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**Department of Defense  
Fiscal Year (FY) 2020 Budget Estimates**

March 2019



**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 2020 • RDT&E Program

**Volume 3a Table of Contents**

**Introduction and Explanation of Contents.....Volume 3a - iii**  
**Comptroller Exhibit R-1..... Volume 3a - v**  
**Master Program Element Table of Contents (by Budget Activity then Line Item Number)..... Volume 3a - liii**  
**Master Program Element Table of Contents (Alphabetically by Program Element Title)..... Volume 3a - lxxi**  
**Book Split Statement..... Volume 3a - lxxxvii**  
**FY20 PB Classified PEs.....Volume 3a - lxxxix**  
**Exhibit R-2s..... Volume 3a - 1**

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## Fiscal Year (FY) 2020 Budget Estimates RDT&E Descriptive Summaries Budget Activities March 2019

### 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 2020 President's Budget.
  - 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 2020 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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### CLASSIFICATION

- 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)

- FY2020 OCO can be separated into the following categories:
  - OCO for Direct War Costs (\$44,335,000): 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 (\$83,913,000): 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 (\$322,000,000): 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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Department of Defense  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

Appropriation -----	FY 2018 (Base + OCO) -----	FY 2019 Base Enacted -----	FY 2019 OCO Enacted -----	FY 2019 Total Enacted -----
Research, Development, Test & Eval, AF	38,077,597	41,166,683	321,934	41,488,617
Total Research, Development, Test & Evaluation	38,077,597	41,166,683	321,934	41,488,617



UNCLASSIFIED

Department of Defense  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

Appropriation	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Research, Development, Test & Eval, AF	45,616,122	322,000	128,248	450,248	46,066,370
Total Research, Development, Test & Evaluation	45,616,122	322,000	128,248	450,248	46,066,370

## UNCLASSIFIED

Department of Defense  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

Summary Recap of Budget Activities -----	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Basic Research	491,502	561,329		561,329
Applied Research	1,454,070	1,480,573		1,480,573
Advanced Technology Development	829,525	928,747		928,747
Advanced Component Development & Prototypes	4,962,068	6,625,697	13,495	6,639,192
System Development & Demonstration	4,407,341	5,453,523		5,453,523
Management Support	3,490,712	2,963,117		2,963,117
Operational Systems Development	22,442,379	23,153,697	308,439	23,462,136
Total Research, Development, Test & Evaluation	38,077,597	41,166,683	321,934	41,488,617
 Summary Recap of FYDP Programs -----				
Strategic Forces	784,917	1,018,923	34,000	1,052,923
General Purpose Forces	2,899,628	3,077,252	53,049	3,130,301
Intelligence and Communications	1,609,415	1,438,024	54,600	1,492,624
Mobility Forces	550,926	898,833		898,833
Research and Development	11,665,345	12,799,979		12,799,979
Central Supply and Maintenance	97,493	96,826		96,826
Training Medical and Other	2,558	2,578		2,578
Administration and Associated Activities	118,914	122,255		122,255
Support of Other Nations	4,418	3,998		3,998

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UNCLASSIFIED

Page III

<b>Volume 3a - viii</b>
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## UNCLASSIFIED

Department of Defense  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

Summary Recap of Budget Activities	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
-----	-----	-----	-----	-----	-----
Basic Research	529,761				529,761
Applied Research	1,435,626				1,435,626
Advanced Technology Development	839,153				839,153
Advanced Component Development & Prototypes	8,436,279		44,335	44,335	8,480,614
System Development & Demonstration	6,929,244				6,929,244
Management Support	2,916,571				2,916,571
Operational Systems Development	24,529,488	322,000	83,913	405,913	24,935,401
Total Research, Development, Test & Evaluation	45,616,122	322,000	128,248	450,248	46,066,370
Summary Recap of FYDP Programs					
-----	-----	-----	-----	-----	-----
Strategic Forces	879,977				879,977
General Purpose Forces	3,488,992		5,200	5,200	3,494,192
Intelligence and Communications	1,393,298				1,393,298
Mobility Forces	979,221				979,221
Research and Development	14,419,778		26,450	26,450	14,446,228
Central Supply and Maintenance	37,505				37,505
Training Medical and Other	3,542				3,542
Administration and Associated Activities	90,730				90,730
Support of Other Nations	4,071				4,071

