award for DACAS	
JTC TRS Study Options and Engineering Change Proposals (ECPs)	
JTAGSS Development	
JTAGSS Production	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207418F / AFSPECWAR - TACP	Project (Number/Name) 675234 / TACP Support
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Tactical Simulators</i>				
JTC TRS RFP - for DACAS	1	2019	2	2025
JTC TRS Contract Award for DACAS	1	2019	2	2025
JTC TRS Study Options and Engineering Change Proposals (ECPs)	2	2019	3	2025
JTAGSS Development	1	2019	4	2020
JTAGSS Production	4	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	10.316	13.668	16.564	0.000	16.564	23.358	23.061	19.962	11.338	Continuing	Continuing
675307: <i>TARGETING ENTERPRISE RESEARCH</i>	-	9.451	12.922	15.805	0.000	15.805	22.584	22.273	19.160	10.522	Continuing	Continuing
675309: <i>GEO Info & Serv Software</i>	-	0.865	0.746	0.759	0.000	0.759	0.774	0.788	0.802	0.816	Continuing	Continuing

A. Mission Description and Budget Item Justification

The mission of Combat Air Intelligence Systems (CAIS) is to process, analyze, and disseminate intelligence for air component and unit operations worldwide by providing key intelligence infrastructure and production capabilities for the supported and supporting forces with true backbone type of intelligence support for air operations and air support to joint operations. CAIS is focused on providing the intelligence infrastructure and funding to Air Force Major Commands, Intelligence, Cyber and Space Squadrons, Field Operating Agencies, and subordinate units.

Modernizations utilize Section 804, Middle Tier of Acquisitions as a rapid fielding effort to provide required modernization to remain interoperable, certified, supportable, and compliant through software engineering solutions, integration, testing, fielding, and sustainment of new capabilities and upgrades. This includes the utilization of Agile software engineering methodologies and managed cloud infrastructure and platform services. Modernizations are required for the CAIS enterprise capabilities, inside and outside AOCs to keep pace with evolving Government Off the Shelf (GOTS) components, integrated Commercial Off the Shelf (COTS) components, Department of Defense (DoD) directives, and changes in the underlying Information Technology (IT) environment, as well as to deliver effective operational capabilities for the user.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	10.316	13.668	15.257	0.000	15.257
Current President's Budget	10.316	13.668	16.564	0.000	16.564
Total Adjustments	0.000	0.000	1.307	0.000	1.307
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	1.307	0.000	1.307

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>				Project (Number/Name) 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675307: <i>TARGETING ENTERPRISE RESEARCH</i>	-	9.451	12.922	15.805	0.000	15.805	22.584	22.273	19.160	10.522	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provides support to personnel utilizing Target Development, Planning, and Execution applications; Unit Level Intelligence; Tactical Intelligence Applications; and direct support to national, combatant command, and Air Force intelligence missions. This program element may include necessary civilian pay expenses required to manage, recruit, train, execute, and deliver Targeting weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Targeting Enterprise Research	9.451	12.922	15.805
Description: Conduct Targeting Enterprise research and advancement for projects such as Joint Targeting Toolbox (JTT) [In both the Global Command and Control System Joint (GCCS-J) and Stand-alone configurations] and the Unit Level Intelligence (ULI) systems (Personal Computer - Integrated Imagery and Intelligence/Targeting (PC-I3T) and Targeting Application Workstation (TAW).) This budget item also funds emerging targeting capabilities (such as Target System Analysis, 4D visualization, etc.) and Targeting Enterprise software application modernization efforts.			
FY 2020 Plans: Continue the phased modernization of capabilities within the T&G portfolio, expand test automation, and migrate to a true Continuous Integration/DevOps environment to support continuous delivery to the warfighter.			
FY 2021 Plans: Continue the phased modernization of capabilities within the T&G portfolio, expand test automation, and migrate to a true Continuous Integration/DevOps environment to support continuous delivery to the warfighter.			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase reflects rising costs of software services			
Accomplishments/Planned Programs Subtotals	9.451	12.922	15.805

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>	Project (Number/Name) 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 832070: <i>Intelligence Comm Equipment</i>	6.835	5.363	14.535	-	14.535	-	-	-	-	Continuing	Continuing

Remarks

Combat Air Intelligence System (CAIS) procurement funds.

D. Acquisition Strategy

The acquisition strategy builds on agile software engineering methodologies and modernization of existing capabilities utilizing evolutionary acquisition. Using Section 804, timelines are reduced by modularizing both software engineering solutions and the associated contracting and funding strategies. This enables dynamic resource allocation based on current warfighter needs. The desired end state is continuous delivery of Software.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 7				PE 0207431F / Combat Air Intelligence System Activities				675307 / TARGETING ENTERPRISE RESEARCH								
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Targeting Enterprise Research	Various	TBD : TBD	-	7.426	Mar 2019	11.328	Jan 2020	14.104	Jan 2021	-		14.104	Continuing	Continuing	-	
Subtotal			-	7.426		11.328		14.104		-		14.104	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Targeting Systems Support	MIPR	SPAWAR : Phili, PA	-	0.270	Dec 2018	-		-		-		-	Continuing	Continuing	-	
DMS, MilCloud	Various	Various : TBD	-	0.098	Apr 2019	0.154	Apr 2020	0.157	Apr 2021	-		0.157	Continuing	Continuing	-	
Subtotal			-	0.368		0.154		0.157		-		0.157	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
45th Test Squadron	PO	45th Test Squadron : Eglin, FL	-	0.337	Dec 2018	0.128	Dec 2019	0.130	Dec 2020	-		0.130	Continuing	Continuing	-	
Subtotal			-	0.337		0.128		0.130		-		0.130	Continuing	Continuing	N/A	
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Targeting Research Enterprise	Various	Program Management Office : Hanscom, MA	-	1.320	Nov 2018	1.312	Nov 2019	1.414	Nov 2020	-		1.414	Continuing	Continuing	-	
Subtotal			-	1.320		1.312		1.414		-		1.414	Continuing	Continuing	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force								Date: February 2020			
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>				Project (Number/Name) 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>			
	Prior Years	FY 2019	FY 2020		FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	-	9.451	12.922		15.805	-	15.805	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>	Project (Number/Name) 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Targeting	
Software/Hardware Development	
Test and Evaluation	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>	Project (Number/Name) 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Targeting				
Software/Hardware Development	1	2019	4	2025
Test and Evaluation	1	2019	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>				Project (Number/Name) 675309 / <i>GEO Info & Serv Software</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675309: <i>GEO Info & Serv Software</i>	-	0.865	0.746	0.759	0.000	0.759	0.774	0.788	0.802	0.816	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provides support to personnel using Geospatial resources utilized in Geospatial Intelligence (GEOINT) databasing applications, technology exploration and refresh initiatives, geospatial imagery data management and dissemination architecture, geospatial information and services modernization, and enablers for intel and targeting capabilities. Provides support to the MAJCOMs to ensure requisite and available target intelligence and GEOINT tools for information directly available to warfighters.

The GEOINT information and service software program funds the Air Force Enhanced Geospatial Product Library (EGPL) which is currently fielded to all combatant command air components and subordinate units supporting global air operations. The EGPL provides digital GEOINT data to support mission planning, targeting & intelligence in support of mission objectives.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Geospatial Intelligence weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Enhanced Geospatial Product Library (EGPL)	0.865	0.746	0.759
Description: Provide continuing support for EGPL software and storage to meet future and evolving IT and GEOINT standards and support.			
FY 2020 Plans: Continue to develop EGPL software and continue modernization efforts utilizing Agile Methodologies.			
FY 2021 Plans: Continue to develop EGPL software and continue modernization efforts utilizing Agile Methodologies.			
FY 2020 to FY 2021 Increase/Decrease Statement: Decrease costs reflect return to baseline level after modernization efforts.			
Accomplishments/Planned Programs Subtotals	0.865	0.746	0.759

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>	Project (Number/Name) 675309 / <i>GEO Info & Serv Software</i>

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 832070: <i>Intelligence Comm Equipment</i>	6.835	5.363	14.535	-	14.535	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy builds on agile software engineering methodologies and modernization of existing capabilities utilizing evolutionary acquisition. Using section 804, timelines are reduced by modularizing both software engineering solutions and the associated contracting and funding strategies. This enables dynamic resource allocation based on current warfighter needs. The desired end state is continuous delivery of Software.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020					
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>					Project (Number/Name) 675309 / <i>GEO Info & Serv Software</i>						
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Enhanced Geospatial Product Library	MIPR	ARL : Research Triangle, NC	-	0.865	Dec 2018	0.746	Dec 2019	0.759	Dec 2020	-		0.759	Continuing	Continuing	-	
Subtotal			-	0.865		0.746		0.759		-		0.759	Continuing	Continuing	N/A	
			Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total		Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.865		0.746		0.759		-		0.759	Continuing	Continuing	N/A	
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>	Project (Number/Name) 675309 / <i>GEO Info & Serv Software</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Geoint	
Software Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207431F / <i>Combat Air Intelligence System Activities</i>	Project (Number/Name) 675309 / <i>GEO Info & Serv Software</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Geoint				
Software Development	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207438F / <i>Theater Battle Management (TBM) C4I</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	7.858	0.000	7.858	8.024	0.000	0.000	0.000	0.000	15.882
675218: <i>Applications Development</i>	-	0.000	0.000	7.858	0.000	7.858	8.024	0.000	0.000	0.000	0.000	15.882
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This is not a new start.

In FY 2021, PE 0207438F, Theater Battle Management (TBM) C4I, Project 675218, Applications Development, was transferred from PE 0305015F, C2 Air Operations Suite - C2 Information Services (C2AOS-C2IS), Project 675218, Applications Development, in order to improve transparency of development programs.

A. Mission Description and Budget Item Justification

This project funds software development capacity necessary to deliver Air Force's (AF) Command and Control (C2) capabilities and services. Applications Development is executed under the Air Operations Center (AOC) Block 20 Modification effort. Applications Development provides worldwide operational capabilities for AF C2 in support of DoD, Coalition Partners, and other government agencies. These efforts focus on support of the Joint Forces Air Component Commander (JFACC) that provides air, space and cyber support as presented to the AOC and to other AF and Joint Services C2 systems. Applications Development efforts deliver capabilities identified in the Joint Command and Control (JC2) Capability Development Document (CDD) (2013).

In FY 2021, C2 Applications Development will focus on providing software capabilities for the combat plans and operations divisions to build, disseminate and execute the Master Air Attack Plan (MAAP). C2 Applications Development also provides an Airspace Management tool used for building airspaces, evaluating requests and instantaneously generating the Airspace Control Order (ACO). These efforts deliver modern software for inclusion to the AOC Weapon System Modifications to replace the Master Air Attack Plan-Toolkit (MAAPTK) and components of Theater Battle Management Core System - Force Level (TBMCS FL). Additionally in FY 2021, this effort will investigate and develop a solution to address joint partner and non-AOC usage of C2 Applications in TBMCS FL use cases.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Applications Development weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207438F / <i>Theater Battle Management (TBM) C4I</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	7.858	0.000	7.858
Total Adjustments	0.000	0.000	7.858	0.000	7.858
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	7.858	0.000	7.858

Change Summary Explanation

FY 2021 funding increased \$7.858M due to transfer from PE 03050158F, C2AOS-C2IS; based on OSD direction to keep TBMCS FL development supporting joint service AOC applications separate for transparency.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: C2 Applications Development</p> <p>Description: Employ agile software development methodologies to engineer, integrate, and test modern C2 software capabilities leveraging test-driven development. Provide engineering solutions, test, and deliver effective operational C2 capabilities utilizing continuous integration and continuous delivery(CI/CD) processes.</p> <p>FY 2020 Plans: See PE 0305015F, C2 Air Operations Suite - C2 Information Services (C2AOS-C2IS), Project Number 675218, Applications Development.</p> <p>FY 2021 Base Plans: - Deliver software to AOC WS Modifications to replace the MAAPTK and portions of TBMCS FL</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	0.000	0.000	7.858	0.000	7.858

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207438F / <i>Theater Battle Management (TBM) C4I</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding increased due to transfer from PE 0305015F, C2 Air Operations Suite - C2 Information Services (C2AOS-C2IS), Project Number 675218, Applications Development.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	7.858	0.000	7.858

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 834520: <i>Theater Battle Mgt C2 System</i>	0.000	0.000	3.045	0.000	3.045	4.734	0.000	0.000	0.000	0.000	7.779

Remarks

E. Acquisition Strategy

The acquisition strategy builds on agile development and modification of existing capabilities using evolutionary acquisition to standardize and modernize C2 Applications Development. C2 Applications Development will operate under FY16 NDAA, Section 804, Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding, leveraging commercial best practices to fully retire MAAPTK and components of TBMCS FL.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207438F / Theater Battle Management (TBM) C4I	Project (Number/Name) 675218 / Applications Development
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C2 Application Development	Various	Pivotal : Multiple	-	0.000		0.000		7.858	Mar 2021	0.000		7.858	Continuing	Continuing	-
Subtotal			-	0.000		0.000		7.858		0.000		7.858	Continuing	Continuing	N/A
Project Cost Totals			-	0.000		0.000		7.858		0.000		7.858	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207438F / Theater Battle Management (TBM) C4I	Project (Number/Name) 675218 / Applications Development

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Applications Development	
C2 Applications Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207438F / Theater Battle Management (TBM) C4I	Project (Number/Name) 675218 / Applications Development

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Applications Development				
C2 Applications Development	1	2021	4	2022

Note

See PE 0305015F, C2 Air Operations Suite - C2 Information Services (C2AOS-C2IS), Project 675218, Applications Development, for prior years development events.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	6.135	4.117	12.906	0.000	12.906	13.976	13.292	11.728	11.943	Continuing	Continuing
676013: <i>Equipment Modernization</i>	-	6.135	4.117	12.906	0.000	12.906	13.976	13.292	11.728	11.943	Continuing	Continuing

A. Mission Description and Budget Item Justification

Tactical Air Control Party (TACP) are Air Force units manned by airmen who advise Army Ground Commanders and plan, request and control air power in support of army ground maneuver operations. These capabilities are employed at all echelons of Army organizations by: Air Support Operation Center (ASOC) TACPs, Division TACPs, Brigade TACPs, Battalion TACPs, and dismounted Joint Terminal Attack Controllers (JTAC) deployed with Army companies or scout teams on the front lines. TACPs coordinate, request, and control Strike aircraft, Joint fires, airlift support and intelligence, surveillance, and reconnaissance (ISR) support for Army combat operations, and they provide ground communications support for federal disaster response and Homeland Defense operations. TACPs deploy with their aligned Army units and operate in a variety of environments including fixed operations from ASOCs and Tactical Operations Centers (TOC), mobile operations in tactical vehicles, and dismounted (on foot) operations with Army infantry patrols.

The purpose of the Tactical Air Control Party - Modernization (TACP-M) program is to provide TACPs voice, data and video communications, targeting and battlefield awareness/management capabilities. Improved targeting and data communications capabilities provide more accurate target coordinates, reduce Close Air Support (CAS) response times, and reduce the probability of fratricide or collateral damage using networked data communication.

The TACP-M program support includes addressing frequent TACP combat deployments that sometimes lead users to change equipment procurement priorities to support urgent operational needs and respond to evolving threat environments. The TACP-M program works with the Special Warfare (SW) program office to procure dismounted equipment and software. This teaming arrangement helps standardize battlefield airmen equipment, improve efficiency by consolidating acquisition efforts, and often reduces unit costs by increasing procurement quantities.

The TACP-M program provides and modernizes capabilities in the following four major areas: (1) ASOC/TOC systems (used in fixed and mobile operations centers), (2) Vehicle Mounted Systems (used in TACP tactical vehicles) and semi-mobile operations, (3) Dismounted Systems (used by JTACs during dismounted infantry operations), and (4) Close Air Support System (CASS) software.

CASS software provides required advanced communication, advanced targeting capability, and significant interoperability improvements for mobile computing devices used by vehicle-mounted systems and stationary systems used in operations centers. TACP CASS software enables digital data communications with joint Command and Control (C2) nodes, other TACPs, strike aircraft, and Army C2 and Fire Support systems. It includes interfaces with TOC, ASOC, and JTAC radios, and targeting devices, interoperability across the Dismounted, vehicle-mounted systems, and ASOC/TOC mission sets. It also provides battlespace awareness capabilities needed to plan, request, coordinate, and control CAS in support of ground maneuver forces. The CASS software interfaces with all TACP-M components and provides interoperability with joint strike aircraft (F-35, A-10, F-16, F-15, F/A-18, AV-8B, B-52, etc.), Remotely Piloted Aircraft (RPA), artillery fire support systems, network-enabled weapons, and C2 nodes. To enable data communications with those systems / nodes, CASS incorporates several communications protocols including Variable

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	
<p>Message Format (VMF), Link 16, Situational Awareness Data Link (SADL), Marine Tactical System (MTS), and U.S. Message Text Format (USMTF); along with emerging waveform technologies.</p> <p>ASOC provides management and integration with fires systems, utilizes Air Operations Center (AOC) inputs and archives data, provides a visual depiction of battlespace in coordination with DOD, non-governmental and international partners, house and share TACP planning documents, provides server capability for battlespace, integrates ISR management and video feeds, managing Air Tasking real time, modernizing Battle Damage Assessment (BDA) capability. The ASOC will provide C2 capabilities that will be leader-centric, network enabled, and ready to operate in complex and degraded information environments.</p> <p>Dismounted and ASOC/TOC/Mounted (ATM) software meets the technical needs of implementing TACP C2 capabilities in operational environments. Software supports a wide variety of radio systems (including but not limited to AN/ PRC-117F, AN/PRC-117G, AN/ PRC-148, AN/PRC-152A, AN/PRC-154, AN/PRC-158, AN/PRC-161, AN/PRC-163, Harris RF-335M-HH, AN/PRC-150C, AN/PRC-160 and other emerging systems that are expected to be employed by TACPs in the future). Future upgrades are necessary to maintain interoperability with strike aircraft, joint fire support systems, and emerging data networking waveforms. Software upgrades provide a modular architecture for digital communications, messaging, data handling, hardware management, and targeting, and battle space awareness capabilities. The key characteristic of the software will be the Open System, Modular architecture that will enable rapid integration with new end user devices (such as laser range finders and radios) and rapid development, testing and fielding of new mission capability modules to meet future requirements.</p> <p>Funding supports Dismount, ATM, and ASOC software to address: interfaces with new dismount requirements, ASOC modernization (interoperability and hardware/software interfaces), changes to Army fires support systems, changes to AOC Theater Battle Management Core Systems (TBMCS), updates for fielded versions, new joint Digitally-Aided CAS (DACAS) standards, technical support to operators employing the software, and system prototyping for required future ASOC/TOC/Mounted system capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver CASS weapon system capability. The use of such program funds would be in addition to civilian pay expenses budgeted in program element 0605831F.</p> <p>This program is in Budget Activity 7, Operational System Development, because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p> <p>This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	6.149	6.217	12.931	0.000	12.931
Current President's Budget	6.135	4.117	12.906	0.000	12.906
Total Adjustments	-0.014	-2.100	-0.025	0.000	-0.025
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.014	-2.100	-0.025	0.000	-0.025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>				Project (Number/Name) 676013 / <i>Equipment Modernizaton</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676013: <i>Equipment Modernizaton</i>	-	6.135	4.117	12.906	0.000	12.906	13.976	13.292	11.728	11.943	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Tactical Air Control Party (TACP) are Air Force units manned by airmen who advise Army Ground Commanders and plan, request and control air power in support of army ground maneuver operations. These capabilities are employed at all echelons of Army organizations by: Air Support Operation Center (ASOC) TACPs, Division TACPs, Brigade TACPs, Battalion TACPs, and dismounted Joint Terminal Attack Controllers (JTAC) deployed with Army companies or scout teams on the front lines. TACPs coordinate, request, and control Strike aircraft, Joint fires, airlift support and intelligence, surveillance, and reconnaissance (ISR) support for Army combat operations, and they provide ground communications support for federal disaster response and Homeland Defense operations. TACPs deploy with their aligned Army units and operate in a variety of environments including fixed operations from ASOCs and Tactical Operations Centers (TOC), mobile operations in tactical vehicles, and dismounted (on foot) operations with Army infantry patrols.

The purpose of the Tactical Air Control Party - Modernization (TACP-M) program is to provide TACPs voice, data and video communications, targeting and battlefield awareness/management capabilities. Improved targeting and data communications capabilities provide more accurate target coordinates, reduce Close Air Support (CAS) response times, and reduce the probability of fratricide or collateral damage using networked data communication.

The TACP-M program support includes addressing frequent TACP combat deployments that sometimes lead users to change equipment procurement priorities to support urgent operational needs and respond to evolving threat environments. The TACP-M program works with the Special Warfare (SW) program office to procure dismounted equipment and software. This teaming arrangement helps standardize battlefield airmen equipment, improve efficiency by consolidating acquisition efforts, and often reduces unit costs by increasing procurement quantities.

The TACP-M program provides and modernizes capabilities in the following four major areas: (1) ASOC/TOC systems (used in fixed and mobile operations centers), (2) Vehicle Mounted Systems (used in TACP tactical vehicles) and semi-mobile operations, (3) Dismounted Systems (used by JTACs during dismounted infantry operations), and (4) Close Air Support System (CASS) software.

CASS software provides required advanced communication, advanced targeting capability, and significant interoperability improvements for mobile computing devices used by vehicle-mounted systems and stationary systems used in operations centers. TACP CASS software enables digital data communications with joint Command and Control (C2) nodes, other TACPs, strike aircraft, and Army C2 and Fire Support systems. It includes interfaces with TOC, ASOC, and JTAC radios, and targeting devices, interoperability across the Dismounted, vehicle-mounted systems, and ASOC/TOC mission sets. It also provides battlespace awareness capabilities needed to plan, request, coordinate, and control CAS in support of ground maneuver forces. The CASS software interfaces with all TACP-M components and provides interoperability with joint strike aircraft (F-35, A-10, F-16, F-15, F/A-18, AV-8B, B-52, etc.), Remotely Piloted Aircraft (RPA), artillery fire support systems, network-enabled weapons, and C2 nodes. To enable data communications with those systems / nodes, CASS incorporates several communications protocols including Variable

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernization</i>
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Message Format (VMF), Link 16, Situational Awareness Data Link (SADL), Marine Tactical System (MTS), and U.S. Message Text Format (USMTF); along with emerging waveform technologies.

ASOC provides management and integration with fires systems, utilizes Air Operations Center (AOC) inputs and archives data, provides a visual depiction of battlespace in coordination with DOD, non-governmental and international partners, house and share TACP planning documents, provides server capability for battlespace, integrates ISR management and video feeds, managing Air Tasking real time, modernizing Battle Damage Assessment (BDA) capability. The ASOC will provide C2 capabilities that will be leader-centric, network enabled, and ready to operate in complex and degraded information environments.

Dismounted and ASOC/TOC/Mounted (ATM) software meets the technical needs of implementing TACP C2 capabilities in operational environments. Software supports a wide variety of radio systems (including but not limited to AN/ PRC-117F, AN/PRC-117G, AN/ PRC-148, AN/PRC-152A, AN/PRC-154, AN/PRC-158, AN/PRC-161, AN/PRC-163, Harris RF-335M-HH, AN/PRC-150C, AN/PRC-160 and other emerging systems that are expected to be employed by TACPs in the future). Future upgrades are necessary to maintain interoperability with strike aircraft, joint fire support systems, and emerging data networking waveforms. Software upgrades provide a modular architecture for digital communications, messaging, data handling, hardware management, and targeting, and battle space awareness capabilities. The key characteristic of the software will be the Open System, Modular architecture that will enable rapid integration with new end user devices (such as laser range finders and radios) and rapid development, testing and fielding of new mission capability modules to meet future requirements.

Funding supports Dismount, ATM, and ASOC software to address: interfaces with new dismount requirements, ASOC modernization (interoperability and hardware/software interfaces), changes to Army fires support systems, changes to AOC Theater Battle Management Core Systems (TBMCS), updates for fielded versions, new joint Digitally-Aided CAS (DACAS) standards, technical support to operators employing the software, and system prototyping for required future ASOC/TOC/Mounted system capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CASS weapon system capability. The use of such program funds would be in addition to civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Close Air Support System (CASS)</p> <p>Description: Title: TACP-M Software System (TSS)</p> <p>Description: The TACP-M Software program will modernize software for Communications, Command and Control (C3) processing systems for multiple TACP mission areas, i.e., ASOC/TOC operations, Mounted operations, and Dismounted operations</p> <p>FY 2020 Plans: This includes, but is not limited to:</p>	6.135	4.117	12.906

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernizaton</i>

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
-Continued to support development of SW Program's Battlefield Airmen Special Warfare Assault Kit(SWAK) Dismount Android software. - Continued to develop and update interface with TBMCS. - Continued to update of CASS software for new and emerging mobile TACP vehicles. - Completed Risk Reduction effort for CASS 2.0 (1.45 replacement). - Held ASP and stand up ACAT III for CASS 2.0. - Established TACP common software architecture for further development to meet other battlefield airman operational needs. - Hosted DT for CASS Risk Reduction software. -Continued to integrate, and test CASS data communications interfaces with C2 Nodes, CAS aircraft, Army Tactical Network (ATN), Soldier Radios Waveform (SRW) networks, TBMCS, and Mobile User Objective System (MUOS) Satellite Communications (SATCOM) networks to enhance interoperability between TACPs, and other joint warfighters. -Maintained interoperability with fielded systems. FY 2021 Plans: This includes, but is not limited to: -Will continue to support development of BAO Program's Battlefield Airmen Special Warfare Assault Kit (SWAK) Dismount Android software. -Will establish TACP common software architecture for further development to meet other battlefield airman operational needs. -Will conduct investigations to provide additional feature (capabilities) for the software. -Will integrate CASS 2.0 with ASOC Mod software acquisition. -Will continue to integrate, and test CASS data communications interfaces with C2 Nodes, CAS aircraft, Army Tactical Network (ATN), Soldier Radios Waveform (SRW) networks, TBMCS, and Mobile User Objective System (MUOS) Satellite Communications (SATCOM) networks to enhance interoperability between TACPs, and other joint warfighters. FY 2020 to FY 2021 Increase/Decrease Statement: FY 20 funding was reduced for re-phasing and FY 21 and 22 increase is reimbursement for FY20.			
Accomplishments/Planned Programs Subtotals	6.135	4.117	12.906

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

Line Item	FY 2019	FY 2020	FY 2021			FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• OPAF 03 Line item 837100: <i>Tactical C-E Equipment</i>	42.846	35.967	54.455	-	54.455	52.820	52.969	36.376	37.043	Continuing	Continuing

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernization</i>

D. Acquisition Strategy

TACP-M is executing an incremental development for the TACP-M CASS software. CASS Dismount and ATM software strategy continues the incremental development through risk reduction efforts; and coordinating with the SW program office on developing SW-TAK, the replacement for BA-DASS. CASS Software 2.0's strategy is to build off pre-existing software and lessons learned in the current Risk Reduction effort and transition the results to a separate contract. The results of which will be used form the 2.0 Acquisition Strategy Panel (ASP) and start of source selection are planned for the 2nd Qtr. of FY20 with contract award in the 3rd Qtr. of FY20. CASS 2.0 will employ a Modular Open Systems Architecture (MOSA) to allow flexible development, that will compliment an Agile software effort.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernization</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
CASS System Software Dev. Dismounted	Various	GDIT : WP, OH	-	-		1.730	Mar 2020	3.165	Jun 2021	-		3.165	Continuing	Continuing	-
CASS 2.0 System Software Dev. Mounted	TBD	TBD : TBD	-	4.318		-		-		-		-	Continuing	Continuing	-
ASOC MOD	Various	Pope AFB : Pope AFB, NC	-	-		-		1.934	Jan 2021	-		1.934	Continuing	Continuing	-
MDAP Penalty and SBIR assessment	C/CPAF	Not specified. : TBD	-	-		-		0.239	Oct 2020	-		0.239	Continuing	Continuing	-
CASS 2.0 Risk Reduction Phase 1	SS/CPAF	GDIT : WP, OH	-	-		-		-		-		-	Continuing	Continuing	-
CASS 2.0 Risk Reduction Phase 2	SS/CPAF	GDIT : WP, OH	-	-		0.750	Mar 2020	5.756	Mar 2021	-		5.756	Continuing	Continuing	-
CASS 1.4.5 NSWC Crane (Naval Surface Warfare Center)	MIPR	NSWC Crane : Crane, IN	-	-		-		-		-		-	Continuing	Continuing	-
CASS 2.0 NSWC Crane (Naval Surface Warfare Center)	MIPR	NSWC Crane : Crane, MA	-	1.358	Jan 2019	0.988	Jan 2020	1.007	Jan 2021	-		1.007	Continuing	Continuing	-
CASS 2.0 JTAGGS TTP Development	MIPR	AFRL : WPAFB, IN	-	-		-		-		-		-	Continuing	Continuing	-
Subtotal			-	5.676		3.468		12.101		-		12.101	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Test Agency Support	MIPR	Various : Multiple, NV	-	0.459	Jan 2019	0.649	Apr 2020	0.805	Apr 2021	-		0.805	Continuing	Continuing	-
Subtotal			-	0.459		0.649		0.805		-		0.805	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernization</i>
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
Development, operational and interoperability testing

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	6.135	4.117	12.906	-	12.906	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernizat</i> on

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Close Air Support System(CASS)																																
Close Air Support System (CASS) Dismount Software (v1.1) Design and Development (SWAK)																																
Close Air Support System (CASS) Dismount Software (v1.2) Design and Development (SWAK)																																
TACP-M Software (v1.0) Design and Development (SWAK)																																
Close Air Support System (CASS) Dismount Software (v1.3) Design and Development (SWAK)																																
Close Air Support System (CASS) Dismount Software Design and Development (SWAK)																																
Future Close Air Support System (CASS) Dismount Software(v1.5) Design and Development (SWAK)																																
Close Air Support System (CASS) ATM Software Risk Reduction (1A) -Architecture																																
Close Air Support System (CASS) ATM Software Risk Reduction (1B)-capabilities, modem and apps																																
Close Air Support System (CASS) ATM Software (v2..0) Design and Developmentnt																																
Close Air Support System (CASS) ATM Software (v2..1 Design and Development																																
Close Air Support System (CASS) ATM Software (v2..2) Design and Development																																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernization</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Close Air Support System (CASS) ATM Software (v2..3) Design and Development																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207444F / <i>Tactical Air Control Party-Mod</i>	Project (Number/Name) 676013 / <i>Equipment Modernizaton</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Close Air Support System(CASS)				
Close Air Support System (CASS) Dismount Software (v1.1) Design and Development (SWAK)	2	2019	1	2020
Close Air Support System (CASS) Dismount Software (v1.2) Design and Development (SWAK)	2	2020	1	2021
TACP-M Software (v1.0) Design and Development (SWAK)	4	2020	4	2025
Close Air Support System (CASS) Dismount Software (v1.3) Design and Development (SWAK)	2	2021	1	2022
Close Air Support System (CASS) Dismount Software Design and Development (SWAK)	2	2022	1	2023
Future Close Air Support System (CASS) Dismount Software(v1.5) Design and Development (SWAK)	2	2023	1	2024
Close Air Support System (CASS) ATM Software Risk Reduction (1A) -Architecture	1	2019	2	2020
Close Air Support System (CASS) ATM Software Risk Reduction (1B)-capabilities, modem and apps	2	2019	2	2020
Close Air Support System (CASS) ATM Software (v2..0) Design and Developmentnt	2	2020	1	2021
Close Air Support System (CASS) ATM Software (v2..1 Design and Development	2	2021	1	2022
Close Air Support System (CASS) ATM Software (v2..2) Design and Development	2	2022	1	2023
Close Air Support System (CASS) ATM Software (v2..3) Design and Development	2	2023	1	2024

Note

IOC & FOC dates are based on Objective and not Threshold dates.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207448F / <i>C2ISR Tactical Data Link</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.538	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
675045: <i>C2ISR Tactical Data Link</i>	-	0.538	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Tactical Data Links (TDL), as a subset of the broader airborne network, are used in a combat environment to exchange information such as messages, data, radar tracks, target information, platform status, imagery, and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when operating under rapidly changing operational conditions. TDLs provide a jam-resistant; secure digital data transfer network capability with new and standardized waveforms and data formats allowing Line-of-Sight (LOS) and Beyond-Line- of-Sight (BLOS) intra- and inter-flight communications. TDLs increase mission effectiveness, provide positive identification of aircraft in the network, correlate on and off-board sensor data sharing, target, and threat information, and provide the data link to accomplish time critical targeting and other mission update functions. TDLs are used by all service theater Command and Control (C2) elements, weapons platforms, and sensors.