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page IIIA

Volume 3a - ix

UNCLASSIFIED

Department of Defense  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
	-----	-----	-----	-----
Space	3,554,350	4,848,491	18,495	4,866,986
Classified Programs	16,789,633	16,859,524	161,790	17,021,314
Total Research, Development, Test & Evaluation	38,077,597	41,166,683	321,934	41,488,617

UNCLASSIFIED

Department of Defense  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Space	6,289,502		17,885	17,885	6,307,387
Classified Programs	18,029,506	322,000	78,713	400,713	18,430,219
Total Research, Development, Test & Evaluation	45,616,122	322,000	128,248	450,248	46,066,370

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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Applied Research	1,454,070	1,480,573		1,480,573
Advanced Technology Development	829,525	928,747		928,747
Advanced Component Development & Prototypes	4,962,068	6,625,697	13,495	6,639,192
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Management Support	3,490,712	2,963,117		2,963,117
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Central Supply and Maintenance	97,493	96,826		96,826
Training Medical and Other	2,558	2,578		2,578
Administration and Associated Activities	118,914	122,255		122,255
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UNCLASSIFIED

Page F-1

Volume 3a - xii

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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Basic Research	529,761				529,761
Applied Research	1,435,626				1,435,626
Advanced Technology Development	839,153				839,153
Advanced Component Development & Prototypes	8,436,279		44,335	44,335	8,480,614
System Development & Demonstration	6,929,244				6,929,244
Management Support	2,916,571				2,916,571
Operational Systems Development	24,529,488	322,000	83,913	405,913	24,935,401
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Summary Recap of FYDP Programs					
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Strategic Forces	879,977				879,977
General Purpose Forces	3,488,992		5,200	5,200	3,494,192
Intelligence and Communications	1,393,298				1,393,298
Mobility Forces	979,221				979,221
Research and Development	14,419,778		26,450	26,450	14,446,228
Central Supply and Maintenance	37,505				37,505
Training Medical and Other	3,542				3,542
Administration and Associated Activities	90,730				90,730
Support of Other Nations	4,071				4,071

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-1A

Volume 3a - xiii

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

Summary Recap of Budget Activities -----	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Space	3,554,350	4,848,491	18,495	4,866,986
Classified Programs	16,789,633	16,859,524	161,790	17,021,314
Total Research, Development, Test & Evaluation	38,077,597	41,166,683	321,934	41,488,617

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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Space	6,289,502		17,885	17,885	6,307,387
Classified Programs	18,029,506	322,000	78,713	400,713	18,430,219
Total Research, Development, Test & Evaluation	45,616,122	322,000	128,248	450,248	46,066,370

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
1	0601102F	Defense Research Sciences	01	320,961	383,322		383,322	U
2	0601103F	University Research Initiatives	01	157,079	164,991		164,991	U
3	0601108F	High Energy Laser Research Initiatives	01	13,462	13,016		13,016	U
		Basic Research		491,502	561,329		561,329	
4	0602102F	Materials	02	143,900	181,373		181,373	U
5	0602201F	Aerospace Vehicle Technologies	02	151,637	160,461		160,461	U
6	0602202F	Human Effectiveness Applied Research	02	126,542	119,018		119,018	U
7	0602203F	Aerospace Propulsion	02	192,846	218,419		218,419	U
8	0602204F	Aerospace Sensors	02	157,078	171,307		171,307	U
9	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02	74,760				U
10	0602298F	Science and Technology Management - Major Headquarters Activities	02	8,353	8,288		8,288	U
11	0602601F	Space Technology	02	145,921				U
12	0602602F	Conventional Munitions	02	99,543	112,841		112,841	U
13	0602605F	Directed Energy Technology	02	121,610	141,800		141,800	U
14	0602788F	Dominant Information Sciences and Methods	02	191,724	185,276		185,276	U
15	0602890F	High Energy Laser Research	02	40,156	43,192		43,192	U
16	1206601F	Space Technology	02		138,598		138,598	U
		Applied Research		1,454,070	1,480,573		1,480,573	