TDLs include, but are not limited to: Link 16, Link 11, Situation Awareness Data Link (SADL), Multifunction Advanced Data Link (MADL) Variable Message Format (VMF), Integrated Broadcast Service (IBS), Intra-Flight Data Link (IFDL), and Tactical Targeting Network Technology (TTNT). TDL efforts include incorporating changes and additions to the Link-16 message standard (MIL-STD-6016F) and applicable Interface Change Proposals (ICPs), assisting with Air Force and joint interoperability certification testing with the Air Combat Command (ACC) and Joint Interoperability Test Center (JITC); future development, integration, and verification of Operational Flight Program (OFP) upgrades due to TDL integration; support of data gathering processes; studying and incorporating data link technologies to ensure effectiveness and efficiency of the Global Strike and Global Persistent Attack CONOPS.

This effort provides critical capability and enhancements to the airborne network by creating common development, integration and interoperability among ground and C2 platforms and responds to quick reaction capability integration and demonstration including, but not limited to, Airborne Warning and Control System (AWACS), Joint Surveillance Target Attack Radar System (JSTARS), the Air and Space Operations Center (AOC), the Control and Reporting Center (CRC), Global Hawk, Predator, Reaper, Rivet Joint, Combat Sent, and Cobra Ball. TDLs keep all Command and Control Intelligence, Surveillance, and Reconnaissance (C2ISR) platforms and data linked weapons current/interoperable in the airborne network to enable Global Strike, Global Persistent Attack, Offensive and Defensive Counterair (OCA / DCA) and Suppression of Enemy Air Defenses (SEAD) missions. Due to new/evolving Link 16 User identified Interface Changes Proposals (ICPs), studies and analysis will be performed to identify impacts to current and future systems, and to identify the required changes and impacts of implementing these new capabilities. The activities will include studies and analysis to support both current program planning and execution, as well as future program planning.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207448F / <i>C2ISR Tactical Data Link</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver TDL weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F and 0605898F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.538	0.000	0.000	0.000	0.000
Current President's Budget	0.538	0.000	0.000	0.000	0.000
Total Adjustments	0.000	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY19 Congressional Reduction for under execution.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Aerial Network Engineering Lab	0.332	-	-
Description: C2-focused airborne networking studies supporting data link enhancements to include, but not limited to, Link-16 Pathfinder and strength track reporting and fusion/correlation.			
Title: User Identified Critical Interface Change Proposals (ICPs)	0.206	-	-
Description: User-identified critical ICP implementation includes time slot reallocation, strength track reporting and correlation, Global Area Reference System (GARS), and MIL-STD updates.			
This effort was previously titled "E-3 AWACS Block 40/45 Critical User Identified Interface Change Proposals." However, these ICPs apply to multiple C2ISR platforms. These plans were outlined in previous PB/BES document submissions. They include, but are not limited to those listed under the Mission Description and Budget Item Justification found in Exhibit R-2, Section A.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207448F / <i>C2ISR Tactical Data Link</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Accomplishments/Planned Programs Subtotals	0.538	-	-

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 PE 0604281F: <i>TDN Enterprise</i>	207.746	261.742	202.483	-	202.483	202.505	192.550	-	-	Continuing	Continuing
• APAF 05 Line Item F01500: <i>F-15</i>	3.698	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing
• APAF 05 Line Item F01600: <i>F-16</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing
• APAF 05 Line Item B00200: <i>B-2A</i>	2.296	0.200	0.204	-	0.204	0.208	0.211	-	-	Continuing	Continuing
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing
• OPAF 03 Line Item 834010: <i>General Information Technology</i>	0.176	0.179	9.439	-	9.439	11.613	42.727	-	-	Continuing	Continuing

Remarks

E. Acquisition Strategy

Air Force Program Executive Officer for Command, Control, Communications, Intelligence, Surveillance, Reconnaissance and Networks (PEO C3I&N) is the PEO for C2ISR TDL. PEO C3I&N manages activities for the common development, integration, and interoperability across the entire airborne network. These actions ensure TDLs are procured and maintained as a joint, end-to-end C2 system. This program executes various types of contract types to provide technical expertise necessary to test, evaluate and provide recommended solutions to modernize C2 platform data links. The program delivers annual lab-tested software implementations of AWACS Link 16 ICPs. Additionally, the program participates in annual lab demonstrations that produce reports as required to assist with platform integration of Link 16 modernization efforts.

The E-3 Platform architecture utilizes a JTIDS Class 2H Link 16 radio with defined environmental and physical cabinet constraints. An Investigation Report (IR) was initiated to investigate the integration of an Ethernet-enabled CMN4 MIDS JTRS variant into the E-3 platform. A separate IR was issued to understand the dynamics of the L-16 enhancements and facilitate integration of new Link 16 capabilities onto the E-3 platform to ensure cross-service interoperability.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207448F / C2ISR Tactical Data Link	Project (Number/Name) 675045 / C2ISR Tactical Data Link
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
C2ISR Tactical Data Link Software Enhancements	Various	AFLCMC Hanscom AFB : Bedford, MA	-	0.171	Mar 2019	-		-		-		-	Continuing	Continuing	-
Subtotal			-	0.171		-		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
C2ISR Tactical Data Link Aerial Network Engineering Lab	SS/ Various	AFLCMC Hanscom AFB : Bedford, MA	-	0.137	Oct 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			-	0.137		-		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
C2ISR Tactical Data Link PMA - Program Office and Contractor Support	Various	AFLCMC : Bedford, MA	-	0.230	Dec 2018	-		-		-		-	Continuing	Continuing	-
C2ISR Tactical Data Link FFRDC Support	SS/ Various	MITRE : Bedford, MA	-	-		-		-		-		-	Continuing	Continuing	-
Subtotal			-	0.230		-		-		-		-	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.538	0.000	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207448F / <i>C2ISR Tactical Data Link</i>	Project (Number/Name) 675045 / <i>C2ISR Tactical Data Link</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>C2ISR Tactical Data Link</i>	
Mode 5 Link 16 Software Enhancements	
Aerial Network Engineering Lab	
User Identified Critical ICPs	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207448F / <i>C2ISR Tactical Data Link</i>	Project (Number/Name) 675045 / <i>C2ISR Tactical Data Link</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>C2ISR Tactical Data Link</i>				
Mode 5 Link 16 Software Enhancements	1	2019	4	2019
Aerial Network Engineering Lab	1	2019	4	2019
User Identified Critical ICPs	1	2019	4	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207452F / DCAPEs
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	223.602	14.649	19.910	14.816	0.000	14.816	4.370	7.899	8.041	8.188	27.244	328.719
674801: <i>DCAPEs INC 2B</i>	36.421	0.000	19.910	14.816	0.000	14.816	4.370	7.899	8.041	8.188	27.244	126.889
674802: <i>DCAPEs Increment 2A</i>	187.181	14.649	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	201.830

Program MDAP/MAIS Code: 500

Note

In FY 2019, Project 674802 (Increment 2A) efforts were transferred to Project 674801 (Increment 2B) in order to correctly align funding to activity.

A. Mission Description and Budget Item Justification

Deliberate and Crisis Action Planning and Execution Segments (DCAPEs) is the USAF system used to project air expeditionary forces (includes weapon systems, logistics, and personnel). It enables the USAF to posture mission ready and equipped forces (organized in effects-based operational capability packages) to deliver air, space and cyberspace capabilities to Joint commanders worldwide. Technical requirements planned for Increment 2B include enabling the system to support Public Key Infrastructure and Public Key enabling as well as elimination of Social Security Account Numbers as the primary key for identifying Air Force military and civilian members by replacing it with the Electronic Data Interchange Personal Identifier.

DCAPEs funding will be executed against capabilities packaged into agile development projects for multiple releases based on the warfighter's priorities. Additionally, funding will be used to cover downward directed federal mandates.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the DCAPEs system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Funds will be used to perform studies and innovative integration efforts for common technology capabilities such as cloud migration, technology development and mobile application.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207452F / DCAPES
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	13.248	19.910	17.260	0.000	17.260
Current President's Budget	14.649	19.910	14.816	0.000	14.816
Total Adjustments	1.401	0.000	-2.444	0.000	-2.444
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.800	0.000			
• SBIR/STTR Transfer	-0.399	0.000			
• Other Adjustments	0.000	0.000	-2.444	0.000	-2.444

Change Summary Explanation

Below Threshold Reprogramming of \$1.8M in FY 2019 was used to fully fund prime contractor line items.

The FY2021 funding request was reduced by \$2.032M to account for the availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207452F / DCAPEs				Project (Number/Name) 674801 / DCAPEs INC 2B			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674801: DCAPEs INC 2B	36.421	0.000	19.910	14.816	0.000	14.816	4.370	7.899	8.041	8.188	27.244	126.889
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019, Project 674802 (Increment 2A) efforts were transferred to Project 674801 (Increment 2B) in order to correctly align funding to activity.

A. Mission Description and Budget Item Justification

Deliberate and Crisis Action Planning and Execution Segments (DCAPEs) is the USAF system used to project air expeditionary forces (includes weapon systems, logistics, and personnel). It enables the USAF to posture mission ready and equipped forces (organized in effects-based operational capability packages) to deliver air, space and cyberspace capabilities to Joint commanders worldwide. DCAPEs stores planning and execution information for Air Force (AF) functional users in the four (4) main AF disciplines: 1) operations, 2) logistics, 3) manpower, and 4) personnel. These disciplines support joint, combined, and AF military operations worldwide. Technical requirements planned for Increment 2B include enabling the system to support Public Key Infrastructure and Public Key enabling as well as elimination of Social Security Account Numbers as the primary key for identifying Air Force military and civilian members by replacing it with the Electronic Data Interchange Personal Identifier.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the DCAPEs system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Funds will be used to perform studies and innovative integration efforts for common technology capabilities such as cloud migration, technology development and mobile application.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: DCAPEs INCREMENT 2B	-	19.910	14.816
<p>Description: DCAPEs Increment 2B includes Infrastructure Support, Business Intelligence, and the development of multiple War Fighter Capabilities; the Program continued execution of War Fighter Capabilities 1,2,3,4,6 during the FY19 President's Budget, War Fighter Capabilities 1,2,4,6 during the FY20 President's Budget, and War Fighter Capabilities 5 & 6 during the FY21 President's Budget. Additionally, DCAPEs will add two previously deferred capabilities during FY20 President's Budget to be executed in FY21 President's Budget according to Acquisition Program Baseline (APB) Restructure.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue the development of War Fighter Capabilities 1,2,4,6 - Incorporate two remaining capabilities deferred into program schedule according to APB restructure 			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPEs	Project (Number/Name) 674801 / DCAPEs INC 2B
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
No OCO			
FY 2021 Plans: - Will continue the development of War Fighter Capabilities 5,6 - Develop the remaining two capabilities incorporated in DCAPEs Inc 2B APB restructure			
No OCO			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to higher Air Force priorities.			
Accomplishments/Planned Programs Subtotals	-	19.910	14.816

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

N/A

Remarks

D. Acquisition Strategy

The DCAPEs program successfully awarded the DCAPEs Increment 2B Development Task Order for a one-year Base Period and four one-year Option Periods using the NETCENTS 2 Application Services Small Business Indefinite Delivery Indefinite Quantity (IDIQ) contract. The period of performance started on 6 April 2015 and ended on 5 April 2020.

DCAPEs is an Evolutionary Acquisition Program using an incremental development approach (DoDI 5000.02 Model 3) to develop capabilities over several increments. To support the rapid development and delivery of capabilities, DCAPEs employs a hybrid agile acquisition strategy in which capabilities are incrementally delivered in time-phased stages based on warfighter priorities and adoption of key architecture and technology requirements as a trade-off for accelerated delivery and risk reduction.

The DCAPEs Program Management Office (PMO) uses a mix of agreements (Service Level Agreements and Memorandums) with DCAPEs interface partners. A Service Level Agreement is in place with the Capabilities Integration Environment (AFLCMC/HNIZ) to provide the infrastructure used to conduct software development and testing. Memorandums of Agreement with Joint Interoperability Test Command, Air Force Operational Test and Evaluation Command, and the 45th Test Squadron are in place and outline the test support required before fielding the system.

The DCAPEs Increment 2B requirements have been packaged into multiple discreet capabilities which will be developed in multiple releases. Each capability will be developed using several Sprints and with one or more fieldings to satisfy the approved requirements within each package.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPEs	Project (Number/Name) 674801 / DCAPEs INC 2B
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DCAPES Risk Reduction	Various	Various : Various	0.718	-		-		-		-		-	0.000	0.718	0.718
DCAPES Increment 2B/ Prime Contract	C/Various	Array Information Technology, Inc. : Greenbelt, MD	14.389	-		9.152	Dec 2019	6.184	Dec 2020	-		6.184	28.044	57.769	40.991
DCAPES Infrastructure/ Integration	C/CPFF	DATUM Software Inc. : John Creek, GA	2.452	-		0.779	Feb 2020	0.800	Feb 2021	-		0.800	2.462	6.493	5.152
DCAPES Architecture Documentation Development	C/FFP	Copper River IT : Anchorage, AK	1.012	-		0.346	Aug 2020	0.356	Aug 2021	-		0.356	1.094	2.808	13.756
DCAPES DISA Hosting	MIPR	DISA : Pensacola, FL	2.667	-		1.754	Oct 2019	1.496	Oct 2020	-		1.496	5.543	11.460	15.166
Subtotal			21.238	-		12.031		8.836		-		8.836	37.143	79.248	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DCAPES HIB Integration Contract Support	C/FFP	MacLogic, LLC : Dayton, OH	4.050	-		0.749	Apr 2020	0.855	Apr 2021	-		0.855	2.367	8.021	3.225
DCAPES Cost Analysis Contract Support	C/CPFF	BTAS, Inc. : Beavercreek, OH	0.941	-		0.317	May 2020	0.340	May 2021	-		0.340	1.000	2.598	1.908
DCAPES Engineering Contract Support	C/CPFF	Oasis Systems, LLC : Lexington, MA	2.348	-		3.112	Dec 2019	1.502	Dec 2020	-		1.502	9.831	16.793	5.392
DCAPES CIE Tech Support	MIPR	AFLCMC/HNIZ CIE : MAFB-Gunter Annex, AL	2.035	-		0.607	Mar 2020	0.608	Mar 2021	-		0.608	1.918	5.168	7.390
DCAPES Development Environment HW	C/Various	Various : Various	0.876	-		0.000	Aug 2020	0.000	Aug 2021	-		0.000	0.000	0.876	1.730
DCAPES Licenses (Software/Hardware)	C/Various	Various : Various	0.511	-		0.134	Feb 2020	0.245	Feb 2021	-		0.245	0.424	1.314	1.573
DCAPES Oracle Licenses	C/FFP	Mythics : Vienna, VA	2.541	-		0.253	Aug 2020	0.258	Aug 2021	-		0.258	0.798	3.850	4.560

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0207452F / DCAPEs				674801 / DCAPEs INC 2B							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
DCAPES Government Purchase Card	Reqn	Various : Various	0.049	-		0.020	Oct 2019	0.020	Oct 2020	-		0.020	0.063	0.152	0.209
Subtotal			13.351	-		5.192		3.828		-		3.828	16.401	38.772	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
DCAPES User Test Support	Various	Various : Various	0.071	-		-		-		-		-	0.000	0.071	0.071
DCAPES Development Test and Evaluation	MIPR	45/46 Test Sqdn : Eglin AFB, FL	0.531	-		0.498	Dec 2019	0.367	Dec 2020	-		0.367	1.573	2.969	3.519
DCAPES Interoperability Testing and Evaluation	MIPR	DISA JITC : Huachuca, AZ	0.217	-		0.133	Oct 2019	0.135	Oct 2020	-		0.135	0.419	0.904	1.278
Subtotal			0.819	-		0.631		0.502		-		0.502	1.992	3.944	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Assessments	Various	Various : Various	0.000	-		1.991	Oct 2019	1.585	Oct 2020	-		1.585	0.000	3.576	4.145
DCAPES FFRDC	SS/CPFF	MITRE : Bedford, MA	0.818	-		-		-		-		-	0.000	0.818	0.818
DCAPES Travel	Reqn	Various : Various	0.090	-		0.030	Oct 2019	0.030	Oct 2020	-		0.030	0.095	0.245	0.330
DCAPES Business Integration Support	Various	Various : Various	0.105	-		0.035	Oct 2019	0.035	Oct 2020	-		0.035	0.111	0.286	0.385
Subtotal			1.013	-		2.056		1.650		-		1.650	0.206	4.925	N/A
Project Cost Totals			36.421	-		19.910		14.816		-		14.816	55.742	126.889	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674801 / DCAPES INC 2B
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DCAPES Increment 2B																												
DCAPES Increment 2B																												
-- Increment 2B FDD																												
-- Increment 2B FD																												
--- Capability 1 Electronic Data Interface Personnel Identifier (EDIPI)																												
--- Capability 2 Global Force Management Interoperability (GFM-DI)																												
--- Capability 3 Enhanced Contingency-Rotational Air Expeditionary Force Scheduling Tool Interface (ECAST)																												
--- Capability 4 Manpower & Equipment Force Packaging (MEFPAK)																												
--- Capability 5 Logistics Factor File																												
--- Capability 6 Force Availability Analysis																												
DCAPES Acquisition Program Baseline (APB) Restructure																												
DCAPES Continuous Capability Deliveries (CCD)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674801 / DCAPES INC 2B
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
DCAPES Increment 2B				
DCAPES Increment 2B	1	2019	3	2022
-- Increment 2B FDD	3	2022	3	2022
-- Increment 2B FD	4	2022	4	2022
--- Capability 1 Electronic Data Interface Personnel Identifier (EDIPI)	1	2019	2	2020
--- Capability 2 Global Force Management Interoperability (GFM-DI)	1	2019	2	2020
--- Capability 3 Enhanced Contingency-Rotational Air Expeditionary Force Scheduling Tool Interface (ECAST)	1	2019	2	2019
--- Capability 4 Manpower & Equipment Force Packaging (MEFPAK)	3	2019	4	2020
--- Capability 5 Logistics Factor File	1	2021	3	2021
--- Capability 6 Force Availability Analysis	1	2019	2	2021
DCAPES Acquisition Program Baseline (APB) Restructure	4	2020	3	2024
DCAPES Continuous Capability Deliveries (CCD)	4	2024	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207452F / DCAPES				Project (Number/Name) 674802 / DCAPES Increment 2A			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674802: DCAPES Increment 2A	187.181	14.649	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	201.830
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019, Project 674802 (Increment 2A) efforts were transferred to Project 674801 (Increment 2B) in order to correctly align funding to activity.

A. Mission Description and Budget Item Justification

DCAPES Increment 2A delivered Air Force functional specific capabilities as well as technical changes necessary for the Air Force to migrate from a directly connected architectural relationship with the Joint Operations Planning and Execution System (JOPES) to one utilizing data services across the Wide Area Network (WAN). This 'Loose Coupling' solution enabled DCAPES to be interoperable with JOPES and at the same time significantly reduced interoperability costs.

This program element may have included necessary civilian pay expenses required to manage, execute, and deliver the DCAPES system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: DCAPES Increment 2A (Loose Coupling)	14.649	0.000	0.000
Description: DCAPES Increment 2A included Loose Coupling between Deliberate and Crisis Action Planning and Execution Segment (DCAPES) and Joint Operational Planning and Execution System (JOPES), Infrastructure Support, and Business Intelligence. Increment 2A also included requirements definition, prototyping, development, testing, interoperability, sustainment, and service oriented architecture transition.			
FY 2020 Plans: N/A			
FY 2021 Plans: N/A			
Accomplishments/Planned Programs Subtotals	14.649	0.000	0.000

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

N/A

Remarks

In FY 2019, Project 674802 (Increment 2A) efforts were transferred to Project 674801 (Increment 2B) in order to correctly align funding to activity.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674802 / DCAPES Increment 2A
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D. Acquisition Strategy

Increment 2A used the Waterfall approach to develop functional capabilities and maintain interoperability with JOPES. The DCAPES program successfully awarded the DCAPES Development Task Order using the NETCENTS 2 Application Services Small Business Indefinite delivery Indefinite Quantity (IDIQ) contract. This task order was used to close out Increment 2A.

The DCAPES Increment 2A Program Management Office (PMO) utilized a mix of agreements (Service Level Agreements and Memorandums) with DCAPES interface partners.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674802 / DCAPES Increment 2A
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DCAPES Increment 2A SW DEV/FOE	Various	Various : VA	91.707	-		-		-		-		-	0.000	91.707	91.707
DCAPES SW DEV New Prime Contract	Various	Various : MD	0.913	8.689	Dec 2018	-		-		-		-	0.000	9.602	0.913
DCAPES Risk Reduction	Various	Various : Various	0.895	-		-		-		-		-	0.000	0.895	0.895
DCAPES Infrastructure & Integration	Various	Various : GA	3.000	0.779	Feb 2019	-		-		-		-	0.000	3.779	3.000
DCAPES BI Tools / Tech Refresh	Various	Various : MD	7.581	-		-		-		-		-	0.000	7.581	7.581
DCAPES Architecture Documentation Development	Various	Various : AK	4.148	0.108	Aug 2019	-		-		-		-	0.000	4.256	4.148
LOGFAC S/W Development	Various	Various : VA	18.374	-		-		-		-		-	0.000	18.374	18.374
DCAPES DISA Hosting	MIPR	DISA : AK	1.035	1.500	Oct 2018	-		-		-		-	0.000	2.535	1.035
Subtotal			127.653	11.076		-		-		-		-	0.000	138.729	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DCAPES Contract Acquisition /Logistic Functional Support	Various	OASIS Systems Inc : Lexington, MA	6.462	-		-		-		-		-	0.000	6.462	6.462
DCAPES HIB Integration Contract Support	C/CPFF	TM Capture Services, LLC : Dayton, OH	5.944	0.517	Apr 2019	-		-		-		-	0.000	6.461	10.765
DCAPES Contract Cost Analysis Support	C/CPFF	Tecolote Research, Inc. : Goleta, CA	3.577	0.317	May 2019	-		-		-		-	0.000	3.894	3.577
DCAPES Contract Engineering Support	C/CPFF	Jacobs Technology, Inc : Lincoln, MA	3.798	1.142	Mar 2019	-		-		-		-	0.000	4.940	3.798
CIE Tech Support	MIPR	Mitre : Bedford, MA	6.249	0.212	Mar 2019	-		-		-		-	0.000	6.461	6.249

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674802 / DCAPES Increment 2A
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DCAPES Dev Environmental HW	Various	Certified Tech. Expert : Montgomery, AL	3.014	-		-		-		-		-	0.000	3.014	3.014
DCAPES Contract System Security-Information Assurance (HIB-1377)	C/CPFF	Centech Group : Falls Church, VA	2.458	-		-		-		-		-	0.000	2.458	2.458
DCAPES Contract Sys Integration/Tech Support (CIE)	Various	Various : Various	6.462	-		-		-		-		-	0.000	6.462	6.462
DCAPES Licenses Software/Hardware	C/Various	Various : Various	1.180	-		-		-		-		-	0.000	1.180	1.180
DCAPES SIPRNET Comm. Line-Information Assurance	MIPR	Various : Various	0.647	-		-		-		-		-	0.000	0.647	0.647
DCAPES GOVERNMENT PURCHASE CARD	Various	Various : Various	0.015	0.030		-		-		-		-	0.000	0.045	0.015
LOGFAC Contract Acquisition / Logistics Support	C/CPFF	Various : Various, KY	0.343	-		-		-		-		-	0.000	0.343	0.343
LOGFAC Contract Cost Analysis Support	C/CPFF	Various : Various, CA	0.396	-		-		-		-		-	0.000	0.396	0.396
LOGFAC Contract Engineering Support	C/CPFF	Various : Various, MA	0.419	-		-		-		-		-	0.000	0.419	0.419
LOGFAC Contract Requirement Elaboration Support	C/FFP	Various : Various, AL	0.335	-		-		-		-		-	0.000	0.335	0.335
LOGFAC Contract Systems Security / IA Support	C/CPFF	Various : Various, VA	0.426	-		-		-		-		-	0.000	0.426	0.426
LOGFAC FFRDC	SS/CPFF	MITRE : Bedford, MA	0.685	-		-		-		-		-	0.000	0.685	0.685
Subtotal			42.410	2.218		-		-		-		-	0.000	44.628	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674802 / DCAPES Increment 2A
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DCAPES Development Test and Evaluation	MIPR	46 Test Sqdn : Eglin AFB, FL	6.736	0.352	Dec 2018	-		-		-		-	0.000	7.088	6.736
DCAPES Operational Test and Evaluation	Various	605 Test Sqdn : Hurlburt Field, FL	0.700	-		-		-		-		-	0.000	0.700	0.700
DCAPES Interoperability Testing and Evaluation	MIPR	DISA JITC : Ft Hauchuca, AZ	3.669	0.052	Oct 2018	-		-		-		-	0.000	3.721	3.669
DCAPES User Test Support	Various	Various : Various	2.367	-		-		-		-		-	0.000	2.367	2.367
LOGFAC Development Test and Evaluation	MIPR	46 Test Sqdn : Eglin AFB, FL	2.238	-		-		-		-		-	0.000	2.238	2.238
LOGFAC Operational Test and Evaluation	Various	605 Test Sqdn : Hurlburt Field, FL	0.236	-		-		-		-		-	0.000	0.236	0.236
LOGFAC Interoperability Testing and Evaluation	MIPR	DISA JICT : Ft Hauchuca, AZ	0.837	-		-		-		-		-	0.000	0.837	0.837
LOGFAC User Test Support	Various	Various : Various	0.335	-		-		-		-		-	0.000	0.335	0.335
Subtotal			17.118	0.404		-		-		-		-	0.000	17.522	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	Various	Various : Various	0.000	0.951		-		-		-		-	0.000	0.951	-
Subtotal			0.000	0.951		-		-		-		-	0.000	0.951	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	187.181	14.649	0.000	-	-	-	0.000	201.830	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207452F / DCAPES	Project (Number/Name) 674802 / DCAPES Increment 2A
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>DCAPES Increment 2A (Nov 16)</i>				
DCAPES Increment 2A	1	2019	1	2019
--- v5.0.0.2 (JOPES Outbound - Loose Coupling Complete) Fielding (Nov 15)	1	2019	1	2019
--- Full Deployment Decision (FDD) (Oct 15)	1	2019	1	2019
--- Full Deployment (FD) (Oct 15)	1	2019	1	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207521F / <i>Air Force Calibration Programs</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	1.970	0.000	1.970	2.014	2.083	2.121	2.161	Continuing	Continuing
673326: <i>Precision Measurement & Calibration</i>	-	0.000	0.000	1.970	0.000	1.970	2.014	2.083	2.121	2.161	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Precision Measurement & Calibration

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	1.970	0.000	1.970
Total Adjustments	0.000	0.000	1.970	0.000	1.970
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	1.970	0.000	1.970

C. Accomplishments/Planned Programs (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>
Title: Precision Measurement & Calibration	-	-	1.970
Description: Precision Measurement & Calibration			
FY 2021 Plans: Precision Measurement & Calibration			
FY 2020 to FY 2021 Increase/Decrease Statement:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207521F / <i>Air Force Calibration Programs</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
N/A			
Accomplishments/Planned Programs Subtotals	-	-	1.970

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207521F / Air Force Calibration Programs	Project (Number/Name) 673326 / Precision Measurement & Calibration

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

No project title.	
Precision Measurement & Calibration	■

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207521F / <i>Air Force Calibration Programs</i>	Project (Number/Name) 673326 / <i>Precision Measurement & Calibration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>No project title.</i>				
Precision Measurement & Calibration	1	2021	1	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207573F / <i>National Technical Nuclear Forensics</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	1.723	1.788	0.396	0.000	0.396	0.000	0.000	0.000	0.000	0.000	3.907
674881: <i>Prompt Diagnostics</i>	-	1.723	1.788	0.396	0.000	0.396	0.000	0.000	0.000	0.000	0.000	3.907
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

National Technical Nuclear Forensics (NTNF) is the collection, analysis and evaluation of pre- and post-detonation radiological and nuclear materials, devices, and debris as well as the immediate effects created by a nuclear detonation.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver National Technical Nuclear Forensics weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	1.788	1.788	0.397	0.000	0.397
Current President's Budget	1.723	1.788	0.396	0.000	0.396
Total Adjustments	-0.065	0.000	-0.001	0.000	-0.001
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.065	0.000			
• Other Adjustments	0.000	0.000	-0.001	0.000	-0.001

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Nuclear Forensics - Prompt Diagnostics	1.723	1.788	0.396
Description: Develop diagnostic detection systems to immediately record signals resulting from a nuclear detonation. These event signature elements support weapon and event characterization analysis for the purposes of identifying the weapon classification, magnitude of the detonation (yield), and Reaction Time History (RTH) of the device. The combination of these			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207573F / <i>National Technical Nuclear Forensics</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
elements with radiochemical analysis enables analysts to distinguish between wide ranges of nuclear weapon designs and origin, supporting the national attribution assessment process.			
FY 2020 Plans: Continue to develop Prompt Diagnostics detection system. Focused areas include but are not limited to prompt output signal detection and nuclear debris collection analysis and evaluation.			
FY 2021 Plans: Will continue to develop Prompt Diagnostics detection system. Focused areas include but are not limited to prompt output signal detection and nuclear debris collection analysis and evaluation.			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to ramp down of research and development portion of program.			
Accomplishments/Planned Programs Subtotals	1.723	1.788	0.396

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 834320: <i>National Technical Nuclear Forensics</i>	6.070	4.581	5.208	-	5.208	3.995	4.946	3.998	7.136	Continuing	Continuing

Remarks

E. Acquisition Strategy
Will continue development of Prompt Diagnostics detection systems. Focus areas include but are not limited to prompt output signal detection and nuclear debris collection analysis, evaluation, technical data package, documentation, revalidate documented design with representative articles, logistics product data, and product support analysis. Using a phased approach with a single integrator to incrementally deliver technical data and logistics product data by funding various nuclear related government organizations/FFRDC's throughout the nation. Phase 2 is focused on documenting and delivering technical data packages, developing configuration status accounting, and Product Support Analysis/Logistics Product Data.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207573F / <i>National Technical Nuclear Forensics</i>	Project (Number/Name) 674881 / <i>Prompt Diagnostics</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Nuclear Forensics - Prompt Diagnostics	MIPR	DOE : Kansas City, MO	-	1.723	Jan 2019	1.364	Jan 2020	0.396	Dec 2020	-		0.396	0.000	3.483	-
Subtotal			-	1.723		1.364		0.396		-		0.396	0.000	3.483	N/A

Remarks
Multiple nuclear related organizations throughout the nation receive funds to work towards the completion of the prompt diagnostics system.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		0.424		-		-		-	0.000	0.424	-
Subtotal			-	-		0.424		-		-		-	0.000	0.424	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	1.723	1.788	0.396	-	0.396	0.000	3.907	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207573F / <i>National Technical Nuclear Forensics</i>	Project (Number/Name) 674881 / <i>Prompt Diagnostics</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Unites States Prompt Diagnostics System</i>	
Nuclear Forensics - Prompt Diagnostics	
- Phase 2: Complete Technical Data Package, Configuration Status Accounting, and Product Support Analysis/Logistics Product Data	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207573F / <i>National Technical Nuclear Forensics</i>	Project (Number/Name) 674881 / <i>Prompt Diagnostics</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Unites States Prompt Diagnostics System</i>				
Nuclear Forensics - Prompt Diagnostics	1	2019	4	2021
- Phase 2: Complete Technical Data Package, Configuration Status Accounting, and Product Support Analysis/Logistics Product Data	1	2019	1	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	24.618	28.237	29.680	0.000	29.680	30.998	32.241	33.362	33.977	Continuing	Continuing
674037: <i>SEEK EAGLE Certifications</i>	-	24.618	28.237	29.680	0.000	29.680	30.998	32.241	33.362	33.977	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force operates a variety of combat aircraft that carry numerous and varied stores (munitions, missiles, fuel tanks, targeting pods, range pods, electronic countermeasures pods, etc.). Stores are carried in many different loading combinations determined by operational and training scenarios, missions, tactics, and weapon development programs. Aircraft-store configurations/carriage and employment requirements change as operational plans and tactics change and as new stores are developed and fielded. Before operational, training, or test use, the Air Force must certify these configurations for safe loading, carriage, and separation (jettison and normal release), as well as verify ballistics accuracy under the user-certified carriage and employment parameters. The Air Force SEEK EAGLE program completes certification recommendations and recommended flight clearances through any combination of engineering analysis, wind tunnel testing, modeling and simulation, and ground/flight test and evaluation. The SEEK EAGLE effort encompasses eight disciplines: Fit and Function, Flutter, Structural Integrity, Stability and Control, Electromagnetic Compatibility/Interference (EMC/EMI), Separations, Ballistics, and Safe Escape.

In support of certification, the program recommends approximately 1000 aircraft/store combinations for flight each year with analysis and testing, requiring from weeks to years depending on the complexity. Integrated solutions for combat aircrew weapon delivery planning problems are developed and provided to combat forces via Combat Weapons Delivery Software (CWDS) and Joint Safe Escape Analysis Solution (JSEAS). SEEK EAGLE works in coordination with the Air Force Safety Center to provide Hazards of Electromagnetic Radiation to Ordnance (HERO) analysis and certification recommendations of ordnance systems containing electro-explosive devices. The program is also responsible for inserting new and emerging technologies into the SEEK EAGLE process as well as providing resources for the sustainment of a viable Air Force aircraft/store certification capability.

SEEK EAGLE funds are currently budgeted to support certification testing and analysis for new and inventory stores including, but not limited to: Small Diameter Bomb I and II (SDB), Laser Joint Direct Attack Munitions (LJDAM), Joint Air-to-Surface Standoff Missile (JASSM), Air Intercept Missile (AIM-9X), Advanced Medium Range Air-to-Air Missile (AIM-120D), Miniature Air-Launched Decoy (MALD), BRU-57 (Smart Bomb Rack), BRU-61 (SDB Bomb Rack), Advanced Precision Kill Weapon System (APKWS), Sniper Targeting Pod with video data link, LITENING Targeting Pod with video data link, laser guided bombs, B61 (Mod 12), penetrator warhead upgrades, practice bombs, and aircraft instrumentation pod modifications. SEEK EAGLE funds are also used to support certification of other inventory stores on Combat Air Forces (CAF) and Special Operations Command (SOCOM) aircraft. In addition, these funds further support capability development and weapons certification efforts required by Air Combat Command to achieve Full Operational Capability (FOC) for the F-35A. Likewise, these funds also support F-22A weapons certification efforts for emerging weapons and B-21 development for critical Engineering and Manufacturing Development (EMD) milestones.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver SEEK EAGLE capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in Program Element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	24.699	28.237	29.734	0.000	29.734
Current President's Budget	24.618	28.237	29.680	0.000	29.680
Total Adjustments	-0.081	0.000	-0.054	0.000	-0.054
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.081	0.000			
• Other Adjustments	0.000	0.000	-0.054	0.000	-0.054

Change Summary Explanation

N/A

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: AFSEO Warfighter Mission	18.170	16.639	21.811
Description: Supports the ability to rapidly meet emerging warfighter needs for global operations such as Operation INHERENT RESOLVE, Operation FREEDOM'S SENTINEL, and other ongoing world-wide operations.			
FY 2020 Plans: Support urgent warfighter requirements such as JUONs and QRCs through engineering disciplines, to include mission planning, structural integrity, flutter, separations, safe escape, engineering analysis, information assurance, CWDS, and weapon program support.			
FY 2021 Plans: Continue to support growing warfighter demands by expanding aircraft-store carriage envelopes and aircraft load outs. Supports F-15, F-16, A-10, B-52, B-2, B-1, MQ-9, and F-35 CAF ensuring warfighter aircraft-store requirements are met.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Funding increased due to fielding of 5th generation aircraft while continuing to support the expanding capabilities of legacy aircraft.				
<p>Title: 5th Generation Capability Development and Support</p> <p>Description: Supports capability development and weapons certification efforts required by Air Combat Command to achieve Full Operational Capability (FOC) for the F-35A. Funds F-22A capability development and support for emerging weapons certification efforts in addition to B-21 capability development and EMD support.</p> <p>FY 2020 Plans: Maintain F-35A and B-21 capability development and certification efforts. Support critical F-35 wind tunnel model design and build and F-35 engineering tool modernization.</p> <p>FY 2021 Plans: Continue to maintain F-35A and B-21 capability development and certification efforts. Begin initial F-35 wind tunnel setup and supersonic internal GBU variant carriage/release.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to F-35 toolset delivery completion and completion of F-35 wind tunnel model design and build.</p>		3.057	4.438	1.406
<p>Title: Advanced Next Generation Weapon Capability Development and Support</p> <p>Description: Development and certification support for advanced systems such as hypersonic weapons and other classified weapons programs; increased B-1, B-2, and B-52 certification support for advanced weapons such as Joint Air-to-Surface Standoff Missile-Extended Range (JASSM-ER) and Long Range Anti-Ship Missile (LRASM) for PACOM area of responsibility (AOR).</p> <p>FY 2020 Plans: Maintain and improve security infrastructure and tool development for next-generation weapons certification.</p> <p>FY 2021 Plans: Continue to maintain and enhance security infrastructure and tool development for next-generation weapons certification.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to completion of hardware/software tech refresh.</p>		2.662	4.464	2.669
<p>Title: Modeling and Simulation Capability</p>		0.709	2.648	1.886

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: Ensures Modeling and Simulation (M&S) capability development in support of store certification. Supports cutting-edge innovation that leverages artificial intelligence to enable rapid weapons certification. In support of enhanced aircraft store 3D scanning and modeling, 6-DoF (Degrees of Freedom) store trajectory simulations, and computational fluid dynamics (CFD).</p> <p>FY 2020 Plans: Support development and sustainment of state-of-the-art engineering & business tools to support SEEK EAGLE enterprise.</p> <p>FY 2021 Plans: Continue to support development and sustainment of state-of-the-art engineering & business tools to support SEEK EAGLE enterprise.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to higher priorities within the Warfighter Mission thrust area.</p>				
<p>Title: Aircraft-Store Compatibility Analysis</p> <p>Description: Evaluates aircraft/store compatibility through analysis, M&S, and flight and ground test. Provides flight recommendations to airworthiness authorities.</p> <p>FY 2020 Plans: Provide for USAF Air-to-Air and Air-to-Ground Munitions certification efforts such as towed decoys, electronic countermeasure (ECM) pods, and chaff/flare countermeasures certification efforts, and Airborne Instrumentation Systems pods, fuel tanks, and travel pod certification efforts.</p> <p>FY 2021 Plans: Continue to provide for USAF Air-to-Air and Air-to-Ground Munitions certification efforts such as towed decoys, ECM pods, and chaff/flare countermeasures certification efforts, and Airborne Instrumentation Systems pods, fuel tanks, and travel pod certification efforts.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to increased B-52 aircraft/store compatibility efforts.</p>		0.020	0.048	1.908
Accomplishments/Planned Programs Subtotals		24.618	28.237	29.680
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>	

E. Acquisition Strategy

The SEEK EAGLE program does not execute in accordance with established acquisition program milestones. For initial aircraft-weapons integration, the aircraft or weapon program office is responsible for budgeting and providing the test assets to the Air Force SEEK EAGLE Office (AFSEO) for the store certification requirements. For post-integration certification requirements, AFSEO funds are used to obtain the non-inventory test assets.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>	Project (Number/Name) 674037 / <i>SEEK EAGLE Certifications</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
F-22 Capabilities	C/CPFF	Raytheon : Waltham, MA	-	0.210	Jul 2019	0.000		0.000		-		0.000	Continuing	Continuing	-
AFSEO Mission and Planning Support (SEMATS)	C/CPFF	ERC : Ft. Walton Beach, FL	-	11.980	Mar 2019	11.127	Mar 2020	11.783	Mar 2021	-		11.783	Continuing	Continuing	-
F-35 Capabilities	C/CPFF	Lockheed Martin : Marietta, GA	-	1.172	Nov 2018	2.450	Nov 2019	1.214	Nov 2020	-		1.214	Continuing	Continuing	-
Multiple Fighter and Weapon Capability Support	C/CPFF	Multiple : Multiple	-	0.538	Mar 2019	2.490	Mar 2020	1.740	Mar 2021	-		1.740	Continuing	Continuing	-
F-16 Aero Sustainment	C/CPFF	Lockheed Martin : Fort Worth, TX	-	0.120	Feb 2019	0.170	Feb 2020	0.120	Feb 2021	-		0.120	Continuing	Continuing	-
Subtotal			-	14.020		16.237		14.857		-		14.857	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Flight tests and Aircraft/Store compatibility analysis	PO	96th Test Wing : Eglin AFB, FL	-	7.952	Oct 2018	8.954	Oct 2019	11.317	Oct 2020	-		11.317	Continuing	Continuing	-
Wind tunnel model/design and testing	PO	Arnold Engineering Dev Complex : Arnold AFB, TN	-	1.636	Jan 2019	1.607	Jan 2020	0.908	Jan 2021	-		0.908	Continuing	Continuing	-
Subtotal			-	9.588		10.561		12.225		-		12.225	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS Support (TMAS)	C/CPFF	96 : Eglin AFB, FL	-	0.356	Oct 2018	0.140	Oct 2019	0.485	Oct 2020	-		0.485	Continuing	Continuing	-
Management Support	Various	Various : Various, FL	-	0.654	Oct 2018	1.299	Oct 2019	2.113	Oct 2020	-		2.113	Continuing	Continuing	-
Subtotal			-	1.010		1.439		2.598		-		2.598	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>	Project (Number/Name) 674037 / <i>SEEK EAGLE Certifications</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

SEEK EAGLE	
AFSEO Warfighter Mission	
5th Generation Capability Development and Support	
Advanced Next Generation Weapon Capability Development and Support	
Modeling and Simulation Capability	
Aircraft Store Capability Analysis	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207590F / <i>Seek Eagle</i>	Project (Number/Name) 674037 / <i>SEEK EAGLE Certifications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SEEK EAGLE				
AFSEO Warfighter Mission	1	2019	4	2025
5th Generation Capability Development and Support	1	2019	4	2025
Advanced Next Generation Weapon Capability Development and Support	1	2019	4	2025
Modeling and Simulation Capability	1	2019	4	2025
Aircraft Store Capability Analysis	1	2019	4	2025

Note

Note: The SEEK EAGLE program supports both production stores on production aircraft and the planning for future acquisition program milestones without an anticipated end date. Current warfighter requirements trigger the SEEK EAGLE process for requested aircraft-store configurations, as work is completed in accordance with designated user priorities established through the SEEK EAGLE Prioritization List process.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207601F / <i>USAF Modeling and Simulation</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	16.572	15.725	17.666	0.000	17.666	19.042	19.030	18.692	19.035	Continuing	Continuing
674567: <i>M&S Foundations</i>	-	6.815	6.943	7.050	0.000	7.050	7.199	7.328	7.459	7.596	Continuing	Continuing
675135: <i>Warfighter Readiness</i>	-	9.757	8.782	10.616	0.000	10.616	11.843	11.702	11.233	11.439	Continuing	Continuing

A. Mission Description and Budget Item Justification

Modeling and Simulation support to our Warfighter's Readiness is a United States Air Force (USAF) corporate imperative to ensure air, space, cyberspace training, and mission rehearsal activities are supported with realistic, interoperable, and readily available tools, data, services and environments. Warfighter readiness supports Department of Defense (DoD) Training Transformation (T2) and Joint National Training Capability (JNTC) along with the USAF priorities and core functions. Activities also include studies and analysis to support both current program planning, execution, and future program planning.

It includes several complimentary programs, initiatives and areas for investment: Warfighter and Joint Training Integration supports the Chief of Staff of the Air Force (CSAF) directed Live, Virtual, and Constructive (LVC) integration efforts and is a critical piece to the USAF's implementation of the Strategic Plan for Transforming DoD Training. The goal of LVC training and mission rehearsal is to prepare our warfighters for the full range of military operations and maintain the combat readiness levels required by the Combatant Commanders'. This can only be accomplished by training and rehearsing in realistic operational environments. These environments include live training ranges and virtual simulators enhanced with constructive entities. Specific training and mission rehearsal events can include some or all of these simultaneously; making the ability to integrate LVC capabilities a necessity.

The Air, Space, and Cyberspace Constructive Environment (ASCCE) is the USAF's authoritative federation of constructive training models and tools realistically representing the tactical and operational capabilities the USAF brings to the joint fight. Project 675135, Warfighter Readiness, includes the Air Force Modeling and Simulation Training Toolkit (AFMSTT) and its follow on program Command & Control Simulation Environment for Training (C2SET), which provides the authoritative representation of AF and joint theater-level air and space power and is used to train Air and Space Operations Center (AOC) personnel and Combatant Commanders' battle staffs. The primary models in the AFMSTT are the Air Warfare Simulation (AWSIM) and Air Base Simulation (ABS).

The program element also contains Project 674567, M&S Foundations, the Air, Space and Cyberspace Collaborative Environment - Information Operations Suite (ACE-IOS). ACE-IOS is a federation of constructive models for the authoritative representation of Air Force information operations. ACE-IOS is developed and operated by the Air Force Cyber Simulation Center (CSC) to support training and mission rehearsal for the Air Force, Joint Task Force commanders, and Combatant Commanders' battle staffs during Joint and Service exercises, tests, and experiments. The CSC provides cyber live-virtual-constructive (LVC) environments to support the development and fielding of offensive and defensive cyber capabilities for the AF, DoD, and national agencies. This program also supports the DoD Training Transformation Initiative.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AFMSTT and ACE-IOS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207601F / <i>USAF Modeling and Simulation</i>
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This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	17.078	15.725	17.699	0.000	17.699
Current President's Budget	16.572	15.725	17.666	0.000	17.666
Total Adjustments	-0.506	0.000	-0.033	0.000	-0.033
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.506	0.000	-0.033	0.000	-0.033

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation				Project (Number/Name) 674567 / M&S Foundations			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674567: M&S Foundations	-	6.815	6.943	7.050	0.000	7.050	7.199	7.328	7.459	7.596	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Modeling and Simulation Foundations (MSF) focuses on integrating foundational capabilities needed to improve the usefulness of Modeling and Simulation (M&S) capabilities derived from the Warfighter Readiness (WR) thrust. The efforts supporting the MSF thrust include both concept exploration and development. MSF provides the capability to rapidly and efficiently create realistic and accurate synthetic operational battlespaces to support the full spectrum of activities associated with concept development to acquisition and testing through composite training and mission rehearsals.

Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS) project is a federation of constructive models for the authoritative representation of Air Force information operations. ACE-IOS is developed and operated by the Air Force Cyber Simulation Center (CSC) to support training and mission rehearsal for the Air Force, Joint Task Force commanders, and Combatant Commands battle staffs during Joint and Service exercises, tests and experiments.

The CSC provides cyber live-virtual-constructive (LVC) environments to support the development and fielding of offensive and defensive cyber capabilities for the AF, DoD, and national agencies. The CSC is managed by the 90th Cyberspace Operations Squadron, a unit of the 318th Cyberspace Operations Group, 67th Cyberspace Wing, 24th Air Force (AFCYBER). The Distributed Mission Operations Center for Cyberspace (DMOC-C) is a subset of the CSC focused on training and exercising tactical cyber mission forces (CMF) and cyber service providers (CSP) and operational-level command and control, intelligence, and cyber planners and operators. DMOC-C provides the ACE-IOS to support Air Force information operations. DMOC-C, using ACE-IOS, directly supports Air Force, Joint, Coalition composite training and rehearsal, concept development, and acquisition and testing for use by Major and Combatant Commands. DMOC-C thrust areas develop and modernize models and simulations covering cyberspace, intelligence and command and control activities as part of the constructive backbone of Air Force capabilities within DOD and coalition LVC environments.

DMOC-C's development and integration efforts on ACE-IOS are imperative to ensure that air, space, and cyberspace training and mission rehearsal activities are supported with realistic, interoperable, and readily available tools, data, and services. LVC environments today are used as one of the most cost effective and practical means to meet mission needs. These efforts enable more efficient delivery of effective capabilities to the warfighter while reducing the time and resources required for design, development, test and evaluation, maintainability and sustainment.

Authorization and Accreditation and Networthiness is maintained via the Information Technology (IT) systems Risk Management Framework (RMF) for seven classified systems and five supported cross domain solutions, which includes code and ruleset development, testing, and fielding, and meets AF Joint Worldwide Intelligence Communications System (JWICS) and AF Secret Internet Protocol Router Network (SIPRNET) net worthiness standards and evaluations.

This program also supports the DoD Training Transformation Initiative.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 674567 / M&S Foundations
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver AFMSTT and ACE-IOS capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS)</p> <p>Description: Provides the authoritative representation of Air Force information operations. ACE-IOS is comprised of models that support training and mission rehearsal for the Air Force, Joint Task Force commanders, and Combatant Commander battle staffs during Joint and Service exercises and experimentations.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Commence and complete ACE-IOS version 5.0.21 - Commence and complete model transformation to open architecture - Commence and complete model certification and entry onto Air force Approved Product Lists for appropriate networks - Commence and complete the common ASCCE database - Commence and complete the Joint Data Translator as a service - Commence and complete the new design infrastructure database as a service - Commence and complete the migration of all graphics into a single we-based graphics system - Develop database population tools for all parametric data - Develop JNETS scenario builder - Commence and complete the sensor and reporting capability for 5th generation aircraft - Commence and complete the development of tools for the model execution situational awareness and execution control <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Will commence and complete ACE-IOS version 5.0.22 - Will commence database population tools for all parametric data - Will commence JNETS scenario builder <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to inflationary growth.</p>	6.815	6.943	7.050	-	7.050
Accomplishments/Planned Programs Subtotals	6.815	6.943	7.050	-	7.050

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 674567 / M&S Foundations

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks
N/A

D. Acquisition Strategy
The Acquisition goals of the Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS) are achieved through incremental development of the project's M&S activities; all contracts are awarded using full and open competition. To meet evolving M&S technology, and the challenges of new requirements arriving almost daily, DMOC-C is an on-going, evolutionary effort to keep pace with those changes by continuously developing and upgrading environment generators, systems, and tools and to ensure integration and interoperability with other LVC systems to provide the best warfighter training possible.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 674567 / M&S Foundations

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS)																												
- ACE-IOS v5.0.20																												
- ACE-IOS v5.0.21																												
- ACE-IOS v5.0.22																												
- ACE-IOS v5.0.23																												
- ACE-IOS v5.0.24																												
- ACE-IOS v5.0.25																												
- ACE-IOS v5.0.26																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 674567 / M&S Foundations

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS)</i>				
- ACE-IOS v5.0.20	1	2019	4	2019
- ACE-IOS v5.0.21	1	2020	4	2020
- ACE-IOS v5.0.22	1	2021	4	2021
- ACE-IOS v5.0.23	1	2022	4	2022
- ACE-IOS v5.0.24	1	2023	4	2023
- ACE-IOS v5.0.25	1	2024	4	2024
- ACE-IOS v5 0.26	1	2025	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 675135 / Warfighter Readiness
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675135: Warfighter Readiness	-	9.757	8.782	10.616	0.000	10.616	11.843	11.702	11.233	11.439	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Modeling and Simulation support to our Warfighter's Readiness is a United States Air Force (USAF) corporate imperative to ensure air, space, cyberspace training, and mission rehearsal activities are supported with realistic, interoperable, and readily available, tools, data, services and environments. Warfighter Readiness supports Department of Defense (DoD) Training Transformation (T2) and Joint National Training Capability (JNTC) along with the USAF priorities and core functions. Activities also include studies and analysis to support both current program planning, execution, and future program planning.

It includes several complimentary programs, initiatives and areas for investment: Warfighter and Joint Training Integration supports the Chief of Staff of the Air Force (CSAF) directed Live, Virtual, and Constructive (LVC) integration efforts and is a critical piece to the USAF's implementation of the Strategic Plan for Transforming DoD Training. The goal of LVC training and mission rehearsal is to prepare our warfighters for the full range of military operations and maintain the combat readiness levels required by the Combatant Commands. This can only be accomplished by training and rehearsing in realistic operational environments. These environments include live training ranges and virtual simulators enhanced with constructive entities. Specific training and mission rehearsal events can include some or all of these simultaneously; making the ability to integrate LVC capabilities a necessity.