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	See c
1	0601102F	Defense Research Sciences	01	356,107				356,107	U
2	0601103F	University Research Initiatives	01	158,859				158,859	U
3	0601108F	High Energy Laser Research Initiatives	01	14,795				14,795	U
		Basic Research		529,761				529,761	
4	0602102F	Materials	02	128,851				128,851	U
5	0602201F	Aerospace Vehicle Technologies	02	147,724				147,724	U
6	0602202F	Human Effectiveness Applied Research	02	131,795				131,795	U
7	0602203F	Aerospace Propulsion	02	198,775				198,775	U
8	0602204F	Aerospace Sensors	02	202,912				202,912	U
9	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02						U
10	0602298F	Science and Technology Management - Major Headquarters Activities	02	7,968				7,968	U
11	0602601F	Space Technology	02						U
12	0602602F	Conventional Munitions	02	142,772				142,772	U
13	0602605F	Directed Energy Technology	02	124,379				124,379	U
14	0602788F	Dominant Information Sciences and Methods	02	181,562				181,562	U
15	0602890F	High Energy Laser Research	02	44,221				44,221	U
16	1206601F	Space Technology	02	124,667				124,667	U
		Applied Research		1,435,626				1,435,626	

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se c
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17	0603112F	Advanced Materials for Weapon Systems	03	34,694	47,426		47,426	U
18	0603199F	Sustainment Science and Technology (S&T)	03	20,724	15,150		15,150	U
19	0603203F	Advanced Aerospace Sensors	03	46,784	44,968		44,968	U
20	0603211F	Aerospace Technology Dev/Demo	03	103,123	126,002		126,002	U
21	0603216F	Aerospace Propulsion and Power Technology	03	122,217	148,418		148,418	U
22	0603270F	Electronic Combat Technology	03	56,238	55,054		55,054	U
23	0603401F	Advanced Spacecraft Technology	03	94,946	70,734		70,734	U
24	0603444F	Maui Space Surveillance System (MSSS)	03	9,755	10,674		10,674	U
25	0603456F	Human Effectiveness Advanced Technology Development	03	30,153	36,420		36,420	U
26	0603601F	Conventional Weapons Technology	03	157,676	204,756		204,756	U
27	0603605F	Advanced Weapons Technology	03	42,322	43,368		43,368	U
28	0603680F	Manufacturing Technology Program	03	63,224	65,760		65,760	U
29	0603788F	Battlespace Knowledge Development and Demonstration	03	45,481	60,017		60,017	U
30	0303467F	SENSR Spectrum Pipeline SRF	03	2,188				U
		Advanced Technology Development		829,525	928,747		928,747	
31	0603260F	Intelligence Advanced Development	04	7,652	5,568		5,568	U
32	0603742F	Combat Identification Technology	04	23,578	18,194		18,194	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

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 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
17	0603112F	Advanced Materials for Weapon Systems	03	36,586				36,586	U
18	0603199F	Sustainment Science and Technology (S&T)	03	16,249				16,249	U
19	0603203F	Advanced Aerospace Sensors	03	38,292				38,292	U
20	0603211F	Aerospace Technology Dev/Demo	03	102,949				102,949	U
21	0603216F	Aerospace Propulsion and Power Technology	03	113,973				113,973	U
22	0603270F	Electronic Combat Technology	03	48,408				48,408	U
23	0603401F	Advanced Spacecraft Technology	03	70,525				70,525	U
24	0603444F	Maui Space Surveillance System (MSSS)	03	11,878				11,878	U
25	0603456F	Human Effectiveness Advanced Technology Development	03	37,542				37,542	U
26	0603601F	Conventional Weapons Technology	03	225,817				225,817	U
27	0603605F	Advanced Weapons Technology	03	37,404				37,404	U
28	0603680F	Manufacturing Technology Program	03	43,116				43,116	U
29	0603788F	Battlespace Knowledge Development and Demonstration	03	56,414				56,414	U
30	0303467F	SENSR Spectrum Pipeline SRF	03						U
		Advanced Technology Development		839,153				839,153	
31	0603260F	Intelligence Advanced Development	04	5,672				5,672	U
32	0603742F	Combat Identification Technology	04	27,085				27,085	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