The Air, Space, and Cyberspace Constructive Environment (ASCCE) is the USAF's authoritative federation of constructive training models and tools realistically representing the tactical and operational capabilities the USAF brings to the joint fight. This presently includes the Air Force Modeling and Simulation Training Toolkit (AFMSTT) and its follow on program Command & Control Simulation Environment for Training (C2SET), which provides the authoritative representation of AF and joint theater-level air and space power and is used to train Air and Space Operations Center (AOC) personnel and Combatant Commanders' battle staffs. The primary models in the AFMSTT are the Air Warfare Simulation (AWSIM) and Air Base Simulation (ABS).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AFMSTT and ACE-IOS capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Air, Space, and Cyberspace Constructive Environment (ASCCE)/Air Force Modeling & Simulation Training Toolkit (AFMSTT)	9.757	8.282	2.310	0.000	2.310
Description: Provides the authoritative representation of AF and joint theater-level air and space power used to train Air and Space Operations Center (AOC) personnel and Combatant Commanders' battle staffs.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 675135 / Warfighter Readiness

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Complete development, test, and fielding of AFMSTT Version 6.2 - Continue integration with spiral JLVC developments - Continue new joint requirements and model interface changes to the Joint Federate Object Models (FOMs) - Continue modeling of real world environments and new C2 systems' interfaces to ensure continued accurate and realistic training - Initiate development and testing of AFMSTT Version 6.3 <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Complete development, test, and fielding of AFMSTT Version 6.3 - Continue integration with spiral Joint Staff/J7 JLVC developments - Continue new joint requirements and model interface changes to the Joint Federate Object Models (FOMs) - Continue modeling of real world environments and new C2 systems' interfaces to ensure continued accurate and realistic training is supported <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to transfer of funding to initiate work being formed on C2SET.</p>					
<p>Title: Command & Control Simulation Environment for Training (C2SET)</p> <p>Description: Provides the authoritative representation of AF and joint theater-level air and space power and is used to train AOC personnel and Combat Commander's battle staffs</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Prepare documentation for program start and request for quotes release <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Initiate agile rapid development and engineering - Develop agile requirements and prototyping to address new C2SET requirements <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	0.000	0.500	8.306	0.000	8.306

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 675135 / Warfighter Readiness

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding increased due to transfer of funding to initiate work being formed on C2SET.					
Accomplishments/Planned Programs Subtotals	9.757	8.782	10.616	0.000	10.616

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

N/A

Remarks

N/A

D. Acquisition Strategy

The Air Force Life Cycle Management Center (AFLCMC) at Hanscom AFB, MA manages the project's acquisition process. AFLCMC develops the Air C2 constructive M&S models in direct support of AFAMS and the warfighter simulation centers. Their acquisition goals are achieved through incremental development in a sustainment and modernization through modification approach. All major contracts are awarded using full and open competition.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 675135 / Warfighter Readiness
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFMSTT	C/T&M	Cole Engineering Services, Inc : Orlando, FL	-	7.681	Mar 2019	5.986	Mar 2020	1.799	Mar 2021	-		1.799	Continuing	Continuing	-
C2SET	C/TBD	TBD : TBD	-	-		-		6.282	Mar 2021	-		6.282	Continuing	Continuing	-
Subtotal			-	7.681		5.986		8.081		-		8.081	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Hanscom Collaboration and Innovation Center	C/Variou	AFLCMC : Hanscom AFB, MA	-	0.163	Jan 2019	0.092	Oct 2019	0.101	Oct 2020	-		0.101	Continuing	Continuing	-
Subtotal			-	0.163		0.092		0.101		-		0.101	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Verification and Validation	C/CPAF	Not specified. : TBD	-	0.165	Jul 2019	0.203	Jul 2020	0.193	Jul 2021	-		0.193	Continuing	Continuing	-
Subtotal			-	0.165		0.203		0.193		-		0.193	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	C/Variou	AFLCMC : Hanscom AFB, MA	-	1.246	Dec 2018	1.633	Oct 2019	0.511	Oct 2020	-		0.511	Continuing	Continuing	-
Systems Engineering	SS/ Various	MITRE : Bedford, MA	-	0.502	Dec 2018	0.368	Oct 2019	0.376	Oct 2020	-		0.376	Continuing	Continuing	-
Program Management Administration C2SET	C/Variou	AFLCMC : Hanscom AFB, MA	-	-		0.500	Jul 2020	1.354	Jan 2021	-		1.354	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 675135 / Warfighter Readiness

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Air, Space, and Cyberspace Constructive Environment (ASCCE)</i>	
AFMSTT v6.2	
AFMSTT v6.3	
C2SET 1.0	
C2SET 2.0	
C2SET 3.0	
C2SET 4.0	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207601F / USAF Modeling and Simulation	Project (Number/Name) 675135 / Warfighter Readiness

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Air, Space, and Cyberspace Constructive Environment (ASCCE)</i>				
AFMSTT v6.2	2	2019	2	2020
AFMSTT v6.3	2	2020	2	2021
C2SET 1.0	2	2021	2	2022
C2SET 2.0	2	2022	2	2023
C2SET 3.0	2	2023	2	2024
C2SET 4.0	2	2024	2	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	5.916	4.316	6.353	0.000	6.353	7.648	7.378	6.721	6.844	Continuing	Continuing
672888: <i>Distributed Mission Operations Center (DMOC)</i>	-	5.916	4.316	6.353	0.000	6.353	7.648	7.378	6.721	6.844	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Distributed Mission Operations Center (DMOC) provides comprehensive Live, Synthetic, and Blended (LSB) simulation capabilities which prepare warfighters to conduct dominant operations in air, land, sea, space, and cyber domains for theater-level, full spectrum combat training for Air Force, joint service, and coalition partners. The DMOC training capabilities reach 31 geographically separated Live, Virtual, and Constructive (LVC) locations across 17 time zones representing such assets as real-world weapon systems, operator-in-the-loop, and constructive or computer-driven simulations. It is responsible for development and integration of scenarios, models, and databases and the integration of participating sites into Virtual Flag (VF) training events via numerous network connections, DMOC-developed interoperability tools, and controlled interfaces in support of Air Force, joint, and coalition warfighter readiness. In addition, activities include Distributed Mission Operations (DMO) technology and capability studies/analyses which support both current and future program planning and execution by:

1. Distributed Mission Operations Capability/Battlespace Systems Development: The DMOC upgrades and enhances the capabilities of various systems, tools, and simulators to incorporate ever-changing technology and emerging training requirements into DMO events, such as Virtual Flag (VF) and Coalition VF (CVF), to enhance the quality of warfighter training. Activities include Environment Generator development, DMO Tool Development, and Simulator Enhancement. DMOC is in partnership with the US Naval Air Warfare Center-Aircraft Division (NAWCAD) to enhance the capabilities of the Next Generation Threat System (NGTS). The NGTS is the primary environment generator for both Blue and Red Air in DMOC White Force. DMO Tool development includes: a) DMOC Replay Tool (DRT) facilitates a more complete mission review and debrief capability of the exercises as more sites and systems are added to events; b) enhancement & improvement of the The Distributed Mission Operations Center (DMOC) provides comprehensive Live, Synthetic, and Blended (LSB) simulation capabilities which prepare warfighters to conduct dominant operations in air, land, sea, space, and cyber domains for theater-level, full spectrum combat training for Air Force, joint service, and coalition partners. The DMOC training capabilities reach 31 geographically separated Live, Virtual and Constructive locations across 17 time zones representing such assets as real-world weapon systems, operator-in-the-loop, and constructive or computer-driven simulations. It is responsible for development and integration of scenarios, models, and databases and the integration of participating sites into Virtual Flag (VF) training events via numerous network connections, DMOC-developed interoperability tools, and controlled interfaces in support of Air Force, joint, and coalition warfighter readiness. In addition, activities include Distributed Mission Operations (DMO) technology and capability studies/analyses which support both current and future program planning and execution by:

1. Distributed Mission Operations Capability/Battlespace Systems Development: The DMOC upgrades and enhances the capabilities of various systems, tools, and simulators to incorporate ever-changing technology and emerging training requirements into DMO events, such as Virtual Flag (VF) and Coalition Virtual Flag (CVF), to enhance the quality of warfighter training. Activities include Environment Generator development, DMO Tool Development, and Simulator Enhancement. DMOC is in partnership with the US Naval Air Warfare Center-Aircraft Division (NAWCAD) to enhance the capabilities of the Next Generation Threat System (NGTS). The NGTS

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>
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is the primary environment generator for both Blue and Red Air in DMOC White Force. DMO Tool development includes: a) DMOC Replay Tool (DRT) facilitates a more complete mission review and debrief capability of the exercises as more sites and systems are added to events; b) enhancement & improvement of the Distributed Interactive Simulation (DIS) Filter and the Doctor-J (Dr. J) tools to enable tactical datalinks to be communicated and translated between disparate simulator and operationally fielded (i.e. live aircraft) communication formats; c) Development of Intelligence, Surveillance, and Reconnaissance (ISR)/Battle Damage Assessment (BDA) to improve damage state models used by intelligence analysts in exercises; and d) development of solutions for integrating Contested Degraded Operations (geographical and communications jamming) into DMO events; and simulator enhancement efforts to incorporate Mission Package standards upgrades into the Control and Reporting Center (CRC) Simulation Package (CSP) to allow a real-world system to be used as a simulator when needed in DMO events.

2. Assessment & Authorization (A&A)/Software Certification: The DMOC supports cybersecurity requirements definition, integration/test support, analysis, systems engineering support, A&A of core systems, and support software certification. The DMOC implements cybersecurity requirements and is working towards the application of the Risk Management Framework (RMF) and Continuous Monitoring. Efforts include Cross-Domain Information Sharing / Multi-national Information Sharing (CDIS/ MNIS) ruleset development, load sharing, and testing; integration and testing of various newly developed / updated systems such as the DMOC Replay Tool, Dr. J, DIS Filter, and the DMOC Battlespace; and support of Air Force Network Integration Center (AFNIC) software certification.

3. Distributed Training Sites & Systems Integration: DMOC integrates up to 31 geographically separated LVC training locations and 50+ systems into LSB DMO training events such as VF and CVF by resolving interoperability issues between disparate systems and networks so that all exercise participants can interact in the DMO environment. New sites and systems are incorporated into LSB DMO events each year based on higher headquarters and Combatant Commander's (CCDRs) emerging requirements.

The FY 2020 funding request was reduced by \$1.940 million to account for the availability of prior year execution balances.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Distributed Mission Operations Center capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force				Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>				
B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
Previous President's Budget	6.141	4.316	6.365	0.000	6.365	
Current President's Budget	5.916	4.316	6.353	0.000	6.353	
Total Adjustments	-0.225	0.000	-0.012	0.000	-0.012	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	0.000	0.000				
• Other Adjustments	-0.225	0.000	-0.012	0.000	-0.012	
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2019	FY 2020	FY 2021
Title: Distributed Mission Operations (DMO) Capability / Battlespace Systems Development				4.364	2.931	4.744
Description: Simulation software/hardware development in support of users conducting RDT&E, mission rehearsal, and concepts of operation development.						
FY 2020 Plans:						
- Continue DMO tool enhancements						
- Continue DMOC/NAWCAD Partnership: Enhance NGTS source code to implement future Air Force DMO requirements, Develop/Install future versions of DMOC customized NGTS						
- Continue to Explore, improve, and execute the plan for battlespace virtualization and DMO tools						
- Prepare readiness posture for emerging technologies and cybersecurity measures.						
FY 2021 Plans:						
- Will continue DMO tool enhancements						
- Will continue DMOC/NAWCAD Partnership: Enhance NGTS source code to implement future Air Force DMO requirements, Develop/Install future versions of DMOC customized NGTS						
- Will continue to explore, improve, and execute the plan for battlespace virtualization and DMO tools						
- Will prepare readiness posture for emerging technologies and cybersecurity measures.						
FY 2020 to FY 2021 Increase/Decrease Statement:						
FY 2020 decrease is a result of a \$1.940 million program reduction to account for the availability of prior year execution balances. Full funding is being restored to the program in FY 2021, which is why the FY 2021 is higher than FY 2020.						
Title: Assessment and Authorization (A&A)/Software Certification				0.514	0.328	0.533

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>		R-1 Program Element (Number/Name) PE 0207605F <i>I Wargaming and Simulation Centers</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: Support requirements definition, integration test support, scenario development, analysis, systems engineering support, and Certification and Accreditation (C&A) and Networthiness of core systems. Implement requirements of Cybersecurity, Risk Management Framework, and Continuous Monitoring.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue testing for the following Assessment and Authorization activities: <ul style="list-style-type: none"> -- Maintain ATO from HAF/A3 for Battlespace -- Maintain ATO for Jumper Room with accompanying SSP modifications for even-driven needs - Continue to assess DMOC software for AFNIC E/APL process viability and test accordingly - Provide A&A support for virtualization effort - Continue support of CVF and RED KITE with CDIS ruleset development, testing, and implementation. - -Begin development of utilizing Cross Domain Solutions into LSB Training <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Will continue testing for the following Assessment and Authorization activities: <ul style="list-style-type: none"> -- Maintain ATO from HAF/A3 for Battlespace -- Maintain ATO for Jumper Room with accompanying SSP modifications for even-driven needs - Will continue to assess DMOC software for AFNIC E/APL process viability and test accordingly - Will provide A&A support for virtualization effort - Will continue support of CVF and RED KITE with CDIS ruleset development, testing, and implementation. -Will continue development of utilizing Cross Domain Solutions into LSB training <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 decrease is a result of a \$1.940 million program reduction to account for the availability of prior year execution balances. Full funding is being restored to the program in FY 2021, which is why the FY 2021 is higher than FY 2020.</p>				
<p>Title: Distributed Training Sites and Systems Integration</p> <p>Description: Establish distributed training site system integration and interoperability between DMOC, operational units, and modeling & simulation facilities.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue the development of LVC concepts in support of VF/CVF/RF integration efforts - Continue to support emerging higher headquarters/CCDR requirements - Continue Virtual-into-Live integration and testing with NTTR/VTTC/RF - Expand Jumper Room support to CJCS events 		1.038	1.057	1.076

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Expand current practice of distributed training - Establish NMON connection for use in joint training exercises <p><i>FY 2021 Plans:</i></p> <ul style="list-style-type: none"> - Will continue the development of LVC concepts in support of VF/CVF/RF integration efforts - Will continue to support emerging higher headquarters/CCDR requirements - Will continue Virtual-into-Live integration and testing with NTTR/VTTC/RF - Will expand Jumper Room support to CJCS events - Will expand current practice of distributed training - Will utilize NMON connection for use in joint training exercises <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Normal inflationary cost.</p>			
Accomplishments/Planned Programs Subtotals	5.916	4.316	6.353

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks
N/A

E. Acquisition Strategy
The DMOC supports AF/Joint/Coalition DMO and the Joint National Training Capability (JNTC) through the development and integration of DMO training and test events, networks, scenarios, and databases. Due to evolving modeling & simulation technology, the DMOC is an on-going, evolutionary effort to keep pace with those changes by continuously developing/upgrading DMO environment generators, systems, and tools and ensuring integration/interoperability of new systems into DMO to provide the best warfighter training possible.

DMOC has the following two primary contracts that manage the acquisition, development, testing, and integration of DMO standards, training, modeling and simulation, cross-domain information sharing testbed, and exercises on AF/Joint/Coalition DMO networks. Additionally, Military Interdepartmental Purchase Requests (MIPRs) are sent to other external organizations (i.e. NAWCAD and DMOC-S) to fund development of DMO tools that support DMOC efforts.

Infrastructure, Development, and Engineering (IDE) Contract: Develops/upgrades various DMOC tools, systems, and simulators that are needed to conduct DMO training events. Develops, implements, and tests technical solutions for the integration of sites/systems into VF, CVF, and other DMO events. IDE is a firm-fixed-price contract.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>	
<p>Command and Control Technical Support Contract (C2TSC): Supports government by assisting with development of technical requirements for upgrades to various systems and tools that will be developed by the IDE contractor and then performs acceptance testing of the those products. Develops requirements for site/system integration of sites/systems into VF, CVF, and other DMO events. C2TSC is a firm-fixed-price contract.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0207605F / Wargaming and Simulation Centers				672888 / Distributed Mission Operations Center (DMOC)							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Distributed Mission Operations (DMO) Capability / Battlespace Systems Development, Certification & Accreditation (C&A) and Networkiness, and Distributed Training Sites& Systems Integration	C/FFP	General Dynamics IT : Kirtland AFB, NM	-	4.342	Jan 2019	3.198	Jan 2020	4.287	Nov 2020	-		4.287	Continuing	Continuing	17.662
NAWCAD NGTS Development	MIPR	NAWCAD : Patuxent River, MD	-	0.411	Nov 2018	0.375	Nov 2019	0.425	Nov 2020	-		0.425	Continuing	Continuing	-
Subtotal			-	4.753		3.573		4.712		-		4.712	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Technical requirements development, integration/ acceptance testing, and engineering support	C/FFP	River Tech, LLC : Kirtland AFB, NM	-	0.955	Mar 2019	0.548	Jan 2020	1.343	Jan 2021	-		1.343	Continuing	Continuing	4.759
Subtotal			-	0.955		0.548		1.343		-		1.343	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>	Project (Number/Name) 672888 / <i>Distributed Mission Operations Center (DMOC)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

DMO	
DMO Capability / Battlespace Systems Development	
Virtual Flag (VF)	
Virtual Flag / Coalition Virtual Flag exercises	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207605F / <i>Wargaming and Simulation Centers</i>	Project (Number/Name) 672888 / <i>Distributed Mission Operations Center (DMOC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
DMO				
DMO Capability / Battlespace Systems Development	1	2019	4	2025
Virtual Flag (VF)				
Virtual Flag / Coalition Virtual Flag exercises	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	42.349	26.946	6.827	0.000	6.827	34.199	0.000	0.000	0.000	Continuing	Continuing
671201: <i>E-11 Development</i>	-	0.000	26.946	6.827	0.000	6.827	34.199	0.000	0.000	0.000	Continuing	Continuing
675383: <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>	-	42.349	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Battlefield Airborne Communications Node (BACN) enables tactical edge Joint and Coalition information interoperability via air, space, and surface systems, to include a Backbone Network for high capacity data transfer. As requirements emerge, BACN will integrate new hardware and software capabilities that improve system performance, interoperability, availability and open mission system technologies. Efforts include, but are not limited to, expansion of external time reference capabilities, Survivability Urgent Operational Need (UON) Military Global Positioning System (GPS) and other system enhancements, development and integration of advanced antennas and waveforms, ground support capabilities and assimilation of mandates levied on the BACN systems. Survivability UON is required for BACN Fleet to fly in increasingly contested Area of Responsibility (AOR). Safety of flight considerations, including performance, aircraft structural integrity, availability, and continuity of service requirements will be addressed. Efforts will include required non-recurring engineering and Diminishing Manufacturing Sources (DMS) issues, the development of simulators/trainers, development of training materials, and technical publications.

Execute risk reduction activities for development of future capabilities on BACN payload/aircraft efforts.

Beginning in FY21, to support the divestiture of the EQ-4B (a variant of the RQ-4 Block 20/30 aircraft) efforts will taper accordingly, to include BACN payload sustainment & other BACN specific efforts.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BACN weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	42.349	26.946	14.781	0.000	14.781
Current President's Budget	42.349	26.946	6.827	0.000	6.827
Total Adjustments	0.000	0.000	-7.954	0.000	-7.954
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-7.954	0.000	-7.954

Change Summary Explanation

The FY2021 funding request was reduced by \$7.954 to account for the availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 671201 / <i>E-11 Development</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
671201: <i>E-11 Development</i>	-	0.000	26.946	6.827	0.000	6.827	34.199	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Battlefield Airborne Communications Node (BACN) enables tactical edge Joint and Coalition information interoperability via air, space, and surface systems, to include a Backbone Network for high capacity data transfer. As requirements emerge, BACN will integrate new hardware and software capabilities that improve system performance, interoperability, availability and open mission system technologies. Efforts include, but are not limited to, expansion of external time reference capabilities, Survivability Urgent Operational Need (UON) Military Global Positioning System (GPS) and other system enhancements, development and integration of advanced antennas and waveforms, ground support capabilities and assimilation of mandates levied on the BACN systems. Survivability UON is required for BACN Fleet to fly in increasingly contested Area of Responsibility (AOR). Safety of flight considerations, including performance, aircraft structural integrity, availability, and continuity of service requirements will be addressed. Efforts will include required non-recurring engineering and Diminishing Manufacturing Sources (DMS) issues, the development of simulators/trainers, development of training materials, and technical publications.

Execute risk reduction activities for development of future capabilities on BACN payload/aircraft efforts.

Beginning in FY21, to support the divestiture of the EQ-4B (a variant of the RQ-4 Block 20/30 aircraft) efforts will taper accordingly, to include BACN payload sustainment & other BACN specific efforts.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the BACN capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: BACN Simulators/Trainers	0.000	15.600	6.827
Description: This effort will be used to develop payload simulator trainers.			
FY 2020 Plans: Develop training systems and begin training BACN payload operators in an environment conducive for learning.			
FY 2021 Plans: Efforts will include non-recurring engineering and Diminishing Manufacturing Sources (DMS) issues, the development of simulators/trainers, development of training materials, and technical publications.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 671201 / <i>E-11 Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
FY21 funding for this effort has been moved to BACN Development Efforts				
Title: BACN Development Efforts		0.000	11.346	0.000
Description: Provides common development, integration and interoperability of the BACN payload, platforms, emerging capabilities, supporting systems and support equipment. Acquisition strategies vary by effort, will utilize all contracting options available but the majority of development and integration is normally accomplished by the weapon system prime contractor. Survivability UON (Military GPS) is required for BACN Fleet to fly in increasingly contested Area of Responsibility (AOR).				
FY 2020 Plans: Continue establishment of BACN PoR				
FY 2021 Plans: FY21 funding will provide development of Training materials, technical publications, and program support costs. Performs Human Machine Interface (HMI) studies. Develop Payload Simulator/Trainers and begin training BACN payload operators in an environment conducive for learning.				
FY 2020 to FY 2021 Increase/Decrease Statement: FY21 funding increase for this effort has been moved from BACN Simulators/Trainers to Survivability UON efforts.				
Accomplishments/Planned Programs Subtotals		0.000	26.946	6.827
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Provides common development, integration and interoperability of the BACN payload, platforms and supporting systems and equipment. Acquisition strategies vary by effort, will utilize all contracting options available but the majority of development and integration is normally accomplished by the weapon system prime contractor.				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 671201 / <i>E-11 Development</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Trainers	TBD	Not specified. : TBD	-	-		4.987	Jun 2020	6.468		-		6.468	Continuing	Continuing	-
Survivability UON	SS/TBD	Not specified. : TBD	-	-		20.000	Feb 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	-		24.987		6.468		-		6.468	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Acquisition Support	Various	Various : Various, MA	-	-		1.600	Dec 2019	-		-		-	Continuing	Continuing	-
Subtotal			-	-		1.600		-		-		-	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
BACN A&AS	Various	A&AS : Bedford, MA	-	-		0.192	Apr 2020	0.192		-		0.192	Continuing	Continuing	-
MITRE	Various	MITRE : Bedford, MA	-	-		0.167	Oct 2019	0.167		-		0.167	Continuing	Continuing	-
Subtotal			-	-		0.359		0.359		-		0.359	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	26.946	6.827	-	6.827	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 671201 / <i>E-11 Development</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Battlefield Airborne Communication Node (BACN)	
BACN Development Publication and Data	[REDACTED]
Trainers	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 671201 / <i>E-11 Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Battlefield Airborne Communication Node (BACN)</i>				
BACN Development Publication and Data	2	2020	3	2022
Trainers	3	2020	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>				Project (Number/Name) 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675383: <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>	-	42.349	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Battlefield Airborne Communications Node (BACN) enables tactical edge Joint and Coalition information interoperability via air, space, and surface systems, to include a Backbone Network for high capacity data transfer. As requirements emerge, BACN will integrate new hardware and software capabilities that improve system performance, interoperability, availability and open mission system technologies. Efforts include, but are not limited to, expansion of external time reference capabilities, Military GPS enhancements, integration of advanced antennas and waveforms, and assimilation of mandates levied on the BACN systems. Military GPS is required for BACN fleet to fly in increasingly contested AORs. Safety of flight considerations, including performance, aircraft structural integrity, availability, and continuity of service requirements will be addressed. Efforts will include required non-recurring engineering and Diminishing Manufacturing Sources (DMS) issues.

This effort will include the development and integration of Military GPS on the E-11A BACN platform.

Acquire Battlefield Airborne Communications Node (BACN) Payload Trainers/Simulators, to include design of all trainers, training materials, operations and maintenance technical manuals.

Beginning in FY21, to support the divestiture of the EQ-4B (a variant of the RQ-4 Block 20/30 aircraft) efforts will taper accordingly, to include BACN payload sustainment & other BACN specific efforts.

This effort will include the development of a Rapidly Deployable PCE.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BACN weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Military GPS, E-11A & Deployable Program Control Element (PCE)	42.349	0.000	0.000
Description: Battlefield Airborne Communications Node (BACN) enables tactical edge Joint and Coalition information interoperability via air, space, and surface systems; Backbone Network for high capacity data transfer.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Military GPS is required for BACN fleet to fly in increasingly contested AORs. Safety of flight considerations, including performance, integrity, availability, and continuity of service requirements for long range reference, local area reference, and landing/terminal reference, are directly affected by how GPS sensors are used.</p> <p>This effort will include the development and integration of Military GPS on the E-11A BACN platform.</p> <p>Rapidly Deployable Program Control Elements (PCEs) are required to provide agile deployment support to establish remote and full ground control locations in a timely manner to shorten the kill-chain.</p> <p>This effort will include the development and integration of Rapidly Deployable PCE.</p> <p>FY 2020 Plans: Continue efforts started in FY19.</p> <p>FY 2021 Plans: Continue efforts started in FY19</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funds decreased due to effort completed</p>				
Accomplishments/Planned Programs Subtotals		42.349	0.000	0.000
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Provides for common development, integration and interoperability of the BACN payload, platforms and supporting systems and equipment. Acquisition strategies vary by effort, will utilize all contracting options available but the majority of development and integration is normally accomplished by the weapon system prime contractor.				

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Battlefield Airborne Comm Node (BACN)</i>																												
Military GPS, E-11A	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	Project (Number/Name) 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Battlefield Airborne Comm Node (BACN)</i>				
Military GPS, E-11A	1	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207697F / <i>Distributed Training and Exercises</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	3.699	4.303	3.390	0.000	3.390	4.460	4.541	4.622	4.707	Continuing	Continuing
675190: <i>JFCOM Wargaming</i>	-	3.699	4.303	3.390	0.000	3.390	4.460	4.541	4.622	4.707	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding supports the CSAF Title 10 wargaming efforts to test concepts, capabilities, programming choices, and plans using simulation and other techniques, otherwise known as wargaming. Based on the Department and Air Force direction, there is a concerted effort in these periods of fiscal restraint to reinvigorate, institutionalize, and systematize wargaming across the Department. This effort requires continued funding to maintain the level of effort to most effectively pursue an innovative strategy, avoid operational and technical surprise and make best use of limited resources. The Air Force continues to refine the wargame process and design to better integrate and synergize those efforts in support of the new Air Force Strategy, Planning, and Programming (SP3) process. Specifically, in addition to maintaining a robust Title 10 Wargame series, Global Engagement, servicing Chief of Staff of the Air Force (CSAF) objectives. The HAF Wargaming Enterprise is executing on-call Wargaming in support of the AF/A5, the Agile series, along with quick-turning wargame support to the USAF Enterprise Capability Collaboration Team (ECCT) requirements, the Enterprise series, Plan Blue, and to service AF/A5S strategy and concept development objectives; all to better address the requirements of the SP3 process and cycles. Additionally, HAF Wargaming provides and coordinates Air Force representation at other Service and Joint wargames as they execute across the department. These efforts are providing decision support to senior Air Force leaders involving investment strategies and develop concepts to best employ U.S. forces in future conflicts.

The Wargame Information Environment (WIE) is a continually evolving system that provides an array of services to game players which enables the accomplishment of game objectives. The backbone of the WIE is GameNet, a deployable, standalone, Local Area Network (LAN) with servers and laptops that host applications to support virtual battlespace collaboration, decision making, three-dimensional visualizations & mapping, and services. Behind these applications are cutting edge technologies and database architectures from both commercial off-the-shelf and government developed software that assures relevance to the wargame. The modeling, simulation, and analysis applications allow participants, adjudicators, and control team members to effectively and efficiently collaborate, make decisions, present those decisions, and execute moves within the wargame; documenting each step in the process. This information capture enables discovery during the wargame and permits postgame analysis. These findings inform portfolio rebalancing exercises, concept and strategy development, and very senior leader decision making.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207697F / <i>Distributed Training and Exercises</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	3.825	4.303	4.377	0.000	4.377
Current President's Budget	3.699	4.303	3.390	0.000	3.390
Total Adjustments	-0.126	0.000	-0.987	0.000	-0.987
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.126	0.000	-0.987	0.000	-0.987

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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Title: Develop/ Upgrade M&S Tools for WIE	1.248	1.502	1.216	0.000	1.216
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Description: Develop air, space and cyber space wargaming specific functionality in existing modeling and simulation and analysis tools and integrate into the latest version of the WIE

FY 2020 Plans:

- Continue the integration of tools to capture consequences of force structures, capabilities employed in wargames to effect budgeting and programming choices.
- Continue to expand and develop the WIE, incorporating the latest technology and tools, in support of a more flexible, robust, and agile wargaming enterprise; quicker to respond and tailorable for a wider range of wargaming. This will require analysis of utility and functionality of additional models and analytical tools used by other wargames, to include creation of custom interfaces to allow interaction within the WIE, for example the Integrated Sustainment and Wargaming Analysis Toolkit (ISWAT).
- Improve the ease and effectiveness of wargame execution by developing new WIE visualizations and user interfaces.

FY 2021 Base Plans:

- Carry on the assimilation of tools to capture consequences of force structures, capabilities employed in wargames to effect budgeting and programming choices.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207697F / <i>Distributed Training and Exercises</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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- Additionally, continue to expand and develop the Wargaming Information Environment (WIE), integrating the latest technology and tools, in support of a more flexible, robust, and agile wargaming enterprise; quicker to respond and tailorable for a wider range of wargaming. This will require analysis of utility and functionality of additional models and analytical tools used by other wargames, to include creation of custom interfaces to allow interaction within the WIE, for example the latest development Integrated Sustainment and Wargaming Analysis Toolkit(ISWAT3) in FY21.

- Lastly, seek to improve the ease and effectiveness of wargame execution by developing new WIE visualizations and user/ participant interfaces in the GE22 Series beginning in FY21.

FY 2021 OCO Plans:
This PE is not supported by OCO funds to complete its designated mission areas

FY 2020 to FY 2021 Increase/Decrease Statement:
Wargaming JC&D tools typically increase from year to year as part of normal progression. From FY20 to FY21 substantial decrease due to change from typical obligation of funds on contract and transitioning to execution rates. This significantly impacts the wargame 2-yr cycle, and circumvents the Oct 2019 SecDef memo to the Office of Net Assessment for the continuation of long term wargaming. This PE supports a two year cycle using the NDS as the backbone to develop and execute the series and other supported MAJCOM games. Our mission directive is the Title 10 Wargame supporting the CSAF and influencing the SP3 process.

Title: Joint Concept Development & Experimentation (JCD&E) Tools	2.451	2.801	2.174	0.000	2.174
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Description: Develop scenarios and data for future synthetic environment that grounded in truth to support several wargames and mini-wargames.

FY 2020 Plans:
HAF Wargaming will execute Global Engagement 20. HAF Wargaming will design, develop models, research concepts, and conduct workshops for Global Engagement 20 and its post-game analysis and report writing.(USAF Foundation wargame). HAF Wargaming will conduct quick-turn wargames in support of senior leaders (Agile, ECCT) as directed.

No OCO funds programmed nor executed.

FY 2021 Base Plans:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207697F / <i>Distributed Training and Exercises</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>HAF Wargaming will execute Global Engagement 22 and lead up events beginning in FY21. HAF Wargaming will continue to design, develop models, research concepts, and conduct workshops for Global Engagement 22 including the Capstone event in the Spring of 2022 including its post-game analysis and report writing.(USAF Foundation wargame). HAF Wargaming will continue to conduct quick-turn wargames in support of senior leaders (Agile, ECCT)as directed including support to other service wargames to advocate for Air Force equities.</p> <p>No OCO funds programmed nor executed.</p> <p><i>FY 2021 OCO Plans:</i> This PE is not supported by OCO funds to complete its designated mission areas</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Wargaming Joint Concept Development & Experimentation (JCD&E) Tools cost typically increase from year to year as part of normal progression. From FY20 to FY21 significant has been shown. From FY20 to FY21 substantial decrease due to change from typical obligation of funds on contract and transitioning to execution rates. This significantly impacts the wargame 2-yr cycle, and circumvents the Oct 2019 SecDef memo to the Office of Net Assessment for the continuation of long term wargaming. This PE supports a two year cycle using the NDS as the backbone to develop and execute the series and other supported MAJCOM games. Our mission directive is the Title 10 Wargame supporting the CSAF and influencing the SP3 process.</p>					
Accomplishments/Planned Programs Subtotals	3.699	4.303	3.390	0.000	3.390

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
In order to achieve an innovative strategy, avoid operational and technical surprise and make best use of limited resources, wargaming requires an evolutionary acquisition approach for every wargame. Contract support is required as wargame and IT specialized expertise resides with industry and is not available organically. The requirements constantly evolve and a challenge to be accurately defined at the outset of the contract; however, we will continue to pursue a firm fixed price (FFP) contract awarded under a full and open competition.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207697F / <i>Distributed Training and Exercises</i>	Project (Number/Name) 675190 / <i>JFCOM Wargaming</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Wargaming Information Environment</i>	
Develop and Integrate M&S Tools	
Enhance ViewPoint	
Improve GamePoint	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207697F / <i>Distributed Training and Exercises</i>	Project (Number/Name) 675190 / <i>JFCOM Wargaming</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Wargaming Information Environment</i>				
Develop and Integrate M&S Tools	1	2019	4	2025
Enhance ViewPoint	1	2019	4	2025
Improve GamePoint	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	61.164	71.465	91.768	0.000	91.768	93.950	97.363	97.397	92.301	Continuing	Continuing
675302: <i>Precision Aerial Delivery Systems (PADS)</i>	0.000	9.032	7.021	3.084	0.000	3.084	1.893	1.927	1.960	1.997	Continuing	Continuing
675380: <i>Mission Planning Systems (MPS) Modernization</i>	0.000	52.132	64.444	88.684	0.000	88.684	92.057	95.436	95.437	90.304	Continuing	Continuing

Program MDAP/MAIS Code: 509

Note

- MPS software is a layered software, designed with open architected standards and modular construction. The core of the MPS software is the Framework software (FW) used by all MPS platforms and the Navy. Common Components are distinct services that are used by a select number of platforms. An example would be weapon specific capability that fighters share. The Unique Planning Component (UPC) is the platform specific software and associated software (install etc.) that is delivered to the users in the form of a mission planning environment. Traditionally, the MPS Systems Program Office allocates FW funding to other Platform Operational Flight program (OFP) development programs. Beginning in FY20, FW is a separate program code within the MPS Modernization BPAC.

- As part of MPS Modernization, the Mission Planning program is updating the current JMPS architecture with an Open Mission Systems architecture to improve system extensibility, expand the suite of services to meet operational requirements for the warfighter, improve the user interface and overall user experience, improve system performance, and address security vulnerabilities and cybersecurity mandates. MPS is also transitioning its software development processes to incorporate best practice Agile DevOps methodologies which will speed the development and delivery of capabilities to the user as well as improve our ability to address changing threats and cybersecurity requirements. This transition is likely to drive changes in organizational and programmatic structures in the future to align with the Agile DevOps processes and practices. As we integrate the agile development methodology, some program office organizational restructuring into Agile Release Trains (ARTs) will be required. This is expected to commence in the FY21 timeframe.

A. Mission Description and Budget Item Justification

Mission planning involves the creation of a flight plan based on multiple inputs including threats, targets, terrain, weather, aircraft performance capability, and configuration. It is an essential task that must be completed prior to any fixed- or rotary wing aircraft sortie. The planner must have the ability to plan weapon, cargo, passenger, and/or fuel delivery, calculate fuel requirements, and assess the route based on known enemy threat location and type. Mission planners must be able to optimize and de-conflict flight routes with other aircraft; review, print, and brief the plan; download pertinent flight information to on-board aircraft avionics; and, conduct dynamic/in-flight re-planning as applicable.

The Mission Planning Systems (MPS) program is a collaborative program with the Navy to leverage technical solutions and business practices for most Department of Defense (DoD) platforms. It provides automated mission planning tools and support for fixed- and rotary wing aircraft and guided munitions. It replaces two closed architecture legacy mission planning systems (UNIX-based MPS (UNIX-MPS) and the PC-based Portable Flight Planning Software (PFPS)), with a single multi-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>
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service, open architecture system, frequently referred to as the Joint Mission Planning System (JMPS). MPS will compress the mission planning cycle by providing an improved integrated planning environment, reducing the time required to respond to changing situations and urgent needs such as striking time sensitive/critical targets and conducting combat search and rescue. MPS products have the potential to support all DoD fixed-wing and rotary wing aircraft and are shared with the selected programs in the Navy. MPS delivers significant benefits to command and control performance by enhancing information superiority for the warfighter and by providing unique capabilities in support of both precision engagement and dominant maneuver.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Mission Planning weapon system capability. The use of such program funds would be used to supplement the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	63.074	71.465	91.934	0.000	91.934
Current President's Budget	61.164	71.465	91.768	0.000	91.768
Total Adjustments	-1.910	0.000	-0.166	0.000	-0.166
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.910	0.000			
• Other Adjustments	0.000	0.000	-0.166	0.000	-0.166

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>				Project (Number/Name) 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675302: <i>Precision Aerial Delivery Systems (PADS)</i>	0.000	9.032	7.021	3.084	0.000	3.084	1.893	1.927	1.960	1.997	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mission planning involves the creation of a flight plan based on multiple inputs including threats, targets, terrain, weather, aircraft performance capability, and configuration. It is an essential task that must be completed prior to any fixed- or rotary wing aircraft sortie. The planner must have the ability to plan weapon, cargo, passenger, and/or fuel delivery, calculate fuel requirement and assess the route based on known enemy threat location and type. Mission planners must be able to optimize and de-conflict flight routes with other aircraft; review, print and brief the plan; download pertinent flight information to on-board aircraft avionics; and, conduct dynamic/in-flight re-planning as applicable.

This project continues the development of a Joint Precision Airdrop System-Mission Planner (JPADS-MP) capability in conjunction with the Army. JPADS provides a planning capability for DoD airdrop requirements. It is the primary airdrop mission planning system for all ballistic airdrop missions as well as precision guided airdrops that are required when the mission profile or surface-to-air threat assessment warrants a high-altitude and/ or standoff precision delivery. It enables high-altitude, precise airdrop delivery to forward ground forces, while mitigating surface-to-air threats, reducing risk of exposure to Improvised Explosive Devices (IEDs) and insurgent attack on ground convoys. JPADS allows the warfighter to consider weather, terrain, aircraft capabilities, threat, and other data to accurately deliver payloads to U.S. and other friendly forces.

Consolidated Airdrop Tool (CAT) is the key JPADS-MP software deliverable. It will increase the accuracy of airdrop mission planning by improving aircraft, payload, and chute specific calculations along with weather analysis visualization tools specifically adapted for airdrop. Future initiatives are designated to achieve automation of airdrop planning and execution to reduce task saturation in the cockpit and support Air Mobility Command's (AMC) objective of moving to a two-man cockpit. These efforts include the ability to automatically receive and use real-time winds in any location, calculation of a release point and airdrop in a single pass, the ability to conduct real-time objective area analysis to calculate probable damage estimates and execute dynamic re-tasking, the ability to conduct post-drop assessments, and the implementation of new technologies (e.g. Service Oriented Architecture (SOA) Touch Screen environment).

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Mission Planning weapon system. The use of such program funds would be used to supplement the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>	Project (Number/Name) 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: JPADS-MP Phase I</p> <p>Description: Continues development of a JPADS capability for precise, high altitude delivery of material to forward ground forces.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue agile development of increased JPADS capability. The goal of quarterly releases are targeted, although specific fielding dates will be worked with the Using Command based on Operational Tempo. Capabilities - Provide precision and conventional airdrop capabilities including but not limited to, Airdrop Damage Estimate (ADE), 3D Hazard and obstruction data for guided delivery system navigation, automation for aircrew in-flight airdrop workflow, Extracted Container Delivery Systems (ExCDS), data services to multiple mission planning devices, and calculations to maximize payload impact success on drop zones. - Continue development of CAT v7.0 (incorporating capabilities from MAJCOM prioritization requirements) <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue the agile development of increased JPADS capability via a new contract for the additional capabilities as directed by the MAJCOM, Navy and other DoD users. This development is for the continued tablet capabilities along with potential C-130 and C-17 data exchange of airdrop weather, navigation and flight performance information. - Will continue the refinement of precision and conventional airdrop capabilities including but not limited to, Airdrop Damage Estimate (ADE), 3D Hazard and obstruction data for guided delivery system navigation, automation for aircrew in-flight airdrop workflow, Extracted Container Delivery Systems (ExCDS), data services to multiple mission planning devices, and calculations to maximize payload impact success on drop zones <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <ul style="list-style-type: none"> - FY21 total requirement for JPADS is \$9.915M. The requested increase is due to incorporation of additional capabilities into the airdrop system. 	9.032	7.021	3.084
Accomplishments/Planned Programs Subtotals	9.032	7.021	3.084

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 833170: <i>Mission Planning Systems</i>	12.092	14.508	15.149	-	15.149	14.892	15.710	17.979	18.308	Continuing	Continuing

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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D. Acquisition Strategy

The MPS PADS efforts are developed and fielded using a variety of contracting instruments. Efforts to accomplish activities such as SAFe Agile software development methodology, systems engineering and integration, training, and support are completed using competitively awarded contracts (e.g. Cost Plus Award Fee (CPAF), Fixed Price (FP)).

Program Management Administration (PMA) contracts are awarded competitively and consist of various types of contracts at various locations. MITRE, a Federally Funded Research and Development Center (FFRDC) contractor, provides technical support via a no fee for service contract. Other efforts are accomplished using Purchase Orders (PO) and Military Interdepartmental Purchase Requests (MIPR).

For the efforts listed above, the Air Force Life Cycle Management Center at Hanscom AFB (AFLCMC/HB) is the Contracting Authority and provides Contracts, Legal, and Comptroller Support.

Air Force Program Executive Officer (PEO) for Digital (AFPEO/BM) is the PEO and Milestone Decision Authority (MDA) for the PADS program.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>	Project (Number/Name) 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPFF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Software Development	C/CPIF	Various : Various	0.000	5.492	Nov 2018	5.115	Nov 2019	1.873	Nov 2020	-		1.873	Continuing	Continuing	-
Systems Engineering and Integration	C/CPAF	Leidos, Inc. : Reston, VA	0.000	1.651	Jan 2019	0.870	Jan 2020	0.175	Jan 2021	-		0.175	Continuing	Continuing	-
Subtotal			0.000	7.143		5.985		2.048		-		2.048	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Cost Estimating	C/T&M	Quantech Services : Lexington, MA	0.000	0.011	Nov 2018	0.015	Nov 2019	0.016	Nov 2020	-		0.016	Continuing	Continuing	-
Subtotal			0.000	0.011		0.015		0.016		-		0.016	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Responsible Test Organization (RTO)	PO	96CTG: Eglin AFB, FL : TBD	0.000	0.364	Dec 2018	0.370	Dec 2019	0.350	Dec 2020	-		0.350	Continuing	Continuing	-
Type I Training	C/FP	Spiral Solutions & Technologies : Bellevue, NE	0.000	-		-		-		-		-	0.000	0.000	-
Subtotal			0.000	0.364		0.370		0.350		-		0.350	Continuing	Continuing	N/A

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>	Project (Number/Name) 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Precision Aerial Delivery Systems (PADS)</i>				
JPADS-MP Rel 7+ CAT Agile Development, Integration, Test, and Release	1	2020	4	2020
JPADS-MP Rel 8+ CAT Agile Development, Integration, Test and Release	1	2021	4	2021
JPADS-MP Rel 9-14+ CAT Agile Development, Integration, Test and Release	1	2022	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>				Project (Number/Name) 675380 / <i>Mission Planning Systems (MPS) Modernization</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675380: <i>Mission Planning Systems (MPS) Modernization</i>	0.000	52.132	64.444	88.684	0.000	88.684	92.057	95.436	95.437	90.304	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mission planning involves the creation of a flight plan based on multiple inputs including threats, targets, terrain, weather, aircraft performance capability, and configuration. It is an essential task that must be completed prior to any fixed- or rotary wing aircraft sortie. The planner must have the ability to plan weapon, cargo, passenger, and/or fuel delivery, calculate fuel requirements, and assess the route based on known enemy threat location and type. Mission planners must be able to optimize and de-conflict flight routes with other aircraft; review, print and brief the plan; download pertinent flight information to on-board aircraft avionics; and, conduct dynamic/in-flight re-planning as applicable. This project focuses on modernizing MPS to support Combat Air Forces (CAF) and Mobility Air Forces (MAF), including the development, test and sustainment of Mission Planning Environments (MPEs) to support the B-1, C-5, C-17, C-130, HC-130, EC-130, E-3, E-8, F-15, , F-22A, KC-10, KC-46, KC-135, RC-135, HH-60 other platforms, Framework (FW) and all Common Component (CCs) software tools for mission requirements. Activities also include studies and analysis to support both current program planning and execution and future program planning. MPS Modernization efforts are as follows:

1) CAF MPS Modernization: These development efforts modernize CAF Mission Planning Environments (MPEs). The modernization effort will provide new and improved mission planning capability for individual Operational Flight Program (OFF) requirements, such as new weapons, avionics upgrades, communications systems, etc. The OFFs requiring MPE updates under the CAF modernization effort include, but are not limited to, B-1 (Sustainment Blocks 15, 16, 16a, 17, 17a and 18), F-15 (Suites 7, 8, 9, 9.1 and 9.2) and F-22 Increments 3.2B, update Release One, Release Two, and Release Three. CAF modernization also includes updates to mission planning capabilities supporting associated weapons including, but not limited to, Small Diameter Bomb (SDB-II), Joint Direct Attack Munitions (JDAM) and the Joint Air-to-Surface Standoff Missile (JASSM). Finally, CAF modernization will address required improvements to CAF related JMPS MPE CCs, including Weapon Planning Software (WPS), Electronic Warfare CC (EWCC), GPS Crypto (including GPS M-code), Weather CC, etc. CAF MPE Modernization includes, but is not limited to, the following platform efforts:

a. F-15 Modernization Phase II & III: This modernization program consists of multiple software development efforts driven by OFF updates for F-15 Suites 7,8,9,9.1, and 9.2. Suite 7-9 MPE capabilities include, but are not limited to, Data Transfer Device (DTD) improvements, updates for new features in weapons such as Joint Direct Attack Munition (JDAM), Small Diameter Bomb I and II (SDB I and II), AIM-9X, AIM-120D, and Network Enable Weapon support elements (e.g. key handling, weapon data link and Link 16). It will also include enhancements to the synthetic aperture radar planning tool (SAR-PT) and the global area reference tool as well as radar modernization updates (e.g. combat identification, radar planning tool enhancements). Development efforts for F-15 Suite 8 include, but are not limited to, integration of B61 Life Extension Program (LEP), feature updates for several weapons, and the expansion of Link-16 messages sets. F-15 Suite 9 MPE will include a variety of updates and enhancements for weapons and aircraft systems to include, but are not limited to, Eagle Passive Active Warning Survivability System (EPAWSS), a new Advanced Dual Core Process II (ADCP-II) computer as well as Digital Transfer Device/Modules (DTD/DTM) modernization.

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<p>b. F-22 Modernization Phase I: The F-22 Modernization program includes OFP-driven software updates v13.1, v14.0, v14.1, and v14.2. These enhancements include, but are not limited to, the addition of improved capabilities for the AIM-9X and AIM-120D, the incorporation of additional electronic protection tasks, combat identification improvements, addition of an Inter-flight Data Link Gateway, Mode 5 IFF and Combat ID updates, Link 16 updates, and incorporation of the synthetic aperture radar planning tool. Additionally, other new and emerging OFP-generated requirements will be addressed as identified by the operational user(s). Other Common Component (CC) updates will also be completed as required.</p> <p>c. B-1 Modernization Phase I: The B-1 Modernization program includes OFP-driven software updates for Releases 7.0, 8.0, 9.0, and 11.0. It will incrementally update the platform MPE and provide updates to the aircraft mission capabilities, including adding sensor anywhere on tactical display, updating threat range rings and route re-planning capabilities, improving Air Coordination Order (ACO) file loading and the memory utilization in the onboard avionics updates. Additionally, it will migrate the B-1 MPE to a native 64-bit environment and utilize Mission Planning Data Service Layers (MPDSL) to modernize the software architecture.</p> <p>d. The platform efforts include work associated with updates to the framework and associated services. Beginning in FY20 the Framework will be broken out as a separate program with a separate funding line.</p> <p>2) MAF MPS Modernization: These development efforts modernize MAF MPEs for the KC-46 aircraft as well as all Air Mobility Command platforms initially fielded under MPS Increment 5. The modernization effort will provide new and improved mission planning capability for individual Operational Flight Program (OFP), Global C2, and AMC fuel efficiency requirements.</p> <p>3) The SMACC Modernization Program includes development, testing, and fielding of MP software for the E-3 DRAGON, E-3/E-8, RC-135 and EC-130. Combat Search and Rescue (CSAR) is providing a new JMPS capability to the HH-60G and MC/HC-130 aircraft. The follow-on versions continue that development.</p> <p>4) MAF Modernization effort builds upon the fielded E-8 MPE to provide new and improved mission planning capabilities for the MAF fleet (e.g. C-5, C-130, KC-10, etc.) as required to meet OFP, fuel efficiency, and global planning net-centric requirements. It includes, but is not limited to, enhanced capabilities to accommodate avionics upgrades, improved communications systems, interfaces with command and control systems, new parachutes, etc. for various MAF platforms. Development efforts also include, but are not limited to, integrating improvements to MAF related Common Components (CCs). Examples of these CCs include, but are not limited to, MAF tools, such as Assault Zone CC and the Air Refueling Tool (ART) CC. CSAR Release 1.1 program began in FY17 modernizing the efforts begun with the CSAR products developed in MPS Inc 5. The CSAR effort will continue modernization via agile development for evolving CSAR requirements.</p> <p>5) Mobility Air Forces Automated Flight Planning Service (MAFPS) Phase Two began in FY17. This effort modernizes the MAFPS products developed in Increment 5. This effort completes the development of a centralized/net-centric global mobility flight planning capability, which will provide significant fuel savings through automated flight route, airspeed, and altitude optimization utilizing aircraft performance, air traffic management, weather, and other data. Additional development includes streamlining the support structure for flight planning to reduce mission planning and execution time while maximizing the time available for enroute aircrew support. Also a , Web-based Global Flight Planning (Web-GFP) modernizes a second MAFPS client, the Global Flight Planning Common Component (GFPCC) which integrates into the Global Mobility Mission Planning Environment (GM MPE) aimed at Unit-level mission and flight planning operations. This client enables GM MPE users with access to the same MAFPS capabilities in order to facilitate fuel and cost efficiencies across the MAF.</p>		

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6) In FY20 the MPS Framework will be established as an independent Program of Record (anticipated as an ACAT III). MPS Framework will be used as a one year pathfinder effort that represents the basic corefunctions of the JMPS software. It rides on SDC compliant Windows OS. The basic services that all programs use (Falconview, Data Load, Route construction, flight planning etc.) are included in the MPS Framework architecture. The Navy utilizes the same basic core MPS Framework software. The funding for the MPS Framework has historically been accomplished through an allocation to the platform mission planning budgets. The programs were based upon the platform OFPs and the fielded software packages (mission planning environments). The program office will segregate MPS Framework for future oversight. MPS FW Framework will be an agile development effort based on services developed in a common development environment. Beginning with the FY21 efforts, MPS Framework will become Core Mission Planning (CMP). This will be a follow-on Program of Record continuing the efforts of MPS Framework.

Test, Training, and Certification: Continues all MPS-related integration, test, and certification activities for all CAF and MAF platforms.

Program Support: Continues all program office management operations and support activities to ensure the timely development, testing, and delivery of mission planning systems to the warfighter.

The platform efforts include work associated with updates to the Framework and associated services.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Mission Planning weapon system capability. The use of such program funds would be used to supplement the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: F-15 Modernization Phase II and III	5.387	8.113	10.406
Description: Continues the modernization of previously fielded F-15 Mission Planning Environments (MPEs) to enable efficient use of new and improved capabilities being developed in platform Operational Flight Programs (OFPs).			
FY 2020 Plans: - Field v5.0 - Field v6.0 - Begin development of v6.1			
FY 2021 Plans:			

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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>	Project (Number/Name) 675380 / <i>Mission Planning Systems (MPS) Modernization</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
- Will complete FQT, DT/OT and Field v6.1				
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to beginning of development of 6.1 in FY20				
Title: F-22 Modernization Phase I and II		7.296	8.690	10.900
Description: Continues the modernization of previously fielded F-22 MPEs to enable efficient use of new and improved capabilities being developed in the OFPs.				
FY 2020 Plans: - Field v14.0 - Will complete FQT of v14.1 - Will complete DT of v14.1 - Will begin development for v14.2				
FY 2021 Plans: - Will continue development of v14.2 - Complete FQT of v14.2 - Complete DT of v14.2 - Begin development of v14.3				
FY 2020 to FY 2021 Increase/Decrease Statement: There is an increase from FY20 to FY21 budgets due to a projected new contract award in FY21				
Title: B-1 Modernization Phase I and II		10.050	10.634	10.104
Description: Continues the modernization of previously fielded B-1 MPEs to enable efficient use of new and improved capabilities being developed in the OFPs.				
FY 2020 Plans: - Continue/complete development of B-1 Rel 11.0 in support of B-1 SB18 OFP requirements.				
FY 2021 Plans: - Field B-1 Rel 11.0 in support of B-1 SB18 OFP requirements. - Begin development of B-1 Rel 12.0 in support of B-1 SB19 OFP requirements.				
FY 2020 to FY 2021 Increase/Decrease Statement:				

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Slight decrease from FY20 to FY21				
<p>Title: MAF Modernization</p> <p>Description: Continues the development, testing, and fielding of the Agile Global Mobility (AGM) effort for the modernization of the JMPS Mission Planning Environment (MPE) for the C-5, C-17, C-130, KC-10, KC 135 and KC-46 to account for changes in aircraft operational flight profiles and Global Command and Control Changes.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue development of AGM for modernized capabilities. Integration/development, testing, and release will be conducted concurrently via agile development with multiple Program Increments (PIs). Each of the PIs provide full and/or interim capabilities made available to the using command for fielding. The goal of quarterly releases are targeted, although specific fielding dates will be worked with Air Mobility Command based on Operational Tempo. The initial release with a Minimum Viable Capability release (MVCR) is projected for Jun 2020. <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Will continue development of follow on AGM releases for modernized capabilities. Integration/development, testing, and release will be conducted concurrently via agile development with multiple Program Increments (PIs). Each of the PIs provide full and/or interim capabilities made available to the using command for fielding. <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <p>Increase due to continued required modernization for the mobility platforms including absorption of the KC-46 into AGM modernization effort.</p>		11.721	15.892	21.533
<p>Title: Special Mission ACC (SMACC)</p> <p>Description: Continues the modernization of previously fielded mission planning software environments for the E-3, E-8, E-4, EC-130, and RC-135. In addition, continues modernization efforts for the Inc 5 follow on for SMACC CSAR and continued modernization for SMACC Combat Search and Rescue (CSAR) component for the HH-60 helicopters and the HC-130J.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Fielding decision of RC-135 V3.4 - Release Recommendation for E-3/E-8 V2.2 - Continue modernization of the E-3 Dragon and EC-130 - Continuation of CSAR-PK modernization <p>FY 2021 Plans:</p>		16.336	16.713	19.390

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>CSAR efforts continue with implementation of evolving capabilities identified during the FY 2020 requirement process. SMACC aircraft will complete the migration from waterfall to agile development with the goal of quarterly releases of capabilities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The increase is due to completion of development for the SMACC RC-135, E-3 Dragon, E-3/E-8 as well as the continued modernization of the SMACC CSAR.</p>				
<p>Title: MPS Framework (FW)</p> <p>Description: MPS Framework is the set of core Mission Planning services that all platforms and common capabilities utilize. It is the bottom layer of the software architecture. It provides the core services such as utilized by both MAF and CAF platforms. MPS FW includes the interfaces required to be integrated into the various platforms and weapons systems as well as addresses data access, services, integrity and real-time operational communication development streamlining sortie generations. Services being developed include Local Points, Mission Folders, and Moving Map.</p> <p>FY 2020 Plans: MPS FW will be classified as a program of record. The MPS FW program will be an agile development effort with service capability releases versus the traditional waterfall major framework releases. Planned services include UCI route management and Mission Planning Parametrics (MPP) as well as efforts to improve quality, security, and automation of data supplied to mission planning systems. FY20 efforts will be aligned under the SAFe Agile construct specifically the Core Mission Planning Agile Release Train (ART).</p> <p>FY 2021 Plans: Will establish a follow-on program of record, known as Core Mission Planning (CMP) at the conclusion of the FY20 Pathfinder development effort. CMP will continue development of services, modernizing from legacy development to micro-services in an Open Mission Systems/Service Oriented Architecture environment and improving quality, security, and automation of data supplied to mission planning systems.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding was realigned to support Framework effort. This is not a New Start.</p>		0.000	4.402	16.322
<p>Title: MAF Automated Flight Planning Service (MAFPS)Phase II</p> <p>Description: Develops a centralized/net-centric global mobility flight planning capability, which will provide significant fuel savings through automated flight route, airspeed, and altitude optimization utilizing aircraft performance, air traffic management, weather, and other data. The Web-based Global Flight Planning (Web-GFP) portion modernizes a second MAFPS client enabling GM MPE users with access to the same MAFPS capabilities in order to facilitate fuel and cost efficiencies across the MAF.</p>		1.342	0.000	0.029

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>FY 2020 Plans:</i> Program will be in sustainment with no more development funding required.			
<i>FY 2021 Plans:</i> Program will be in sustainment with no more development funding required.			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> The decrease reflects the end of development and fielding for the Web-GFP. Moved to sustainment.			
Accomplishments/Planned Programs Subtotals	52.132	64.444	88.684

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Line Item 833170: <i>Mission Planning Systems</i>	8.291	9.300	9.935	-	9.935	9.783	10.583	10.133	10.319	Continuing	Continuing