## UNCLASSIFIED

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---	-----	----	---	-----	-----	-----	-----	-
33	0603790F	NATO Research and Development	04	3,710	2,305		2,305	U
34	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	27,424	32,356		32,356	U
35	0603859F	Pollution Prevention - Dem/Val	04	2	200		200	U
36	0604002F	Air Force Weather Services Research	04					U
37	0604004F	Advanced Engine Development	04		720,355		720,355	U
38	0604015F	Long Range Strike - Bomber	04	1,914,611	2,279,196		2,279,196	U
39	0604032F	Directed Energy Prototyping	04		50,000		50,000	U
40	0604033F	Hypersonics Prototyping	04		508,858		508,858	U
41	0604201F	PNT Resiliency, Mods, and Improvements	04	63,302	81,271		81,271	U
42	0604257F	Advanced Technology and Sensors	04	78,122	34,585		34,585	U
43	0604288F	National Airborne Ops Center (NAOC) Recap	04	6,141	7,440		7,440	U
44	0604317F	Technology Transfer	04	17,644	16,924		16,924	U
45	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	39,682	36,701		36,701	U
46	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	41,055	62,618		62,618	U
47	0604776F	Deployment & Distribution Enterprise R&D	04	25,597	27,964		27,964	U
48	0604858F	Tech Transition Program	04	1,079,458	167,277		167,277	U
49	0605230F	Ground Based Strategic Deterrent	04	221,536	414,441		414,441	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-5

Volume 3a - xx

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
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Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
33	0603790F	NATO Research and Development	04	4,955				4,955	U
34	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	44,109				44,109	U
35	0603859F	Pollution Prevention - Dem/Val	04						U
36	0604002F	Air Force Weather Services Research	04	772				772	U
37	0604004F	Advanced Engine Development	04	878,442				878,442	U
38	0604015F	Long Range Strike - Bomber	04	3,003,899				3,003,899	U
39	0604032F	Directed Energy Prototyping	04	10,000				10,000	U
40	0604033F	Hypersonics Prototyping	04	576,000				576,000	U
41	0604201F	PNT Resiliency, Mods, and Improvements	04	92,600				92,600	U
42	0604257F	Advanced Technology and Sensors	04	23,145				23,145	U
43	0604288F	National Airborne Ops Center (NAOC) Recap	04	16,669				16,669	U
44	0604317F	Technology Transfer	04	23,614				23,614	U
45	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	113,121				113,121	U
46	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	56,325				56,325	U
47	0604776F	Deployment & Distribution Enterprise R&D	04	28,034				28,034	U
48	0604858F	Tech Transition Program	04	128,476		26,450	26,450	154,926	U
49	0605230F	Ground Based Strategic Deterrent	04	570,373				570,373	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se c
50	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04					U
51	0207110F	Next Generation Air Dominance	04	283,964	429,610		429,610	U
52	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	12,122	24,856		24,856	U
53	0208099F	Unified Platform (UP)	04		29,800		29,800	U
54	0305236F	Common Data Link Executive Agent (CDL EA)	04	40,838	41,880		41,880	U
55	0305251F	Cyberspace Operations Forces and Force Support	04					U
56	0305601F	Mission Partner Environments	04		10,074		10,074	U
57	0306250F	Cyber Operations Technology Development	04	278,521	246,502		246,502	U
58	0306415F	Enabled Cyber Activities	04	16,687	16,325		16,325	U
59	0408011F	Special Tactics / Combat Control	04	4,266				U
60	0901410F	Contracting Information Technology System	04	18,973	17,577		17,577	U
61	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04	321,186	252,834		252,834	U
62	1203710F	EO/IR Weather Systems	04	8,000	7,940		7,940	U
63	1206422F	Weather System Follow-on	04	98,396	138,052		138,052	U
64	1206425F	Space Situation Awareness Systems	04	43,290	33,469		33,469	U
65	1206427F	Space Systems Prototype Transitions (SSPT)	04					U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-6

Volume 3a - xxii

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	See
50	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04	35,000				35,000	U
51	0207110F	Next Generation Air Dominance	04	1,000,000				1,000,000	U
52	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	37,290				37,290	U
53	0208099F	Unified Platform (UP)	04	10,000				10,000	U
54	0305236F	Common Data Link Executive Agent (CDL EA)	04	36,910				36,910	U
55	0305251F	Cyberspace Operations Forces and Force Support	04	35,000				35,000	U
56	0305601F	Mission Partner Environments	04	8,550				8,550	U
57	0306250F	Cyber Operations Technology Development	04	198,864				198,864	U
58	0306415F	Enabled Cyber Activities	04	16,632				16,632	U
59	0408011F	Special Tactics / Combat Control	04						U
60	0901410F	Contracting Information Technology System	04	20,830				20,830	U
61	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04	329,948				329,948	U
62	1203710F	EO/IR Weather Systems	04	101,222				101,222	U
63	1206422F	Weather System Follow-on	04	225,660				225,660	U
64	1206425F	Space Situation Awareness Systems	04	29,776				29,776	U
65	1206427F	Space Systems Prototype Transitions (SSPT)	04	142,045				142,045	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-6A

Volume 3a - xxiii

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
66	1206434F	Midterm Polar MILSATCOM System	04	60,123	383,113		383,113	U
67	1206438F	Space Control Technology	04	44,139	90,546	1,100	91,646	U
68	1206730F	Space Security and Defense Program	04	41,385	45,542		45,542	U
69	1206760F	Protected Tactical Enterprise Service (PTES)	04	17,552	46,419		46,419	U
70	1206761F	Protected Tactical Service (PTS)	04	23,404	29,626		29,626	U
71	1206855F	Evolved Strategic SATCOM (ESS)	04	15,473	29,229		29,229	U
72	1206857F	Space Rapid Capabilities Office	04	84,235	286,050	12,395	298,445	U
		Advanced Component Development & Prototypes		4,962,068	6,625,697	13,495	6,639,192	
73	0604200F	Future Advanced Weapon Analysis & Programs	05	5,108	39,602		39,602	U
74	0604201F	PNT Resiliency, Mods, and Improvements	05	97,943	46,731		46,731	U
75	0604222F	Nuclear Weapons Support	05	2,910	4,468		4,468	U
76	0604270F	Electronic Warfare Development	05	2,159	1,909		1,909	U
77	0604281F	Tactical Data Networks Enterprise	05	42,128	270,015		270,015	U
78	0604287F	Physical Security Equipment	05	39,639	14,421		14,421	U
79	0604329F	Small Diameter Bomb (SDB) - EMD	05	37,667	78,091		78,091	U
80	0604429F	Airborne Electronic Attack	05	4,910	6,153		6,153	U
81	0604602F	Armament/Ordnance Development	05	16,765	49,590		49,590	U
82	0604604F	Submunitions	05	2,697	2,990		2,990	U
83	0604617F	Agile Combat Support	05	36,351	23,489		23,489	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
66	1206434F	Midterm Polar MILSATCOM System	04						U
67	1206438F	Space Control Technology	04	64,231				64,231	U
68	1206730F	Space Security and Defense Program	04	56,385				56,385	U
69	1206760F	Protected Tactical Enterprise Service (PTES)	04	105,003				105,003	U
70	1206761F	Protected Tactical Service (PTS)	04	173,694				173,694	U
71	1206855F	Evolved Strategic SATCOM (ESS)	04	172,206				172,206	U
72	1206857F	Space Rapid Capabilities Office	04	33,742		17,885	17,885	51,627	U