Remarks

D. Acquisition Strategy

MPS Modernization consists of multiple capability upgrades across multiple platforms that are developed and fielded using a variety of contracting instruments. The Air Force Life Cycle Management Center at Hanscom AFB AFLCMC/HB competitively awarded multiple (Indefinite Delivery/Indefinite Quantities) (ID/IQ) contracts for software development. Currently there are five (5) contractors, one of which is Small Business set aside, who are qualified sources. Each Delivery Order (DO) is competed among the five contractors. Efforts to accomplish program activities such as software development, systems engineering and integration, training, and support are competitively awarded using a variety of contract types (e.g. Cost Plus Award Fee (CPAF), Fixed Price (FP), and Fixed Price Incentive Fee (FPIF)). Program Management Administration (PMA) contracts are awarded competitively and consist of various types of contracts at various locations. Mitre, a Federally Funded Research and Development Center (FFRDC) contractor provides technical support on a no fee for service contract. Other efforts are accomplished via Purchase Orders (PO) and Military Interdepartmental Purchase Requests (MIPR). For the efforts listed above, the Air Force Life Cycle Management Center at Hanscom AFB (AFLCMC/HB) provides the program management, contracts, legal, and financial management support. The Air Force Program Executive Officer (PEO) for Digital (AFPEO/HB) is the Milestone Decision Authority (MDA) for all MPS Modernization projects. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Mission Planning Software Development (MPEC II)	C/Various	Various : Various	0.000	10.698	Nov 2018	16.075	Nov 2019	23.146	Nov 2020	-		23.146	Continuing	Continuing	-
A-10 Modernization	PO	Organic : Hill AFB, UT	0.000	-		-		-		-		-	0.000	0.000	-
F-16 Modernization	PO	Organic : Hill AFB, UT	0.000	-		-		-		-		-	0.000	0.000	-
EC-130H Modernization	PO	Organic : Robins AFB, GA	0.000	1.121	Jan 2019	0.775	Jan 2020	0.850	Jan 2021	-		0.850	Continuing	Continuing	-
F-22 MilCloud SIL	MIPR	GSA : Washington, DC	0.000	-		-		-		-		-	0.000	0.000	-
MAF AMC Transition Tools	MIPR	AMCOM : Redstone Arsenal, AL	0.000	-		-		-		-		-	0.000	0.000	-
SMACC CSAR Tools	MIPR	Various : Various	0.000	0.563	Jan 2019	0.514	Jan 2020	0.529	Jan 2021	-		0.529	Continuing	Continuing	-
Systems Engineering and Integration	C/CPAF	Leidos, Inc. : Reston, VA	0.000	9.637	Jan 2019	10.178	Jan 2020	10.484	Jan 2021	-		10.484	Continuing	Continuing	-
Framework	C/FPIF	Northrop Grumman : Herndon, VA	0.000	6.907	Jan 2019	10.479	Jan 2020	15.490	Jan 2021	-		15.490	Continuing	Continuing	-
Common Components	C/Various	Various : Various	0.000	6.333	Nov 2018	8.046	Nov 2019	15.395	Nov 2020	-		15.395	Continuing	Continuing	-
Subtotal			0.000	35.259		46.067		65.894		-		65.894	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Software Engineering	C/T&M	SEI : Pittsburgh, PA	0.000	0.055	Jul 2019	-		-		-		-	0.000	0.055	0.080
Cost Estimating	C/T&M	Tecolote Inc : Goleta, CA	0.000	0.079	Nov 2018	0.140	Nov 2019	0.145	Nov 2020	-		0.145	Continuing	Continuing	-
Subtotal			0.000	0.134		0.140		0.145		-		0.145	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Responsible Test Organization (RTO)	PO	96CTG : Eglin AFB, FL	0.000	4.115	Dec 2018	4.126	Dec 2019	4.511	Dec 2020	-		4.511	Continuing	Continuing	-
Certification and Accreditation	MIPR	JITC : Fort Huachuca, AZ	0.000	0.089	Feb 2019	0.089	Feb 2020	0.092	Feb 2021	-		0.092	Continuing	Continuing	-
Type I Training	C/FP	Summit Technologies Inc : Winter Park, FL	0.000	0.903	Jul 2019	1.545	Jul 2020	1.825	Jul 2021	-		1.825	Continuing	Continuing	-
Field Representative Hardware	C/Various	Various : Various	0.000	0.300	Nov 2018	0.302	Nov 2019	0.374	Nov 2020	-		0.374	Continuing	Continuing	-
Subtotal			0.000	5.407		6.062		6.802		-		6.802	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Engineering and Technical Support	RO	MITRE Corp : Bedford, MA	0.000	3.310	Oct 2018	3.254	Oct 2018	3.702	Oct 2020	-		3.702	Continuing	Continuing	-
Program Management Administration	Various	Various : Various	0.000	8.022	Nov 2018	8.921	Nov 2019	12.141	Nov 2020	-		12.141	Continuing	Continuing	-
Subtotal			0.000	11.332		12.175		15.843		-		15.843	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	52.132	64.444	88.684	-	88.684	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Mission Planning Systems (MPS) Modernization</i>				
F-15 v4.2 Fielding	1	2019	1	2019
F-15 v5.0 Fielding	2	2020	2	2020
F-15 v6.0 Fielding	3	2020	4	2020
F-15 v6.1 Fielding	3	2021	3	2021
F-22 v13.1 Fielding	4	2019	4	2019
F-22 v14.0 Fielding	2	2020	2	2020
F-22 v14.1 Fielding	2	2021	2	2021
F-22 v14.2 Fielding	2	2022	2	2022
B-1 Release 11 Fielding	3	2021	3	2021
CAF Modernization Continued Integration, Test, and Fielding	3	2020	4	2024
MAF Modernization continued Integration, Test, and Fielding	1	2020	4	2025
SMACC E-3/E8 Release 2.2 Fielding	4	2020	4	2020
SMACC EC-130H Release 2.3-2.7 Fielding	1	2022	4	2025
SMACC EC-130H Release 2.1 Fielding	3	2020	3	2020
SMACC EC-130H Release 3.0 Fielding	2	2021	2	2021
SMACC EC-130H Release 3.1-3.6 Fielding	1	2022	4	2025
SMACC E-3 DRAGON Release 3.1 Fielding	4	2020	4	2020
SMACCE-3 DRAGON Release 3.2-3.5 Fielding	1	2022	4	2025
SMACC RC-135 Release 3.4 Fielding	2	2020	3	2020
SMACC RC-135 Release 3.5 Fielding	3	2021	3	2021
SMACC RC-135 Release 3.6-4.0 Fielding	1	2022	4	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208006F / <i>Mission Planning Systems</i>	Project (Number/Name) 675380 / <i>Mission Planning Systems (MPS) Modernization</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CSAR-Pedro King (HH-60G/HC-130J) Rel 1.1.7-2.0	1	2020	4	2020
CSAR-Pedro King(HH-60G/HC-130J) Rel 2.0+	1	2021	4	2021
CSAR-Pedro King(HH-60G/HC-130j) Rel 2.1-3.2+	1	2022	4	2025
Agile Global Mobility (AGM) Rel 1.0.400-2.0	2	2020	4	2020
Agile Global Mobility (AGM) Rel 3.0-3.4	1	2021	4	2021
Agile Global Mobility (AGM) 4.0-8.0	1	2022	4	2025
MAFPS Release 2 Fielding	2	2019	2	2019
MAFPS Rel 2 Web-GFP Agile Development, Integration, Test, and Release	4	2019	3	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208007F / <i>Tactical Deception</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	6.687	7.446	2.370	0.000	2.370	0.496	0.505	0.514	0.523	Continuing	Continuing
674550: <i>Air Base Resiliency</i>	-	6.687	7.446	2.370	0.000	2.370	0.496	0.505	0.514	0.523	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Military Deceptions mission is to execute actions to deliberately mislead adversary military, paramilitary, or violent extremist organization decision makers, thereby causing the adversary to take specific actions (or inactions) that will contribute to the accomplishment of the friendly mission.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	6.949	7.446	3.474	0.000	3.474
Current President's Budget	6.687	7.446	2.370	0.000	2.370
Total Adjustments	-0.262	0.000	-1.104	0.000	-1.104
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.254	0.000			
• Other Adjustments	-0.008	0.000	-1.104	0.000	-1.104

C. Accomplishments/Planned Programs (\$ in Millions)

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>
Title: Non-Kinetic Air Base Defense	6.687	7.446	2.370
Description: Provide non-kinetic air base defense capabilities to include military and civilian personnel to support planning, concept development, experimentation, and operational employment of emerging air base defense capabilities.			
FY 2020 Plans: needed to meet reqts			
FY 2021 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208007F / <i>Tactical Deception</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Non-kinetic Air Base Defense			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Decreased contract award value.			
Accomplishments/Planned Programs Subtotals	6.687	7.446	2.370

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208007F / <i>Tactical Deception</i>	Project (Number/Name) 674550 / <i>Air Base Resiliency</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Non-Kinetic Air Base Defense Development</i>	
Non-Kinetic Defense Development	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208007F / <i>Tactical Deception</i>	Project (Number/Name) 674550 / <i>Air Base Resiliency</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Non-Kinetic Air Base Defense Development</i>				
Non-Kinetic Defense Development	2	2020	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208064F / <i>OPERATIONAL HQ - CYBER</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	7.602	5.527	0.000	5.527	2.263	2.303	14.781	0.000	Continuing	Continuing
676002: <i>Cyber Systems Modernization</i>	-	0.000	7.602	5.527	0.000	5.527	2.263	2.303	14.781	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Cyber Command and Control Mission System (C3MS) Mission Description: Provides the AFCYBER Commander with the tools necessary to effectively and efficiently plan, monitor, and execute missions in the cyber domain. This includes development and dissemination of Cyberspace Tasking Orders to ensure commander's intent is supported through the application of cyber forces using the latest intelligence. C3MS provides a common operational picture to maintain cyberspace threat activities and integrates cyberspace indications and warnings, analysis, and other actionable intelligence products into overall situational awareness, planning, and execution.

C3MS will continue modernization efforts based on a backlog of validated requirements to automate battle management capabilities and provide comprehensive cyber situational awareness. Developmental Activities include: machine-to-machine interfaces to dynamically interoperate with Air Operations Center (AOC) systems in order to quickly facilitate collaboration and mutual situational awareness; capabilities to present weapon system operators with force location, mission, effect, and linked information including a standardized, dynamic, map-based, situational awareness interface to display, manipulate, and manage units, missions, network elements, and effects; and multi-level security capabilities to support full-spectrum operations.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver C3MS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

In CY OPERATIONAL HQ - CYBER was a new start.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208064F / OPERATIONAL HQ - CYBER
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	7.602	5.537	0.000	5.537
Current President's Budget	0.000	7.602	5.527	0.000	5.527
Total Adjustments	0.000	0.000	-0.010	0.000	-0.010
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.010	0.000	-0.010

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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Title: Cyber Command and Control Mission System (C3MS) Modernization

Description: Perform development activities to automate processes and ingest & visualize data in support of Air Force specific cyber command and control requirements. Funding includes agile/continuous software development, test, and evaluation as well as support for architecture and modeling.

FY 2020 Plans:

- Develop automated battle management processes to define and provide cyber situational awareness to improve Air Force cyber command and control.
- Develop multi-level security capabilities.
- Develop man-to-machine interface to dynamically interoperate with Air Operations Center (AOC) systems.
- Develop visualization tools for force location, mission, effect, and linked information.

FY 2021 Plans:

- Will continue development of automated battle management processes to define and provide cyber situational awareness to improve Air Force cyber command and control.
- Will continue development of multi-level security capabilities.

0.000	7.602	5.527
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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208064F / OPERATIONAL HQ - CYBER
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
- Will continue development of man-to-machine interface to dynamically interoperate with Air Operations Center (AOC) systems.			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding decreased from initial start up to stabilized software development activities.			
Accomplishments/Planned Programs Subtotals	0.000	7.602	5.527

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 831010: <i>Comsec Equipment</i>	11.705	5.113	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.818
• OPAF 03 834320: <i>C3 Countermeasures</i>	0.000	0.000	4.794	-	4.794	4.935	5.021	17.557	0.000	0.000	32.307

Remarks
Beginning in FY21 associated OPAF realigned from COMSEC Equipment WSC to C3 Countermeasures WSC for clarity in reporting.

E. Acquisition Strategy
The Cyber Command and Control Mission System (C3MS) weapon system program office will lead development of new capabilities to provide automated battle management capabilities to plan, monitor, and execute missions in the cyber domain. The program office will develop solutions based on a backlog of validated requirements. To meet these requirements, the C3MS program office will utilize various contractual vehicles when necessary, such as Government-Wide Acquisition Contract, Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV, and General Services Administration Federal Supply Schedules, Network-Centric Solutions and competitive contract (if required). The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that will be able to meet emerging requirements related to Air Force Cyber Command and Control.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208064F / OPERATIONAL HQ - CYBER	Project (Number/Name) 676002 / Cyber Systems Modernization
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C3MS Software Development	Various	Multiple : Various	-	-		6.202	Jan 2020	4.211	Jan 2021	-		4.211	Continuing	Continuing	-
Subtotal			-	-		6.202		4.211		-		4.211	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C3MS Architecture and Modeling Support	Various	FFRDC : JBSA	-	-		1.000	Jan 2020	1.000	Jan 2021	-		1.000	Continuing	Continuing	-
Subtotal			-	-		1.000		1.000		-		1.000	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C3MS Software Test and Evaluation	Various	Multiple : Various	-	-		0.400	Apr 2020	0.316	Apr 2021	-		0.316	Continuing	Continuing	-
Subtotal			-	-		0.400		0.316		-		0.316	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	7.602	5.527	-	5.527	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208064F / OPERATIONAL HQ - CYBER	Project (Number/Name) 676002 / Cyber Systems Modernization

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Automated Battle Management and Cyber SA	
Architecture and Modeling Support	
Software Development	
Test and Evaluation	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208064F / OPERATIONAL HQ - CYBER	Project (Number/Name) 676002 / Cyber Systems Modernization

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Automated Battle Management and Cyber SA</i>				
Architecture and Modeling Support	2	2020	4	2025
Software Development	2	2020	4	2025
Test and Evaluation	3	2020	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	38.857	35.178	68.279	0.000	68.279	105.450	91.132	110.688	94.795	Continuing	Continuing
670375: <i>Network Warfare Systems and Support</i>	-	38.857	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	38.857
674540: <i>Cyber Tech Products - Payloads</i>	-	0.000	6.615	44.351	0.000	44.351	42.987	44.496	43.718	42.671	Continuing	Continuing
674541: <i>Cyber Tech Projects - Platforms</i>	-	0.000	10.054	8.378	0.000	8.378	31.598	22.706	32.480	25.007	Continuing	Continuing
674542: <i>Cyber Tech Projects - Access/Infrastructure</i>	-	0.000	18.509	15.550	0.000	15.550	30.865	23.930	34.490	27.117	Continuing	Continuing

Note
In FY2021, PE 0305251F, Cyberspace Operations Forces and Force Support, Project 646008, US Cyber Command Technology Development efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674540, Cyber Tech Products - Payloads, to consolidate prototyping and development of cyber payload capabilities.

A. Mission Description and Budget Item Justification
Distributed Cyber Warfare Operations (DCWO) provides advanced offensive cyber warfare capabilities to the 16th Air Force in direct support of US Cyber Command (USCYBERCOM), AF Major Commands (MAJCOMs), unified commands, and national agency cyber warfighting requirements. DCWO efforts directly support the Joint Network Attack Initial Capabilities Document (ICD), the National Military Strategy for Cyberspace Operations (NMS-CO), Department of Defense Cyber Strategy, USCYBERCOM operational directives, MAJCOM directive and guidance documentation, and other formal requirements documents in the delivery of offensive cyber effects.

Activities within the DCWO deliver operations-ready cyberspace superiority capabilities through the research, development, testing, evaluation, accelerated prototyping, demonstration, and fielding of advanced offensive cyber technologies and capabilities. The ongoing development of peculiar support equipment, facilities, operations, fielding, maintenance, and logistical support of fielded systems permits the rapid adaptation of current cyber capabilities to capitalize on emerging opportunities and mitigate adversary actions. This portfolio of capabilities permits Combatant Commanders the ability to operate in and through cyberspace to manipulate, disrupt, deny, degrade, or destroy targeted computers, information systems, or networks, and actively gather information from computers, information systems, and networks.

DCWO effectiveness comes from balancing three modular and interoperable elements necessary for the successful presentation of offensive cyber capabilities: Platforms, Access/Infrastructure, and Payloads. When unified, these three elements combine to form a cyber mission thread capable of delivering cyber effects to Combatant Commanders, to include cyber operational preparation of the environment, offensive counter-cyber, cyber-attack, electronic warfare operations, mission

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>
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planning, intelligence, cybersecurity products and services and Command and Control/Situational Awareness (C2SA) tools needed to attack enemy networks, telephony, Integrated Air Defense Systems (IADS), command and control systems, and create cyber effects through the Electromagnetic Spectrum (EMS).

Efforts within DCWO may include the expedited development of innovative solutions for existing and emerging technologies required for the continued superiority within the cyber domain.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Distributed Cyber Warfare Operations weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

The FY 2021 funding request was reduced by \$3.215 million to account for the availability of prior year execution balances.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	40.168	35.178	33.620	0.000	33.620
Current President's Budget	38.857	35.178	68.279	0.000	68.279
Total Adjustments	-1.311	0.000	34.659	0.000	34.659
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.311	0.000			
• Other Adjustments	0.000	0.000	34.659	0.000	34.659

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>			Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>				
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
670375: <i>Network Warfare Systems and Support</i>	-	38.857	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	38.857
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY20, PE 0208087F, Distributed Cyber Warfare Operations, Project 670375, Network Warfare Systems and Support efforts were distributed to PE 0208087F, Distributed Cyber Warfare Operations, Project 674540, Cyber Tech Projects - Payloads, Project 674541, Platforms, and Project 674542, Cyber Tech Projects - Access/Infrastructure, to provide additional clarity and structure to the Distributed Cyber Warfare Operations portfolio.

A. Mission Description and Budget Item Justification

Distributed Cyber Warfare Operations (DCWO) conducts Research, Development, Testing and Evaluation (RDT&E) leading to operations-ready cyberspace superiority capabilities including the transition of efforts from laboratory, industry, and academia via studies, accelerated prototyping, and technology demonstrations. DCWO consists of a portfolio of programs and projects providing the rapid acquisition of operational cyber capabilities. DCWO effectiveness comes from balancing funding among three capability thrust areas required for cyber warfare operations: Air Force Platforms, Access and Payloads. The DCWO portfolio provides capabilities by combining these three areas to provide cyber effects to Combatant Commanders.

Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Platforms	22.920	0.000	0.000	0.000	0.000
<p>Description: The Cyber Mission Platform (CMP) program is an ACAT III program of record that provides a modular, configurable framework for Cyber Operations. The CMP framework is currently being applied to offensive cyber operations and may also be applied to defensive cyber operations in the future as prioritized by CMP stakeholders. CMP uses an Agile acquisition strategy that allows the USAF to dynamically prioritize the delivery of operational capabilities. CMP develops capability enhancements on a regular cadence and delivers them to operations based on operational need and acceptance timelines. The platform major thrust also includes platform integration development activities necessary to integrate CMP into DCWO mission threads.</p> <p>- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.</p> <p>FY 2020 Plans:</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Refer to Project Number 674541. -FY19 last year to use Project# 670375. Project# 670375 transition to New Project# 674541 starting FY20.</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>					
<p>Title: Access</p> <p>Description: The Access capability provides connectivity and required infrastructure by leveraging industry and other Government/non-Government mission partners' applications and programs.</p> <p>- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.</p> <p>FY 2020 Plans: Refer to Project Number 674542. -FY19 last year to use Project# 670375. Project# 670375 transition to New Project# 674542 starting FY20.</p> <p>FY 2021 Base Plans: N/A</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>	7.869	0.000	0.000	0.000	0.000
<p>Title: Payloads</p> <p>Description: The payloads capability develops and fields cyber tools and payloads leveraging industry and other Government/non-Government mission partnered applications and programs.</p>	8.068	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.					
<i>FY 2020 Plans:</i> Refer to Project Number 674540. -FY19 last year to use Project# 670375. Project# 670375 transition to New Project# 674540 starting FY20.					
<i>FY 2021 Base Plans:</i> N/A					
<i>FY 2021 OCO Plans:</i> N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A					
Accomplishments/Planned Programs Subtotals	38.857	0.000	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Line Item 831010: <i>COMSEC Equipment</i>	0.070	2.790	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.860
• OPAF 03 Line Item 834320: <i>C3 Countermeasures</i>	25.947	25.036	18.782	-	18.782	29.022	23.323	38.538	39.079	Continuing	Continuing

Remarks
In FY21, all OPAF funds for the DCWO portfolio have been consolidated to Line Item 834320.

D. Acquisition Strategy
The Distributed Cyber Warfare Operations program office will utilize Concept, Development, Risk Management, Production, or Deployment Plans as part of a streamlined approach to acquisition planning. All plans will contain sufficient information for the Milestone Decision Authority (MDA) to determine readiness to enter into the applicable phase of the acquisition process. Distributed Cyber Warfare Operations will utilize both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV)), and General Services Administration (GSA) Federal Supply Schedules and a Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet many requirements related to Offensive Cyberspace Operations. These multiple-award

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>

contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA), which requires a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Platform	Various	Various : Various	-	20.145	Nov 2018	-		-		-		-	0.000	20.145	-
Access/Infrastructure	Various	Various : Various	-	4.976	Jan 2019	-		-		-		-	0.000	4.976	-
Payloads	Various	Various : Various	-	5.749	Jan 2019	-		-		-		-	0.000	5.749	-
Subtotal			-	30.870		-		-		-		-	0.000	30.870	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Platforms	MIPR	47 CTS : San Antonio, TX	-	0.694	Dec 2018	-		-		-		-	0.000	0.694	-
Access/Infrastructure	MIPR	47 CTS : San Antonio, TX	-	0.407	Dec 2018	-		-		-		-	0.000	0.407	-
Payloads	MIPR	Various : San Antonio, TX	-	0.000		-		-		-		-	0.000	0.000	-
Subtotal			-	1.101		-		-		-		-	0.000	1.101	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PSC - Advisory & Assistance Services (A&AS & FFRDC Support) - Platforms	C/Various	Various : San Antonio, TX	-	2.081	Oct 2018	-		-		-		-	0.000	2.081	-
PSC - Acquisition Support - Access	C/Various	Various : San Antonio, TX	-	2.486	Oct 2018	-		-		-		-	0.000	2.486	-
PSC - Engineering & Technical Assistance Support Services (ETASS & FFRDC) - Payloads	C/FFP	Various : San Antonio, TX	-	2.319	Apr 2018	-		-		-		-	0.000	2.319	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Platform																												
CMP Development Increment 2																												
Platform Integration																												
Access																												
AF Unique Access																												
Next-Gen OCO WS																												
DCWO Infrastructure Development																												
Payloads																												
Payload Development																												
Corner Series Development																												
Tools Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 670375 / <i>Network Warfare Systems and Support</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Platform				
CMP Development Increment 2	1	2019	4	2019
Platform Integration	2	2019	4	2019
Access				
AF Unique Access	1	2019	4	2019
Next-Gen OCO WS	1	2019	4	2019
DCWO Infrastructure Development	1	2019	4	2019
Payloads				
Payload Development	1	2019	4	2019
Corner Series Development	1	2019	4	2019
Tools Development	1	2019	4	2019

Note

Starting in FY 2020, future projects are broken out under each respective BPAC:

- 674540: Payloads
- 674541: Platforms
- 674542: Access/Infrastructure

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				Project (Number/Name) 674540 / <i>Cyber Tech Products - Payloads</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674540: <i>Cyber Tech Products - Payloads</i>	-	0.000	6.615	44.351	0.000	44.351	42.987	44.496	43.718	42.671	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2020, PE 0208087F, Distributed Cyber Warfare Operations, Project 670375, Network Warfare Systems and Support payload efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674540, Cyber Tech Projects - Payloads, to provide additional clarity and structure to the Distributed Cyber Warfare Operations portfolio.

In FY2021, PE 0305251F, Cyberspace Operations Forces and Force Support, Project 646008, US Cyber Command Technology Development efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674540, Cyber Tech Products - Payloads, to consolidate prototyping and development of cyber payload capabilities.

A. Mission Description and Budget Item Justification

Distributed Cyber Warfare Operations (DCWO) conducts Research, Development, Testing and Evaluation (RDT&E) leading to operations-ready cyberspace superiority capabilities including the transition of efforts from laboratory, industry, and academia via studies, accelerated prototyping, and technology demonstrations. DCWO consists of a portfolio of programs and projects providing the rapid acquisition of operational cyber capabilities. DCWO effectiveness comes from balancing funding among three capability thrust areas required for cyber warfare operations: Air Force Platforms, Access and Payloads. The DCWO portfolio provides capabilities by combining these three areas to provide cyber effects to Combatant Commanders. Cyber payload capabilities and foundational tools are required to deliver cyber effects through the DCWO platform and access.

The payloads capability develops and fields cyber tools and payloads leveraging industry and other Government/non-Government mission partnered applications and programs.

Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Payloads	0.000	6.615	44.351	0.000	44.351
Description: The payloads capability develops and fields cyber tools and payloads leveraging industry and other Government/non-Government mission partnered applications and programs.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674540 / <i>Cyber Tech Products - Payloads</i>

B. Accomplishments/Planned Programs (\$ in Millions)

Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.

FY 2020 Plans:

- Continue the development of cyber tools and payloads by leveraging industry and other government/non-Government mission partnered developed applications and programs.
- Continue the development and transition of cyber tool and payload quick reaction capabilities for current and next-generation DCWO weapon systems supporting requirements from DCWO Mission Threads.
- Expand USCYBERCOM-funded efforts to produce prioritized family of foundational tools.
- Develop additional tool development software teams.
- Transition and integrate available prototype tool kits to DCWO portfolio.
- Deliver prototype tools into USCYBERCOM architecture to ensure interoperability.
- Develop automated testing and information assurance support tools.

FY 2021 Base Plans:

- Will continue the development of cyber tools and payloads by leveraging industry and other government/non-Government mission partnered developed applications and programs.
- Will continue the development and transition of cyber tool and payload quick reaction capabilities for current and next-generation DCWO weapon systems supporting requirements from DCWO Mission Threads.
- Will continue to expand USCYBERCOM-funded efforts to produce prioritized family of foundational tools.
- Will continue to develop additional tool development software teams.
- Will continue to transition and integrate available prototype tool kits to DCWO portfolio.

FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674540 / <i>Cyber Tech Products - Payloads</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Will continue to deliver prototype tools into USCYBERCOM architecture to ensure interoperability.					
- Will continue to develop automated testing and information assurance support tools.					
<i>FY 2021 OCO Plans:</i> N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> -Funding increase due to consolidation of Cyber Mission forces (CMF) Foundational Tools requirements from PE 0305251F.					
Accomplishments/Planned Programs Subtotals	0.000	6.615	44.351	0.000	44.351

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 831010: <i>COMSEC Equipment</i>	0.070	2.790	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.860
• OPAF 03 Line Item 834320: <i>C3 Countermeasures</i>	25.947	25.036	18.782	-	18.782	29.022	23.323	38.538	39.079	Continuing	Continuing

Remarks
In FY21, all OPAF funds for the DCWO portfolio have been consolidated to Line Item 834320.

D. Acquisition Strategy
The Distributed Cyber Warfare Operations program office will utilize Concept, Development, Risk Management, Production, or Deployment Plans as part of a streamlined approach to acquisition planning. All plans will contain sufficient information for the Milestone Decision Authority (MDA) to determine readiness to enter into the applicable phase of the acquisition process. Distributed Cyber Warfare Operations will utilize both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV)), and General Services Administration (GSA) Federal Supply Schedules and a Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet many requirements related to Offensive Cyberspace Operations. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA), which requires a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674540 / <i>Cyber Tech Products - Payloads</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Payload Development	Various	Various : Various	-	-		4.346	Nov 2019	4.738	Oct 2020	-		4.738	Continuing	Continuing	-
CMF Foundational Tool Development	Various	Various : Various	-	-		-		27.284	Oct 2020	-		27.284	Continuing	Continuing	-
CMF Interoperability Development	Various	Various : Various	-	-		-		3.800	Nov 2020	-		3.800	Continuing	Continuing	-
CMF Automated Test Development	Various	Various : Various	-	-		-		3.700	Oct 2020	-		3.700	Continuing	Continuing	-
Subtotal			-	-		4.346		39.522		-		39.522	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Payload Test and Evaluation	MIPR	47 CTS : San Antonio, TX	-	-		0.200	Dec 2019	0.154	Dec 2020	-		0.154	Continuing	Continuing	-
CMF Foundational Tool Testing	MIPR	47 CTS : San Antonio, TX	-	-		-		0.600	Oct 2020	-		0.600	Continuing	Continuing	-
Subtotal			-	-		0.200		0.754		-		0.754	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PSC - Engineering & Technical Assistance Support Services (Various)	C/FFP	Various : San Antonio, TX	-	-		2.069	Apr 2020	2.218	Oct 2020	-		2.218	Continuing	Continuing	-
CMF Foundational Tool PSC (A&AS, FFRDC)	C/Various	Various : Various	-	-		-		1.857	Oct 2020	-		1.857	Continuing	Continuing	-
Subtotal			-	-		2.069		4.075		-		4.075	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674540 / <i>Cyber Tech Products - Payloads</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Payload Development</i>																												
Payloads Development																												
Corner Series Development																												
Tools Development																												
CMF Foundational Tool Development																												
CMF Interoperability Development																												
CMF Automated Test Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674540 / <i>Cyber Tech Products - Payloads</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Payload Development</i>				
Payloads Development	1	2020	4	2025
Corner Series Development	1	2020	4	2025
Tools Development	1	2020	4	2025
CMF Foundational Tool Development	1	2021	4	2025
CMF Interoperability Development	1	2021	4	2022
CMF Automated Test Development	1	2021	4	2022

Note

Corner Series develops payloads against a specific series of targets. These aspects are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				Project (Number/Name) 674541 / <i>Cyber Tech Projects - Platforms</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674541: <i>Cyber Tech Projects - Platforms</i>	-	0.000	10.054	8.378	0.000	8.378	31.598	22.706	32.480	25.007	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2020, PE 0208087F, Distributed Cyber Warfare Operations, Project 670375, Network Warfare Systems and Support platform efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674541, Platforms, to provides additional clarity and structure to the Distributed Cyber Warfare Operations portfolio.

A. Mission Description and Budget Item Justification

DCWO conducts Research, Development, Testing and Evaluation (RDT&E) leading to operations-ready cyberspace superiority capabilities including the transition of efforts from laboratory, industry, and academia via studies, accelerated prototyping, and technology demonstrations. DCWO consists of a portfolio of programs and projects providing the rapid acquisition of operational cyber capabilities. DCWO effectiveness comes from balancing funding among three capability thrust areas required for cyber warfare operations: Air Force Platforms, Access and Payloads. The DCWO portfolio provides capabilities by combining these three areas to provide cyber effects to Combatant Commanders. Cyber platforms serve as the primary operator interface in the DCWO portfolio and projects encompass hardware and software development.

The platform capability provides user interface and controls by leveraging industry and other Government/non-Government mission partners' applications and programs.

Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Platforms	0.000	10.054	8.378	0.000	8.378
Description: The Cyber Mission Platform (CMP) program is an ACAT III program of record that provides a modular, configurable framework for Cyber Operations. The CMP framework is currently being applied to offensive cyber operations and may also be applied to defensive cyber operations in the future as prioritized by CMP stakeholders. CMP uses an Agile acquisition strategy that allows the USAF to dynamically prioritize the delivery of operational capabilities. CMP develops capability enhancements on a regular cadence and delivers them to operations based on operational need and acceptance timelines. The platform project also includes platform integration development activities necessary to integrate CMP into DCWO mission threads.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674541 / <i>Cyber Tech Projects - Platforms</i>

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.					
FY 2020 Plans: - Continue enhancements to the CMP Platform to satisfy prioritized requirements from USAF Offensive Cyber Operations Mission Threads. - Execute an approved FY18 NDAA Pilot Program for Agile Software Development.					
FY 2021 Base Plans: - Will continue enhancements to the CMP Platform to satisfy prioritized requirements from USAF Distributed Cyber Warfare Operations Mission Threads. - Will continue to conduct delta accreditation and fielding of updated CMP software. - Will continue to execute a continuous delivery program structure.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: - Funding decreased to address other USAF priorities.					
Accomplishments/Planned Programs Subtotals	0.000	10.054	8.378	0.000	8.378

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

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Line Item 831010: <i>COMSEC Equipment</i>	0.070	2.790	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.860
• OPAF 03 Line Item 834320: <i>C3 Countermeasures</i>	25.947	25.036	18.782	-	18.782	29.022	23.323	38.538	39.079	Continuing	Continuing

Remarks

In FY21, all OPAF funds for the DCWO portfolio have been consolidated to Line Item 834320.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674541 / <i>Cyber Tech Projects - Platforms</i>

D. Acquisition Strategy

The Distributed Cyber Warfare Operations program office will utilize Concept, Development, Risk Management, Production, or Deployment Plans as part of a streamlined approach to acquisition planning. All plans will contain sufficient information for the Milestone Decision Authority (MDA) to determine readiness to enter into the applicable phase of the acquisition process. Distributed Cyber Warfare Operations will utilize both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV)), and General Services Administration (GSA) Federal Supply Schedules and a Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet many requirements related to Offensive Cyberspace Operations. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA), which requires a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674541 / <i>Cyber Tech Projects - Platforms</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Platform Development	C/Various	Various : Various	-	-		6.969	Nov 2019	4.303	Nov 2020	-		4.303	Continuing	Continuing	-
Subtotal			-	-		6.969		4.303		-		4.303	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Platform Test and Evaluation	MIPR	47 CTS : San Antonio, TX	-	-		0.750	Dec 2019	0.150	Dec 2020	-		0.150	Continuing	Continuing	-
Subtotal			-	-		0.750		0.150		-		0.150	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PSC - Advisory & Assistance Services (A&AS & FFRDC Support)	C/Various	Various : San Antonio, TX	-	-		2.335	Oct 2019	3.925	Oct 2020	-		3.925	Continuing	Continuing	-
Subtotal			-	-		2.335		3.925		-		3.925	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	10.054	8.378	-	8.378	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674541 / <i>Cyber Tech Projects - Platforms</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Platform Development: CMP	
CMP Program (Incrementally Delivered Each Quarter)	
Platform Integration: NEPTUNE SHIELD	
NEPTUNE SHIELD (Incrementally Delivered Each Quarter)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674541 / <i>Cyber Tech Projects - Platforms</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Platform Development: CMP				
CMP Program (Incrementally Delivered Each Quarter)	1	2020	4	2025
Platform Integration: NEPTUNE SHIELD				
NEPTUNE SHIELD (Incrementally Delivered Each Quarter)	1	2020	4	2025

Note

Each project delivers increments on a quarterly frequency. Increments 4 thru 11 are planned through FY 2021.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				Project (Number/Name) 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
674542: <i>Cyber Tech Projects - Access/Infrastructure</i>	-	0.000	18.509	15.550	0.000	15.550	30.865	23.930	34.490	27.117	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY20, PE 0208087F, Distributed Cyber Warfare Operations, Project 670375, Network Warfare Systems and Support access and infrastructure efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674542, Cyber Tech Projects - Access/Infrastructure, to provide additional clarity and structure to the Distributed Cyber Warfare Operations portfolio.

A. Mission Description and Budget Item Justification

Distributed Cyber Warfare Operations (DCWO) conducts Research, Development, Testing and Evaluation (RDT&E) leading to operations-ready cyberspace superiority capabilities including the transition of efforts from laboratory, industry, and academia via studies, accelerated prototyping, and technology demonstrations. DCWO consists of a portfolio of programs and projects providing the rapid acquisition of operational cyber capabilities. DCWO effectiveness comes from balancing funding among three capability thrust areas required for cyber warfare operations: Air Force Platforms, Access and Payloads. The DCWO portfolio provides capabilities by combining these three areas to provide cyber effects to Combatant Commanders. Cyber access capabilities enables a variety of DCWO missions and projects encompass hardware and software development.

The Access capability provides connectivity and required infrastructure by leveraging industry and other Government/non-Government mission partners' applications and programs.

Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Access	0.000	18.509	15.550	0.000	15.550
Description: The Access capability provides connectivity and required infrastructure by leveraging industry and other Government/non-Government mission partners' applications and programs.					
- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Continue to develop Air Force unique connectivity and required infrastructures across multiple spectrums leveraging industry and other Government/non-Government mission partner's applications and programs.					
- Continue to develop and transition Offensive Cyber Operations (OCO) quick reaction capabilities for next-generation DCWO weapon system supporting requirements from DCWO Mission Threads.					
<i>FY 2021 Base Plans:</i>					
- Will continue to develop Air Force unique connectivity and required infrastructures across multiple spectrums leveraging industry and other Government/non-Government mission partner's applications and programs.					
- Will continue to develop and transition Offensive Cyber Operations (OCO) quick reaction capabilities for next-generation DCWO weapon system supporting requirements from DCWO Mission Threads.					
<i>FY 2021 OCO Plans:</i>					
N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>					
-Funding decreased from FY2020 to FY2021 due to transition to sustainment.					
Accomplishments/Planned Programs Subtotals	0.000	18.509	15.550	0.000	15.550

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Line Item 831010: <i>COMSEC Equipment</i>	0.070	2.790	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.860
• OPAF 03 Line Item 834320: <i>C3 Countermeasures</i>	25.947	25.036	18.782	-	18.782	29.022	23.323	38.538	39.079	Continuing	Continuing

Remarks
In FY21, all OPAF funds for the DCWO portfolio have been consolidated to Line Item 834320.

D. Acquisition Strategy
The Distributed Cyber Warfare Operations program office will utilize Concept, Development, Risk Management, Production, or Deployment Plans as part of a streamlined approach to acquisition planning. All plans will contain sufficient information for the Milestone Decision Authority (MDA) to determine readiness to enter into the applicable phase of the acquisition process. Distributed Cyber Warfare Operations will utilize both new and existing contractual vehicles, such as Government-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>
<p>Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV)), and General Services Administration (GSA) Federal Supply Schedules and a Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet many requirements related to Offensive Cyberspace Operations. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA), which requires a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Access Development	Various	Various : Various	-	-		13.386	Nov 2019	11.534	Nov 2020	-		11.534	Continuing	Continuing	-
Subtotal			-	-		13.386		11.534		-		11.534	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Access Test and Evaluation	MIPR	47 CTS : San Antonio, TX	-	-		0.760	Dec 2019	0.255	Dec 2020	-		0.255	Continuing	Continuing	-
Subtotal			-	-		0.760		0.255		-		0.255	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PSC - Acquisition Support (Various)	C/Various	Various : San Antonio, TX	-	-		4.363	Oct 2019	3.761	Oct 2020	-		3.761	Continuing	Continuing	-
Subtotal			-	-		4.363		3.761		-		3.761	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	18.509	15.550	-	15.550	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020				
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>			Project (Number/Name) 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>		

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Access Development																											
AF Unique Access																											
Next-Gen Offensive Cyber Operations Weapon System																											
DCWO Infrastructure Development																											
Cloud Network Transport System (CNeTS)																											
CNeTS Development (Incrementally Delivered Each Year)																											
Build Infrastructure Tracking Systems (BITS)																											
BITS Development																											
NEPTUNE ZEPHYR (NZ)																											
NZ Development (Incrementally Delivered Every 6 Months)																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	Project (Number/Name) 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Access Development				
AF Unique Access	1	2020	4	2025
Next-Gen Offensive Cyber Operations Weapon System	1	2020	4	2025
DCWO Infrastructure Development	1	2020	4	2025
Cloud Network Transport System (CNeTS)				
CNeTS Development (Incrementally Delivered Each Year)	1	2021	4	2024
Build Infrastructure Tracking Systems (BITS)				
BITS Development	1	2021	3	2022
NEPTUNE ZEPHYR (NZ)				
NZ Development (Incrementally Delivered Every 6 Months)	1	2021	2	2022

Note

Ongoing development to provide continuously updated access for D5 operations.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208088F / <i>AF Defensive Cyberspace Operations</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	36.953	38.609	15.165	0.000	15.165	18.726	17.601	15.098	15.375	Continuing	Continuing
677820: <i>Computer Security RDTE: Firestarter</i>	-	21.308	25.264	6.524	0.000	6.524	8.655	7.942	6.902	7.028	Continuing	Continuing
677821: <i>Cyberspace Vulnerability Assessment</i>	-	14.080	11.745	7.015	0.000	7.015	8.412	7.970	6.477	6.597	Continuing	Continuing
677822: <i>Cyber Defense Analysis</i>	-	0.268	0.274	0.279	0.000	0.279	0.285	0.290	0.295	0.300	Continuing	Continuing
677823: <i>AFCERT</i>	-	1.297	1.326	1.347	0.000	1.347	1.374	1.399	1.424	1.450	Continuing	Continuing

A. Mission Description and Budget Item Justification

AF Defensive Cyberspace Operations (AF DCO) provides defensive cyber capabilities that protect the AFNET and DoD network enclaves, to include their associated computer systems, software applications and sensitive operational information against unauthorized intrusion, corruption, and/or destruction. The emphasis of the program is directed toward defensive cyberspace capabilities, computer and network systems security, damage assessment and recovery, cyber threat recognition, attribution, and mitigation, and active response methodologies in response to evolving threats and changes to cyber environment. These areas of emphasis are realized through research and development, test and acquisition in the areas of proactive defense, defensive counter cyberspace, cyberspace intelligence, surveillance and reconnaissance, command and control situational awareness, persistent network operations, as well as decision support, recovery, and digital forensics.

Firestarter utilizes cyber and Information Assurance (IA) technology investments by US Cyber Command, the Defense Advanced Research Projects Agency (DARPA), the National Security Agency (NSA), Director of National Intelligence (DNI), Intelligence Advanced Research Projects Activity (IARPA), the Department of Homeland Security (DHS), and various government research laboratories, to jump-start its development of solutions to existing Air Force cyber and IA requirements. This program supports AF Cyberspace strategic direction in support of Cyber Defense which provides capabilities to 16th AF, as AF component to US Cyber Command (USCYBERCOM), Defense Information Systems Agency (DISA), National Security Agency (NSA), and other services to ensure Global Information Grid (GIG) cyber and IA requirements are being met. Activities performed include those designed to identify, analyze, test, rapidly acquire, and integrate emerging IA and cyber technology and defensive cyberspace weapons systems and capabilities into all regions of the GIG - terrestrial, airborne, and space systems. In addition, this effort will support implementation of DoD Enterprise-wide IA & Computer Network Defense (CND) Solutions Steering Group (ESSG) solutions. Current Air Force systems, such as the AFNET NIPRNet Gateways, SIPRNet Modernization program, and Host Based Security System leverage this technology to meet their information assurance and defensive cyberspace needs/requirements.

Cyberspace Vulnerability Assessment/ Hunter Team (CVA/H) weapon system develops new capabilities to provide Air Force Cyber Command (AFCYBER) and Combatant Commanders additional mobile precision in addition to currently fielded protection capabilities to identify, pursue, and mitigate cyberspace threats. The CVA/H weapon system performs defensive sorties world-wide via remote or on-site access. CVA/H executes vulnerability, compliance, defense and non-technical assessments, best practice reviews, penetration testing and Hunter missions of AF and DoD networks and systems. Hunter operations characterize and then eliminate threats for the purpose of mission assurance. The Hunter mission focuses on the capability to find, fix, track, target, engage, and assess (F2T2EA) the advanced

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208088F / <i>AF Defensive Cyberspace Operations</i>
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persistent threat (APT). This effort funds the development efforts to enhance command and control situational awareness and to expand the capability of the current weapon system to meet the scope and scale of USCYBERCOM directed Cyber Protection Teams and AF Mission Defense Teams.

Cyberspace Defense Analysis (CDA) is an assessment of non-secure telecommunications to determine type and amount of sensitive and/or classified information that may have been disclosed to our adversaries and encompasses the following mission subsets: Telephony Communications, Radio Frequency (RF) Communications, Email Communications, Internet based Capabilities (IbC), and Cyber Operations Risk Assessment (CORA). CDA is the cyberspace weapon system that is used to conduct assessments during peace time and contingency operations. CDA shows its true capability in the force protection realm and helps ensure our adversaries are not provided early warning of our plans, capabilities, or limitations. FY21 funding is essential in developing new capabilities to combat the rapidly evolving cyber threat.

The AF Cyberspace Defense (ACD) weapon system is designed to prevent, detect, and respond to adversarial penetration into AF unclassified and classified networks. ACD supports Air Force and Combatant Commanders by conducting synchronized Defensive Cyber Operations (DCO) and providing 24/7/365 monitoring and defense of USAF and US Central Command Secure/Non-secure Internet Protocol Router Network (SIPRNET/NIPRNET) systems against hostile attack. Daily intrusions to the AF network are analyzed in a forensics manner to identify a multitude of counter defensive and defensive tools and techniques that are required to truly strengthen cyber security. The Air Force Research Laboratory (AFRL), Air Force CyberWorx and other Federal R&D entities often have cutting edge solutions, that, with Research and Development funding, can be taken to the technology readiness level (TRL) needed for rapid deployment as new capability to counter critical cyber weapon system vulnerabilities. AFCERT Funding for this effort will focus on development of capability, capacity, and potential modifications to increase the utility of the ACD weapon system to the warfighter as well as testing requirements for new capabilities.

Activities include studies and analysis to support both current program planning and execution and future program planning.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Defensive Cyberspace Operations weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

The FY 2021 funding request was reduced by \$1.654 million to account for the availability of prior year execution balances.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208088F / <i>AF Defensive Cyberspace Operations</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	38.387	16.609	16.819	0.000	16.819
Current President's Budget	36.953	38.609	15.165	0.000	15.165
Total Adjustments	-1.434	22.000	-1.654	0.000	-1.654
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	22.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.434	0.000			
• Other Adjustments	0.000	0.000	-1.654	0.000	-1.654

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 677820: *Computer Security RDTE: Firestarter*

Congressional Add: *Internet of Things Research*

Congressional Add: *Transportation Research*

Congressional Add: *Critical Infrastructure Cyber Security*

Congressional Add: *Cyber Resilient Space Architecture*

Congressional Add Subtotals for Project: 677820

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	7.500	-
	7.500	-
	-	10.000
	-	12.000
Congressional Add Subtotals for Project: 677820	15.000	22.000
Congressional Add Totals for all Projects	15.000	22.000

Change Summary Explanation

The FY 2021 funding request was reduced by \$1.654 million to account for the availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations				Project (Number/Name) 677820 / Computer Security RDTE: Firestarter			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
677820: Computer Security RDTE: Firestarter	-	21.308	25.264	6.524	0.000	6.524	8.655	7.942	6.902	7.028	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Firestarter program provides newly improved capabilities and technical transition opportunities for Cyber Defense and Information Assurance (IA) technologies and tools needed to defend Air Force Command, Control, Communications, Computer, and Intelligence (C4I) systems from cyber attacks, while ensuring recovery in the event of an attack. The emphasis of the program is directed toward defensive cyberspace capabilities; computer and network systems security; damage assessment and recovery; cyber threat recognition, attribution, and mitigation; and active response methodologies in response to evolving threats and changes to cyber environment. These areas of emphasis are realized through research and development, test and acquisition in the areas of proactive defense, defensive counter cyberspace, cyberspace intelligence, surveillance and reconnaissance & situational awareness, persistent network operations, as well as decision support, recovery, and digital forensics. Current Air Force systems, such as the AFNET NIPRNet Gateways, SIPRNet Modernization program, and Host Based Security System leverage this technology to meet their information assurance and defensive cyberspace needs/requirements.

Firestarter utilizes cyber and IA technology investments by US Cyber Command, the Defense Advanced Research Projects Agency (DARPA), the National Security Agency (NSA), Director of National Intelligence (DNI), Intelligence Advanced Research Projects Activity (IARPA), and the Department of Homeland Security (DHS), and various government research laboratories, to jump-start its development of solutions to existing Air Force cyber and IA requirements. This program supports AF Cyberspace strategic direction in support of Cyber Defense which provides capabilities to 16th AF, as AF component to US Cyber Command (USCYBERCOM), Defense Information Systems Agency (DISA), National Security Agency (NSA), and other services to ensure Global Information Grid (GIG) cyber and IA requirements are being met. Activities performed include those designed to identify, analyze, test, rapidly acquire, and integrate emerging IA and cyber technology and defensive cyberspace weapons systems and capabilities into all regions of the GIG - terrestrial, airborne, and space systems. In addition, this effort will support implementation of DoD Enterprise-wide Information Assurance (IA) & Computer Network Defense (CND) Solutions Steering Group (ESSG) solutions.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Defensive Cyberspace Operations weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Cyber Forensic Tools & Methodologies	1.500	0.812	1.400	-	1.400
Description: Cyber forensic tools & methodologies. Includes initial metrics for reliable info assurance; secure coalition cyber data management, collaboration and visualization; analysis of cyber security bots					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677820 / Computer Security RDTE: Firestarter

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: - Continue the development, enhancement, and transition of incident response data gathering and attack attribution technologies</p> <p>FY 2021 Base Plans: - Will continue the development, enhancement, and transition of incident response data gathering and attack attribution technologies</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased to meet need for cyber forensic tools to counter emerging threats.</p>					
<p>Title: Cyber Threat Recognition</p> <p>Description: Enhancing cyber platform technology to identify zero-day threats in real time.</p> <p>FY 2020 Plans: - Continue to normalize and automate methods and procedures to identify zero day cyber threats prior to system compromise</p> <p>FY 2021 Base Plans: - Will continue to normalize and automate methods and procedures to identify zero day cyber threats prior to system compromise</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased for additional cyber threat recognition requirements.</p>	1.411	0.626	1.599	-	1.599
<p>Title: Cyber Threat Attribution & Mitigation</p> <p>Description: Includes risk mitigation techniques for wireless networks and systems; active response, dynamic policy enforcement and computer/net attack attribution efforts.</p> <p>FY 2020 Plans: - Continue to mature, enhance, and integrate developmental concepts to attribute cyber patterns, techniques, behaviors, and signatures to specific threat actors and identify mitigation strategies for each</p> <p>FY 2021 Base Plans:</p>	0.750	0.700	0.815	-	0.815

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677820 / Computer Security RDTE: Firestarter
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>- Will continue to mature, enhance, and integrate developmental concepts to attribute cyber patterns, techniques, behaviors, and signatures to specific threat actors and identify mitigation strategies for each</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to increased need for attribution & mitigation of foreign and criminal actors in Air Force networks and systems.</p>					
<p>Title: Transition of Cyber and Information Assurance Technologies</p> <p>Description: Transition cyber defense technologies that support AF Defensive Cyber Operations architecture. Includes space systems cyber solutions; terrestrial net defense technology development; airborne IP network cyber and IA tools; IA/cyber modeling & simulation; secure interoperable distributed agent computing, and others that relate to defending the AF networks.</p> <p>FY 2020 Plans: - Continue enhancing and transitioning customer funded cyber and IA technology to operational USAF components in accordance with rapid requirements documentation</p> <p>FY 2021 Base Plans: - Will continue enhancing and transitioning customer funded cyber and IA technology to operational USAF components in accordance with rapid requirements documentation</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to higher pace of transition of IA technologies for the defense of AF networks against emerging cyber threats.</p>	2.647	1.126	2.710	-	2.710
Accomplishments/Planned Programs Subtotals	6.308	3.264	6.524	-	6.524

	FY 2019	FY 2020
<p>Congressional Add: Internet of Things Research</p> <p>FY 2019 Accomplishments: - Craft and execute integrated Internet of Things research and development plan</p> <p>- Perform research, develop test configurations, conduct assessments, and complete technical reports on multiple classes of Internet of Things devices</p>	7.500	-
<p>Congressional Add: Transportation Research</p>	7.500	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677820 / Computer Security RDTE: Firestarter
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	FY 2019	FY 2020
FY 2019 Accomplishments: - Craft and execute integrated transportation research and development plan - Perform research, develop basic test configurations, conduct assessments, and complete technical reports on a variety of Air Force transportation methods		
Congressional Add: Critical Infrastructure Cyber Security FY 2020 Plans: - Craft and execute Critical Infrastructure Cyber Security research and development plan - Perform research; develop test plans, exercises, and security configurations; conduct assessments; and complete technical reports on a variety of Air Force critical infrastructure and interfaces	-	10.000
Congressional Add: Cyber Resilient Space Architecture FY 2020 Plans: - Craft and execute cyber resilient space architecture research and development plan - Perform research; develop security profiles, integrate developmental concepts and enhance security configurations; conduct assessments; and complete technical reports on a variety of space system architectures - Transition cyber technologies for use in space enterprise	-	12.000
Congressional Adds Subtotals	15.000	22.000

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

N/A

Remarks

D. Acquisition Strategy

Firestarter conducts late stage Science and Technology (S&T) for tech demo and tech transition to warfighter employment. All contracts within this project are awarded using full and open competition and utilize evolutionary capability and incremental development. Where appropriate, collaborative efforts are conducted with services and agencies within the USAF to result in more robust and cost effective solutions. Contracting activities are primarily done through other agencies when deemed more advantageous. All aspects of the Firestarter project are managed by the Air Force Research Laboratory.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677820 / Computer Security RDTE: Firestarter
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Firestarter Development	C/CPFF	Various : Various	-	17.221	Jan 2019	23.710	Jan 2020	3.427	Jan 2021	-		3.427	Continuing	Continuing	-
Firestarter Integration	C/CPFF	Various : Various	-	2.271	Jan 2019	0.638	Jan 2020	1.499	Jan 2021	-		1.499	Continuing	Continuing	-
Subtotal			-	19.492		24.348		4.926		-		4.926	Continuing	Continuing	N/A

Remarks
Multiple contractors and multiple universities reflect on-going efforts with over a dozen contractors and universities. Each has a different contract date depending on when that particular contract was awarded.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Firestarter Testing	C/CPFF	Various : Various	-	1.369	Jan 2019	0.691	Jan 2020	1.373	Jan 2021	-		1.373	Continuing	Continuing	-
Subtotal			-	1.369		0.691		1.373		-		1.373	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Firestarter PMA	C/CPFF	Various : Various	-	0.447	Jan 2019	0.225	Jan 2020	0.225	Jan 2021	-		0.225	Continuing	Continuing	-
Subtotal			-	0.447		0.225		0.225		-		0.225	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	21.308	25.264	6.524	-	6.524	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677820 / Computer Security RDTE: Firestarter

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Firestarter	
Cyber Forensic Tools & Methodologies	
Cyber Threat Recognition	
Cyber Threat Attribution & Mitigation	
Transition of Cyber/IA Technologies	
Internet of Things Research	
Transportation Research	
Critical Infrastructure Cyber Security	
Cyber Resilient Space Architecture	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677820 / Computer Security RDTE: Firestarter

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Firestarter				
Cyber Forensic Tools & Methodologies	1	2019	4	2025
Cyber Threat Recognition	1	2019	4	2025
Cyber Threat Attribution & Mitigation	1	2019	4	2025
Transition of Cyber/IA Technologies	1	2019	4	2025
Internet of Things Research	1	2019	2	2020
Transportation Research	1	2019	2	2020
Critical Infrastructure Cyber Security	2	2020	3	2021
Cyber Resilient Space Architecture	2	2020	3	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations				Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
677821: <i>Cyberspace Vulnerability Assessment</i>	-	14.080	11.745	7.015	0.000	7.015	8.412	7.970	6.477	6.597	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This requirement supports the Cyberspace Vulnerability Assessment / Hunter Team (CVA/H) weapon system development of new capabilities to provide Air Force Cyber Command (AFCYBER) and Combatant Commanders additional mobile precision in addition to currently fielded protection capabilities to identify, pursue, and mitigate cyberspace threats. The CVA/H weapon system performs defensive sorties world-wide via remote or on-site access. CVA/H executes vulnerability, compliance, defense and non-technical assessments, best practice reviews, penetration testing and Hunter missions on AF and DoD networks & systems. Hunter operations characterize and then eliminate threats for the purpose of mission assurance. The Hunter mission focuses on the capability to find, fix, track, target, engage, and assess (F2T2EA) the advanced persistent threat (APT). This effort funds development efforts to enhance command and control situational awareness and to expand the capability of the current weapon system to meet scope and scale of the USCYBERCOM directed Cyber Protection Teams and AF Mission Defense Teams.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Defensive Cyberspace Operations weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Cyber Threat Mitigation	0.800	0.800	0.400	0.000	0.400
Description: Cyber Threat Mitigation includes vulnerability, compliance, defense and non-technical assessments, best practice reviews, penetration testing and supports Cyberspace Vulnerability Assessment/ Hunter (CVA/H) missions in support of Air Force Cyber Command and Combatant Commanders.					
FY 2020 Plans: - Continue development and integration of technologies to conduct vulnerability assessments, network intrusion analysis and systems vulnerability analysis					
FY 2021 Base Plans: -Will continue development and integration of technologies to conduct vulnerability assessments, network intrusion analysis and systems vulnerability analysis					
FY 2021 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease due to mission prioritization for vulnerability assessments					
Title: Defensive Next Generation Development	12.280	9.945	5.615	-	5.615
Description: Development and integration of solutions supporting defensive cyber modernization and AF Cyber Needs Forms in the area of DCO capabilities and technologies to meet capability gaps required by Cyber Protection Teams and Mission Defense Teams.					
FY 2020 Plans: - Continue development and integration to support modernization of DCO capabilities and technologies to support Cyber Protection Teams and Mission Defense Teams					
FY 2021 Base Plans: - Will continue development and integration to support modernization of DCO capabilities and technologies to support Cyber Protection Teams and Mission Defense Teams					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease due to the availability of prior year execution balances					
Title: Test & Evaluation	1.000	1.000	1.000	0.000	1.000
Description: Test and Evaluation					
Description: Test and Evaluation provides both developmental testing of new capabilities and the test environments for validating the capabilities.					
FY 2020 Plans: - Continue developmental testing for DCO capability products and technologies prior to fielding					
FY 2021 Base Plans: -Will continue development testing for DCO capability products and technologies prior to fielding					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
Accomplishments/Planned Programs Subtotals	14.080	11.745	7.015	0.000	7.015

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 831010: <i>Comsec Equipment</i>	28.803	12.654	-	-	-	-	-	-	-	-	Continuing
• OPAF 03 834320: <i>C3 Countermeasures</i>	-	-	32.436	-	32.436	43.513	40.974	41.140	5.366	Continuing	Continuing

Remarks
Beginning in FY21 associated OPAF realigned from COMSEC Equipment WSC to C3 Countermeasures WSC for clarity in reporting.