		Advanced Component Development & Prototypes		8,436,279		44,335	44,335	8,480,614	
73	0604200F	Future Advanced Weapon Analysis & Programs	05	246,200				246,200	U
74	0604201F	PNT Resiliency, Mods, and Improvements	05	67,782				67,782	U
75	0604222F	Nuclear Weapons Support	05	4,406				4,406	U
76	0604270F	Electronic Warfare Development	05	2,066				2,066	U
77	0604281F	Tactical Data Networks Enterprise	05	229,631				229,631	U
78	0604287F	Physical Security Equipment	05	9,700				9,700	U
79	0604329F	Small Diameter Bomb (SDB) - EMD	05	31,241				31,241	U
80	0604429F	Airborne Electronic Attack	05	2				2	U
81	0604602F	Armament/Ordnance Development	05	28,043				28,043	U
82	0604604F	Submunitions	05	3,045				3,045	U
83	0604617F	Agile Combat Support	05	19,944				19,944	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
84	0604706F	Life Support Systems	05	10,342	8,919		8,919	U
85	0604735F	Combat Training Ranges	05	75,981	43,895		43,895	U
86	0604800F	F-35 - EMD	05	282,126	69,001		69,001	U
87	0604932F	Long Range Standoff Weapon	05	437,521	664,920		664,920	U
88	0604933F	ICBM Fuze Modernization	05	166,571	167,659		167,659	U
89	0605030F	Joint Tactical Network Center (JTNC)	05	404				U
90	0605031F	Joint Tactical Network (JTN)	05	1,331				U
91	0605056F	Open Architecture Management	05					U
92	0605213F	F-22 Modernization Increment 3.2B	05	10,482				U
93	0605221F	KC-46	05	75,598	80,170		80,170	U
94	0605223F	Advanced Pilot Training	05	82,628	245,465		245,465	U
95	0605229F	Combat Rescue Helicopter	05	342,030	445,652		445,652	U
96	0605458F	Air & Space Ops Center 10.2 RDT&E	05	4,666				U
97	0605830F	Acq Workforce- Global Battle Mgmt	05		3,617		3,617	U
98	0605931F	B-2 Defensive Management System	05	148,946	253,258		253,258	U
99	0101125F	Nuclear Weapons Modernization	05	81,631	81,592		81,592	U
100	0101213F	Minuteman Squadrons	05					U
101	0207171F	F-15 EPAWSS	05	202,167	137,095		137,095	U
102	0207328F	Stand In Attack Weapon	05	3,288	14,975		14,975	U
103	0207701F	Full Combat Mission Training	05	8,427	1,015		1,015	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
84	0604706F	Life Support Systems	05	8,624				8,624	U
85	0604735F	Combat Training Ranges	05	37,365				37,365	U
86	0604800F	F-35 - EMD	05	7,628				7,628	U
87	0604932F	Long Range Standoff Weapon	05	712,539				712,539	U
88	0604933F	ICBM Fuze Modernization	05	161,199				161,199	U
89	0605030F	Joint Tactical Network Center (JTNC)	05	2,414				2,414	U
90	0605031F	Joint Tactical Network (JTN)	05						U
91	0605056F	Open Architecture Management	05	30,000				30,000	U
92	0605213F	F-22 Modernization Increment 3.2B	05						U
93	0605221F	KC-46	05	59,561				59,561	U
94	0605223F	Advanced Pilot Training	05	348,473				348,473	U
95	0605229F	Combat Rescue Helicopter	05	247,047				247,047	U
96	0605458F	Air & Space Ops Center 10.2 RDT&E	05						U
97	0605830F	Acq Workforce- Global Battle Mgmt	05						U
98	0605931F	B-2 Defensive Management System	05	294,400				294,400	U
99	0101125F	Nuclear Weapons Modernization	05	27,564				27,564	U
100	0101213F	Minuteman Squadrons	05	1				1	U
101	0207171F	F-15 EPAWSS	05	47,322				47,322	U
102	0207328F	Stand In Attack Weapon	05	162,840				162,840	U
103	0207701F	Full Combat Mission Training	05	9,797				9,797	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-8A