D. Acquisition Strategy
The Cyberspace Vulnerability Assessment Hunter (CVA/H) program office will utilize Concept, Development, Risk Management, or Production and Deployment Plans as part of a phased approach to acquisition planning. All plans will contain sufficient information for the Milestone Decision Authority (MDA) to determine readiness to enter into the applicable phase of the acquisition process. CVA/H Program office will utilize both new and existing contractual vehicles, in addition to existing Government-Wide Acquisition Contract (GWAC) vehicles such as Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules, Network-Centric Solutions (NETCENTs).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cyber Threat Mitigation - Threat Intelligence	C/CPFF	Various : Various	-	0.800	Jan 2019	0.800	Jan 2020	0.400	Jan 2021	-		0.400	Continuing	Continuing	-
Defensive Next Gen - Data & Analysis	C/CPFF	Various : Various	-	1.950	Mar 2019	0.850	Mar 2020	0.716	Mar 2021	-		0.716	Continuing	Continuing	-
Defensive Next Gen - Sensor Optimization	C/FFP	Various : Various	-	1.650	Mar 2019	2.779	May 2020	1.105	May 2021	-		1.105	Continuing	Continuing	-
Defensive Next Gen - Training Simulator	C/FFP	Various : Various	-	5.724	Apr 2019	2.675	Apr 2020	0.552	Apr 2021	-		0.552	Continuing	Continuing	-
Defensive Next Gen - Data Collection and Correlation	C/FFP	Various : Various	-	1.092	Mar 2019	1.031	Mar 2020	0.666	Mar 2021	-		0.666	Continuing	Continuing	-
Defensive Next Gen - Intrusion Prevention Capabilities	C/FFP	Various : Various	-	0.690	Aug 2019	0.690	Aug 2020	0.656	Aug 2021	-		0.656	Continuing	Continuing	-
Subtotal			-	11.906		8.825		4.095		-		4.095	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	MIPR	46 Test Squadron : Eglin, FL	-	1.000	Oct 2018	1.000	Oct 2019	1.000	Oct 2020	-		1.000	Continuing	Continuing	-
Subtotal			-	1.000		1.000		1.000		-		1.000	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA - Engineering & Technical Assistance Support Services (ETASS & FFRDC)	Various	AFLCMC/PZ : Bedford, MA	-	1.174	Jan 2019	1.920	Jan 2020	1.920	Jan 2021	-		1.920	Continuing	Continuing	-
Subtotal			-	1.174		1.920		1.920		-		1.920	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force							Date: February 2020				
Appropriation/Budget Activity 3600 / 7			R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations			Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment					
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals	-	14.080	11.745	7.015	-	7.015	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Cyber Vulnerability Assessment	
Test and Evaluation	
Cyber Threat Mitigation	
Defensive Next Generation Development (Data & Analysis)	
Defensive Next Generation (Data Collection and Correlation)	
Defensive Next Generation Sensor Optimization	
Defensive Next Generation (Training Simulator)	
Defensive Next Generation (Cloudshield Capabilities)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677821 / Cyberspace Vulnerability Assessment

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Cyber Vulnerability Assessment				
Test and Evaluation	1	2019	4	2025
Cyber Threat Mitigation	1	2019	4	2025
Defensive Next Generation Development (Data & Analysis)	1	2019	4	2025
Defensive Next Generation (Data Collection and Correlation)	1	2019	4	2025
Defensive Next Generation Sensor Optimization	1	2019	4	2025
Defensive Next Generation (Training Simulator)	1	2019	4	2025
Defensive Next Generation (Cloudshield Capabilities)	1	2019	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations				Project (Number/Name) 677822 / Cyber Defense Analysis			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
677822: Cyber Defense Analysis	-	0.268	0.274	0.279	0.000	0.279	0.285	0.290	0.295	0.300	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Cyberspace Defense Analysis (CDA): The CDA Weapon System conducts Defensive Cyberspace Operations (DCO) and network defense by monitoring, collecting, analyzing, and reporting sensitive information transiting or residing on the AFNet. Without proper funding the CDA Operators will not be able to determine potential impacts and operational adjustments resulting from information disclosures or identify compromised information from network intrusions. There will be a decreased assurance of network defense and an increase in the amount of lost PII, OPSEC, and other sensitive information. The CDA mission subsets include: Telephony Communications, Radio Frequency (RF) Communications, Email Communications, Internet based Capabilities (IbC), and Cyber Operations Risk Assessment (CORA). CDA is the cyberspace weapon system that is used to conduct assessments during peace time and contingency operations. CDA shows its true capability in the force protection realm and helps ensure our adversaries are not provided early warning of our plans, capabilities, or limitations. FY21 funding is essential in developing new capabilities to combat the rapidly evolving cyber threats.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Defensive Cyberspace Operations weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Cyber Defense Analysis	0.268	0.274	0.279	-	0.279
Description: Engineering support to conduct Cyberspace Defense Analysis (CDA) assessment of non-secure telecommunications during peace time and contingency operations.					
FY 2020 Plans: - Continue to support CDA technical maturation and development of technologies to prevent disclosure of sensitive and or classified information to adversaries that attempt to penetrate the network					
FY 2021 Base Plans: Continued support development of data loss prevention technologies and support insider threat detection capabilities. Support technology areas that prevent adversary's attempt to get into our networks.					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to inflation adjustment					
Accomplishments/Planned Programs Subtotals	0.268	0.274	0.279	-	0.279

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677822 / Cyber Defense Analysis
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>	
• OPAF 03 Line Item 831010: <i>COMSEC Equipment</i>	1.259	1.698	-	-	-	-	-	-	-	-	Continuing	Continuing
• OPAF 03 834320: <i>C3 Countermeasures</i>	-	-	1.699	-	1.699	10.488	10.672	10.864	3.070	-	Continuing	Continuing

Remarks

Beginning in FY21 associated OPAF realigned from COMSEC Equipment WSC 831010 to C3 Countermeasures WSC 834320 for clarity in reporting.

D. Acquisition Strategy

The Cyberspace Defense Analysis (CDA) Weapon System development of new capabilities to provide additional information protection capabilities to monitor, collect, analysis, and report cyberspace threats and compromised data. These capabilities encompass the support to OPSEC protection as well. The CDA program will utilize various contractual vehicles when necessary such as Government-Wide Acquisition Contract (GWAC), Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules, Network-Centric Solutions (NETCENTS) and competitive contract (if required). The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet requirements related to Defensive Cyberspace Operations.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677822 / Cyber Defense Analysis
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CDA PMA - Engineering & Technical Assistance Support Services (ETASS & FFRDC)	Various	AFLCMC/PZ : Hanscom, MA	-	0.268	Jan 2019	0.274	Jan 2020	0.279	Jan 2021	-		0.279	Continuing	Continuing	-
Subtotal			-	0.268		0.274		0.279		-		0.279	Continuing	Continuing	N/A

Remarks
Provides program office subject matter expertise, engineering continuity, technical maturation and expertise, and access to an extensive professional network for future capabilities.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	0.268	0.274	0.279	-	0.279	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677822 / Cyber Defense Analysis

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Cyber Defense Analysis	
Cyber Defense Analysis (FFRDC)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677822 / Cyber Defense Analysis

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Cyber Defense Analysis				
Cyber Defense Analysis (FFRDC)	1	2019	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations				Project (Number/Name) 677823 / AFCERT			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
677823: AFCERT	-	1.297	1.326	1.347	0.000	1.347	1.374	1.399	1.424	1.450	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AF Cyberspace Defense (ACD) weapon system and is designed to prevent, detect, and respond to adversarial penetration into AF unclassified and classified networks. ACD supports Air Force and Combatant Commanders by conducting synchronized Defensive Cyber Operations (DCO) and providing 24/7/365 monitoring and defense of USAF and US Central Command Secure/Non-secure Internet Protocol Router Network (SIPRNET/NIPRNET) systems against hostile attack. Daily intrusions to the AF network are analyzed in a forensics manner to identify a multitude of counter defensive and defensive tools and techniques that are required to truly strengthen cyber security. The Air Force Research Laboratory (AFRL), Air Force CyberWorx, and other Federal R&D entities often have cutting edge solutions, that, with Research and Development funding, take them to the technology readiness level (TRL) needed for rapid deployment as new capabilities to counter critical cyber weapon system vulnerabilities. AFCERT funding for this effort will focus on development of capability, capacity, and potential modifications to increase the utility of the ACD weapon system to the warfighter as well as testing requirements for new capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Defensive Cyberspace Operations weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Cyberspace Defense Development	1.297	1.326	1.347	-	1.347
Description: AF Cyberspace Defense (ACD) weapon system to prevent, detect, and respond to adversarial penetration in AF networks					
FY 2020 Plans: - Continue to develop and test technologies for the AF Cyberspace Defensive (ACD) weapon system to prevent, detect, and respond to adversarial penetration in AF networks					
FY 2021 Base Plans: - Will continue to develop and test technologies for the AF Cyberspace Defensive (ACD) weapon system to prevent, detect, and respond adversarial penetration in AF networks					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to inflation adjustment					
Accomplishments/Planned Programs Subtotals	1.297	1.326	1.347	-	1.347

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677823 / AFCERT
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 835080: AFNET	30.044	16.883	-	-	-	-	-	-	-	-	Continuing
• OPAF 03 834320: C3 Countermeasures	-	-	23.860	-	23.860	35.852	36.476	37.134	1.851	-	Continuing

Remarks

Beginning in FY21 associated OPAF realigned from AFNET WSC 835080 to C3 Countermeasures WSC 834320 for clarity in reporting. In FY21, Computer Security Assistance Program (CSAP) to merge into ACD baseline. Beginning in FY22, OPAF funding associated with CSAP included within ACD funding line.

D. Acquisition Strategy

The AF Cyberspace Defense (ACD) weapon system office will utilize existing contractual vehicles such as Massachusetts Institute of Technology Research and Engineering (MITRE), General Services Administration (GSA) Federal Supply Schedules, Air Force Research Laboratory (AFRL), Advisory and Assistance Services (A&AS) as well as various Test and Evaluation Enterprises. The ACD weapon system office also intends to utilize the commercial contracting community to lead the Development, Test and Integration of future Cyberspace Defense capabilities. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet many requirements related to the ACD mission.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / AF Defensive Cyberspace Operations	Project (Number/Name) 677823 / AFCERT

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Integrated Cyber Aggregation Tool</i>	
Cyberspace Defense Development	
Test and Evaluation	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208088F / <i>AF Defensive Cyberspace Operations</i>	Project (Number/Name) 677823 / <i>AFCERT</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Integrated Cyber Aggregation Tool</i>				
Cyberspace Defense Development	1	2019	4	2025
Test and Evaluation	1	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	12.553	11.603	38.480	0.000	38.480	51.486	65.601	67.727	61.994	Continuing	Continuing
676045: <i>Foundational Efforts</i>	-	12.553	11.603	38.480	0.000	38.480	51.486	65.601	67.727	61.994	Continuing	Continuing

Note

In FY20, PE 0306250F, Cyber Operations Technology Development efforts were transferred to PE 0208097F, Joint Cyber Command and Control (JCC2) efforts in order to enable Executive Agent oversight and management and to provide adequate oversight and Service stakeholder transparency.

A. Mission Description and Budget Item Justification

Joint Cyber Command and Control (JCC2) provides Combatant Commanders, Joint Force Commanders and Service Component Commanders with enhanced situational awareness and battle management for cyberspace operations missions and forces. JCC2 establishes congressionally directed focal point to provide integrated JCC2 solutions to all echelons for execution of cyberspace operations to enable and accelerate planning/collaboration between Cyber Mission Forces and Combatant Commands (CCMD).

It will integrate Cyber C2 with Joint, Coalition and inter-agency C2 to enhance multi-domain operations, reduce planning time, improve decision quality and speed resulting in a shorter kill chain. Capabilities will be developed to address the Cyber Mission Forces used to conduct cyber operations. Additionally, it will leverage and utilize the Continuous Infrastructure/Continuous Development (CI/CD) Framework (a cyber factory) to pace development with warfighter need. JCC2 development activities include, but are not limited to: rapid prototyping, development of software/hardware systems; integration and transition of lab developed cyber capabilities to the warfighter; testing and evaluation; program management administration, studies, analysis, pilots, demonstrations; risk reduction for emerging technologies; and development and assessment of operational systems for inclusion into JCC2 to meet capability requirements. The increase in funds will enable greater capacity to react to emerging requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver JCC2 capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208097F I <i>Joint Cyber Command and Control (JCC2)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	13.000	11.603	11.602	0.000	11.602
Current President's Budget	12.553	11.603	38.480	0.000	38.480
Total Adjustments	-0.447	0.000	26.878	0.000	26.878
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.447	0.000	26.878	0.000	26.878

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208097F / Joint Cyber Command and Control (JCC2)	Project (Number/Name) 676045 / Foundational Efforts
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676045: Foundational Efforts	-	12.553	11.603	38.480	0.000	38.480	51.486	65.601	67.727	61.994	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY20, PE 0306250F, Cyber Operations Technology Development efforts were transferred to PE 0208097F, Joint Cyber Command and Control (JCC2) efforts in order to enable Executive Agent oversight and management, and to provide adequate oversight and Service stakeholder transparency.

A. Mission Description and Budget Item Justification

Joint Cyber Command and Control (JCC2) provides Combatant Commanders, Joint Force Commanders and Service Component Commanders with enhanced situational awareness and battle management for cyberspace operations missions and forces. JCC2 establishes congressionally directed focal point to provide integrated JCC2 solutions to all echelons for execution of cyberspace operations to enable and accelerate planning/collaboration between Cyber Mission Forces and Combatant Commands (CCMD).

It will integrate Cyber C2 with Joint, Coalition and inter-agency C2 to enhance multi-domain operations, reduce planning time, improve decision quality and speed resulting in a shorter kill chain. Capabilities will be developed to address the Cyber Mission Forces used to conduct cyber operations. Additionally, it will leverage and utilize the Continuous Infrastructure/Continuous Development (CI/CD) Framework (a cyber factory) to pace development with warfighter need. JCC2 development activities include, but are not limited to: rapid prototyping, development of software/hardware systems; integration and transition of lab developed cyber capabilities to the warfighter; testing and evaluation; program management administration, studies, analysis, pilots, demonstrations; risk reduction for emerging technologies; and development and assessment of operational systems for inclusion into JCC2 to meet capability requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver JCC2 capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Foundational Efforts	12.553	11.603	38.480
Description: Foundational Efforts are program activities, at multiple operating locations, supporting development and evaluations activities and JCC2 baseline efforts to retain capability. Actions include system and software engineering, risk management, developmental framework management, and the execution of acquisition activities.			
FY 2020 Plans:			
- Develop capabilities and initiate the Cyber Tasking Order used in CMF to conduct cyber operations			
- Expand program office to support JCC2 requirements development packages			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>	Project (Number/Name) 676045 / <i>Foundational Efforts</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Build-up DevSecOps teams for continued piloting at CCMDs - Stand up development environment, i.e., hosting services, infrastructure - Integrate optimal Situational Awareness (SA) capabilities to integrate automated threat information sharing and collaboration <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Will incrementally develop JCC2 capabilities using the DevSecOps approach. - Will continue to integrate existing situational awareness and battle management capabilities to the JCC2 solution - Will continue to build the backlog of requirements through Joint Working Groups and the JCC2 Governance Process <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to decision to develop JCC2 capabilities from FY20 to FY21.</p>				
Accomplishments/Planned Programs Subtotals		12.553	11.603	38.480
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
<p>JCC2 is pre-Material Development Decision (MDD). JCC2 will apply agile acquisition tenets to the programmatic, design/engineering, test and delivery aspects to provide an ability to deliver Situational Awareness/C2 capabilities to the warfighter in a rapid manner. JCC2 will transition from a collection of distinct, special-purpose tools to an integrated joint capability to reduce overall lifecycle costs, improve interoperability, and increase information sharing across the CCMDs. JCC2 PMO will seek the new Software Acquisition Pathway as a long-term acquisition strategy. The IT-Box approach instills rigor for capability deployments and documentation for JCC2 while utilizing multiple middle tier acquisition designations allow the program to proceed with the DevSecOps pace. The JCC2 program office will utilize new and existing contract vehicles and concept, development, risk management, production, or deployment plans as part of a streamlined approach. The JCC2 program office will establish continuous integration/continuous development pipeline to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The JCC2 program will execute the agile development requirements provided by the Army, Navy, Marine Corps, Air Force, and USCYBERCOM stakeholders in accordance with the prioritization provided by the multi-Service JCC2 governance structure. The initial JCC2 capability will deliver a minimum viable product (MVP) for immediate deployment and operational use. Subsequent build iterations will continue to deliver enhanced capabilities incrementally building the JCC2 capability to match warfighter needs. The JCC2 baseline capability relies on extensive development and evaluation efforts to analyze integration constraints and opportunities of Service-specific cyber capabilities. The decision to develop joint capabilities moved from FY22 to FY21.</p>				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208097F / Joint Cyber Command and Control (JCC2)	Project (Number/Name) 676045 / Foundational Efforts
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
JCC2 CI/CD Infrastructure	Various	Multiple : Multiple	-	3.153	Mar 2019	-		5.079	Apr 2021	-		5.079	Continuing	Continuing	-
JCC2 Agile Capability Development	Various	Multiple : Multiple	-	5.500	Mar 2019	9.715	Mar 2020	28.780	Mar 2021	-		28.780	Continuing	Continuing	-
Subtotal			-	8.653		9.715		33.859		-		33.859	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
JCC2 Acquisition Support	Various	Multiple : Multiple	-	3.900	Mar 2019	1.888	Nov 2019	4.621	Nov 2020	-		4.621	Continuing	Continuing	-
Subtotal			-	3.900		1.888		4.621		-		4.621	Continuing	Continuing	N/A

Project Cost Totals	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
-	-	12.553	11.603	38.480	-	38.480	Continuing	Continuing	N/A

Remarks
 CI/CD - Continuous Integration/Continuous Development

Transition USCC pilot systems to USAF references that the USAF was designated the lead service via being named the Executive Agent. The pilot systems transferred currently have operational users and are being evaluated for best of breed features and architecture to be further developed into the overarching JCC2 capability requirements.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>	Project (Number/Name) 676045 / <i>Foundational Efforts</i>	

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Foundational Events																												
Transition USCC pilot systems to USAF																												
JCC2 CI/CD Infrastructure																												
JCC2 Agile Capability Development																												
JCC2 Acquisition Support																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>	Project (Number/Name) 676045 / <i>Foundational Efforts</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Foundational Events				
Transition USCC pilot systems to USAF	1	2019	4	2021
JCC2 CI/CD Infrastructure	1	2019	3	2025
JCC2 Agile Capability Development	2	2019	4	2025
JCC2 Acquisition Support	1	2019	4	2025

Note

Transition USCC pilot systems to USAF references that the USAF was designated the lead service via being named the Executive Agent. The pilot systems transferred currently have operational users and are being evaluated for best of breed features and architecture to be further developed into the overarching JCC2 capability requirements.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	26.093	84.702	84.645	0.000	84.645	106.550	106.524	117.206	119.509	Continuing	Continuing
672281: <i>Foundational Efforts</i>	-	26.093	84.702	84.645	0.000	84.645	106.550	106.524	117.206	119.509	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Unified Platform provides the Cyber Mission Forces, U.S. Cyber Command (USCYBERCOM), AF Major Commands, and Service cyber components a Joint cyber operations infrastructure enabling full spectrum cyberspace operations at the operational through tactical levels of warfare as part of USCYBERCOM (JCWA) Joint Cyber Warfare Architecture. The DoD, AF, and the Cyber Mission Force require an interconnected and interoperable cyber infrastructure to conduct integrated planning and execution of cyberspace operations to meet Combatant Commander requirements. Unified Platform delivers this capability through the integration of disparate firing platforms, existing or evolving systems, infrastructure, mission capabilities, data analytics, and programs used for military cyber operations to build interoperable and scalable network for cyber capabilities. A common, Unified Platform allows the DoD to achieve and maintain decision and operational superiority, the key to successful cyber operations within the highly dynamic cyberspace domain.

Foundational Efforts provide for the research, development, prototype maturation, integration, enhancement, delivery, and enduring product support of the Unified Platform capability to ensure responsiveness to warfighter requirements within operationally relevant timeframes. With the government as the lead integrator, Unified Platform Foundational Efforts provide a flexible—yet disciplined—agile development/security/operations (DevSecOps) capability to generate new capabilities, integrate existing and emerging technologies, incorporate rapid prototyping efforts, and evolve the Unified Platform baseline on an agile basis. Foundational efforts include both the management of the DevSecOps capabilities including systems engineering, risk management, contracting, test, and program management as well as the active research and capability development to be conducted for the Unified Platform baseline. Foundational efforts are informed in part by Unified Platform prototyping efforts (BA 4, PE 0208099F Unified Platform, BPACs 646504 AF Prototyping and 646505 USCYBERCOM Prototyping).

The Secretary of the Air Force leads the Unified Platform effort as Executive Agent on behalf of the Department of Defense. Unified Platform directly supports the Joint Network Attack Initial Capabilities Document (ICD), the National Military Strategy for Cyberspace Operations (NMS-CO), USCYBERCOM operational directives, the latest MAJCOM Offensive Cyberspace Operations System Flight Plan, and other formal requirements documents.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Unified Platform weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	26.559	84.702	98.701	0.000	98.701
Current President's Budget	26.093	84.702	84.645	0.000	84.645
Total Adjustments	-0.466	0.000	-14.056	0.000	-14.056
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.466	0.000	-14.056	0.000	-14.056

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Foundational Efforts</p> <p>Description: Foundational Efforts ensure the perpetual capability development, integration, and delivery of the Unified Platform capability through the rapid and agile development of requirements via a DevSecOps pipeline. Unified Platform requirements are warfighter-derived under the framework of validated Unified Platform requirement documents and met using agile development teams, integration of Service and U.S. Cyber Command capabilities, or external prototyping activities.</p> <p>Unified Platform capabilities are developed within the government-lead Unified Platform Continuous Integration/Continuous Deployment DevSecOps pipeline, leveraging a common pipeline baseline maintained by Platform One. This pipeline provides a common system development, integration, and staging environment to permit collaborative development. Developmental efforts will be continuously verified for security compliance and continually tested to ensure development meets established security and performance criteria.</p> <p>Foundational Efforts also include program office expertise at multiple operating locations in the areas of cyberspace, systems engineering, risk management framework, scaled agile framework, contracting, and program management to ensure that agile acquisition development planning and frequent customer engagement is accomplished.</p> <p>FY19 Accomplishment:</p> <ul style="list-style-type: none"> • Provided USCYBERCOM, Army, Air Force, and Marine Corps operators the ability to share and query data, analytics, and analysis across multiple classifications and across multiple Services • Enabled Cyber Mission Force Top Secret and Secret data query capability on Defensive Cyber Operations (DCO) data to inform Commander National Mission Forces for DCO-Response Action 	26.093	84.702	84.645

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> • Enabled the United States Marine Corps and Air Force Cyber Protection Teams to collect, store, and share data with joint stakeholders through USCYBERCOM big data platform <p><i>FY 2020 Plans:</i></p> <ul style="list-style-type: none"> • Continue agile capability development by delivering operationally relevant applications incrementally • Integrate Big Data Platform to allow Services to continue their ability to query and share multi-classification data, analytics, & analysis • Continue to mature our Distributed Common Development/Integration and Staging environments allowing for continuous integration and continuous delivery of capability • Implement Joint Data Standards and event-driven message handling services <p><i>FY 2021 Plans:</i></p> <ul style="list-style-type: none"> • Will continue to scale and deliver capability through an agile development model, delivering operational capability on-demand • Will continue to integrate existing Service capabilities, develop new capabilities, and modernize existing infrastructure while also leveraging prototyping activities from the Services and U.S. Cyber Command. • Will maintain Distributed Common Development/Integration and Staging environments allowing for continuous integration and continuous delivery of capability <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding increased due to additional warfighter capability requirements required of the Unified Platform baseline.</p>			
Accomplishments/Planned Programs Subtotals	26.093	84.702	84.645

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 04 0208099F: <i>Unified Platform (UP)</i>	28.327	10.000	5.998	-	5.998	0.000	0.000	0.000	0.000	0.000	44.325
• OPAF 03 835080: <i>AFNET</i>	-	4.963	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• OPAF 03 834320: <i>C3 Countermeasures</i>	-	0.000	4.956	-	4.956	4.957	4.954	5.043	5.136	Continuing	Continuing

Remarks
 Beginning in FY21 associated OPAF realigned from AFNET WSC to C3 Countermeasures WSC for clarity in reporting.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

R-1 Program Element (Number/Name)
PE 0208099F *I Unified Platform (UP)*

E. Acquisition Strategy

Unified Platform represents a flexible, interoperable, and scalable warfighter capability to be employed by the Army, Navy, Marine Corps, and Air Force in conjunction with U.S. Cyber Command (USCYBERCOM). In order to match the speed of need of the highly dynamic cyberspace domain, the Service-agnostic Unified Platform implements an agile development framework to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The Unified Platform program develops capability in response to requirements provided by the Army, Navy, Marine Corps, Air Force, and USCYBERCOM stakeholders in accordance with the prioritization provided by the multi-Service Unified Platform governance structure.

The initial Unified Platform capability delivered a minimum viable product (MVP) for immediate deployment and operational use by the Cyber Mission Force. Subsequent build iterations will continue to deliver enhanced capabilities, incrementally building the Unified Platform capability to match warfighter needs and requirements to achieve cyberspace dominance. Early development of the Unified Platform baseline capability relies on extensive rapid prototyping efforts to analyze integration constraints and opportunities of Service-specific cyber capabilities to realize the Unified Platform MVP and inform the future Unified Platform baseline (BA 4, PE 0208099F Unified Platform, 646504 AF Prototyping and 646505 USCYBEROM Prototyping). In parallel, an enduring foundational Unified Platform thrust area supports the development and maturation of Unified Platform baseline, integrates successful prototyping activities, and implements an agile development/security/operations (DevSecOps) construct to rapidly evolve and enhance the Unified Platform capability to match warfighter requirements (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts).

The Unified Platform program office utilizes Concept, Development, Risk management, Production, and Deployment Plans as part of a streamlined approach to agile acquisition planning. All plans contain sufficient information to inform acquisition decisions (i.e., authorities to proceed), within the agile framework, to determine readiness to enter into the applicable phase of the acquisition process. Unified Platform will utilize both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules, a Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract, Other Transaction Authority (OTA), DoD Enterprise Software Initiative (ESI), Commercial Solution Openings (CSO), Partnership Intermediary Agreements (PIA), Small Business Innovative Research (SBIR) contracts, and Small Disadvantaged Business 8(a) contracts. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that will meet any future requirements related to Unified Platform.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 672281 / <i>Foundational Efforts</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UP System Technical Coordination	C/T&M	Northrup Grumman : TBD	-	7.359	Oct 2018	16.697	Oct 2019	-		-		-	Continuing	Continuing	24.056
UP System Technical Coordination Follow-On	C/T&M	Multiple: Various : TBD	-	-		-		15.817	Oct 2020	-		15.817	Continuing	Continuing	19.817
Agile Capability Development	Various	Multiple: Various : TBD	-	5.000	Oct 2018	44.857	Oct 2019	42.137	Oct 2020	-		42.137	Continuing	Continuing	49.857
Distributed Common Computing Environment	Various	Multiple: Various : TBD	-	4.200	Feb 2019	8.400	Feb 2020	9.744	Feb 2021	-		9.744	Continuing	Continuing	22.344
Subtotal			-	16.559		69.954		67.698		-		67.698	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	Various	Multiple: Various : TBD	-	1.000	Jan 2019	3.593	Jan 2020	4.135	Jan 2021	-		4.135	Continuing	Continuing	8.761
Subtotal			-	1.000		3.593		4.135		-		4.135	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering	Various	Various : TBD	-	5.634	Dec 2018	7.955	Dec 2019	9.100	Dec 2020	-		9.100	Continuing	Continuing	23.282
Acquisition Support	Various	Various : TBD	-	2.000	Dec 2018	2.168	Dec 2019	2.515	Dec 2020	-		2.515	Continuing	Continuing	6.683
Program Mgmt Office Overhead Costs	Various	Various : TBD	-	0.900	Dec 2018	1.032	Dec 2019	1.197	Dec 2020	-		1.197	Continuing	Continuing	3.129
Subtotal			-	8.534		11.155		12.812		-		12.812	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	26.093	84.702	84.645	-	84.645	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 672281 / <i>Foundational Efforts</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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<u>Remarks</u>									
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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 672281 / <i>Foundational Efforts</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Foundational Efforts</i>	
UP System Technical Coordination	
UP Agile Capability Development	
Distributed Common Computing Environment	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 672281 / <i>Foundational Efforts</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Foundational Efforts</i>				
UP System Technical Coordination	1	2019	4	2025
UP Agile Capability Development	1	2019	4	2025
Distributed Common Computing Environment	2	2019	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208288F / <i>Intel Data Applications</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	1.200	1.200	0.000	1.224	1.224	1.137	1.066	0.965	0.982	0.000	7.774
67A051: <i>Space Superiority - Advanced Intelligence Systems</i>	-	1.200	1.200	0.000	1.224	1.224	1.137	1.066	0.965	0.982	0.000	7.774
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funds the application of Intelligence data as datasets/databases, model and simulations, and analysis for combat and combat support users. Provides for the communications infrastructures required to support Intelligence data applications. May include software and contract assistance to ensure system interoperability for Intelligence data discovery, retrieval, and dissemination. Includes manpower, procurement, and operations and maintenance funding.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	1.200	1.200	1.224	0.000	1.224
Current President's Budget	1.200	1.200	0.000	1.224	1.224
Total Adjustments	0.000	0.000	-1.224	1.224	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-1.224	1.224	0.000

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Radar Dynamic Cueing	1.200	1.200	0.000	1.224	1.224
Description: Develop algorithm to dynamically cue radar assets to increase collection capability and data relevance.					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0208288F / <i>Intel Data Applications</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: N/A</p> <p>Utilize multiple data sources/cues to dynamically target the radar in response to high priority Red Force events of interest.</p> <p>FY 2021 Base Plans: Dynamic radar targeting</p> <p>FY 2021 OCO Plans: Dynamic radar targeting</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increased contract obligations</p>					
Accomplishments/Planned Programs Subtotals	1.200	1.200	0.000	1.224	1.224

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

This effort will be supported via the NASIC ATEP II contract. The project will be delivered 12 months from the date of obligation (approximately May 2019).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force											Date: February 2020				
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0208288F / Intel Data Applications					Project (Number/Name) 67A051 / Space Superiority - Advanced Intelligence Systems					
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
NASIC ATEP II	TBD	NASIC : Dayton, OH	-	1.200	Jan 2019	1.200		0.000		1.224		1.224	Continuing	Continuing	-
Subtotal			-	1.200		1.200		0.000		1.224		1.224	Continuing	Continuing	N/A
			Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	1.200		1.200		0.000		1.224		1.224	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208288F / Intel Data Applications	Project (Number/Name) 67A051 / Space Superiority - Advanced Intelligence Systems

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Radar Dynamic Cueing	
Algorithm Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0208288F / <i>Intel Data Applications</i>	Project (Number/Name) 67A051 / <i>Space Superiority - Advanced Intelligence Systems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Radar Dynamic Cueing</i>				
Algorithm Development	3	2019	4	2024

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