Volume 3a - xxvii

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se c
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104	0303267F	Auctioned Spectrum Relocation Fund	05	60,546				U
105	0307581F	JSTARS Recap	05	390,713				U
106	0401310F	C-32 Executive Transport Recapitalization	05	2,918	7,943		7,943	U
107	0401319F	VC-25B	05	418,500	657,932		657,932	U
108	0701212F	Automated Test Systems	05	17,850	13,653		13,653	U
109	1203176F	Combat Survivor Evader Locator	05	24,099	939		939	U
110	1203269F	GPS III Follow-On (GPS IIIF)	05		426,889		426,889	U
111	1203940F	Space Situation Awareness Operations	05	9,684	46,015		46,015	U
112	1206421F	Counterspace Systems	05	64,208	20,242		20,242	U
113	1206422F	Weather System Follow-on	05					U
114	1206425F	Space Situation Awareness Systems	05	47,580	134,464		134,464	U
115	1206426F	Space Fence	05	34,022	19,425		19,425	U
116	1206431F	Advanced EHF MILSATCOM (SPACE)	05	134,775	144,753		144,753	U
117	1206432F	Polar MILSATCOM (SPACE)	05	32,536	26,380		26,380	U
118	1206433F	Wideband Global SATCOM (SPACE)	05	6,535	3,970		3,970	U
119	1206441F	Space Based Infrared System (SBIRS) High EMD	05	119,585	60,565		60,565	U
120	1206442F	Next Generation OPIR	05	439,497	643,126		643,126	U
121	1206445F	Commercial SATCOM (COMSATCOM) Integration	05		49,500		49,500	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
104	0303267F	Auctioned Spectrum Relocation Fund	05						U
105	0307581F	JSTARS Recap	05						U
106	0401310F	C-32 Executive Transport Recapitalization	05	9,930				9,930	U
107	0401319F	VC-25B	05	757,923				757,923	U
108	0701212F	Automated Test Systems	05	2,787				2,787	U
109	1203176F	Combat Survivor Evader Locator	05	2,000				2,000	U
110	1203269F	GPS III Follow-On (GPS IIIF)	05	462,875				462,875	U
111	1203940F	Space Situation Awareness Operations	05	76,829				76,829	U
112	1206421F	Counterspace Systems	05	29,037				29,037	U
113	1206422F	Weather System Follow-on	05	2,237				2,237	U
114	1206425F	Space Situation Awareness Systems	05	412,894				412,894	U
115	1206426F	Space Fence	05						U
116	1206431F	Advanced EHF MILSATCOM (SPACE)	05	117,290				117,290	U
117	1206432F	Polar MILSATCOM (SPACE)	05	427,400				427,400	U
118	1206433F	Wideband Global SATCOM (SPACE)	05	1,920				1,920	U
119	1206441F	Space Based Infrared System (SBIRS) High EMD	05	1				1	U
120	1206442F	Next Generation OPIR	05	1,395,278				1,395,278	U
121	1206445F	Commercial SATCOM (COMSATCOM) Integration	05						U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
122	1206853F	National Security Space Launch Program (SPACE) - EMD	05	381,877	443,035		443,035	U
		System Development & Demonstration		4,407,341	5,453,523		5,453,523	
123	0604256F	Threat Simulator Development	06	34,777	34,206		34,206	U
124	0604759F	Major T&E Investment	06	111,138	216,844		216,844	U
125	0605101F	RAND Project Air Force	06	33,089	34,614		34,614	U
126	0605502F	Small Business Innovation Research	06	663,657				U
127	0605712F	Initial Operational Test & Evaluation	06	15,523	18,043		18,043	U
128	0605807F	Test and Evaluation Support	06	735,688	692,784		692,784	U
129	0605826F	Acq Workforce- Global Power	06	216,144	227,824		227,824	U
130	0605827F	Acq Workforce- Global Vig & Combat Sys	06	225,854	256,617		256,617	U
131	0605828F	Acq Workforce- Global Reach	06	138,491	149,586		149,586	U
132	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06	205,643	226,257		226,257	U
133	0605830F	Acq Workforce- Global Battle Mgmt	06	146,852	165,438		165,438	U
134	0605831F	Acq Workforce- Capability Integration	06	221,676	220,320		220,320	U
135	0605832F	Acq Workforce- Advanced Prgm Technology	06	27,997	37,399		37,399	U
136	0605833F	Acq Workforce- Nuclear Systems	06	124,111	122,481		122,481	U
137	0605898F	Management HQ - R&D	06	9,394	10,364		10,364	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
122	1206853F	National Security Space Launch Program (SPACE) - EMD	05	432,009				432,009	U
		System Development & Demonstration		6,929,244				6,929,244	
123	0604256F	Threat Simulator Development	06	59,693				59,693	U
124	0604759F	Major T&E Investment	06	181,663				181,663	U
125	0605101F	RAND Project Air Force	06	35,258				35,258	U
126	0605502F	Small Business Innovation Research	06						U
127	0605712F	Initial Operational Test & Evaluation	06	13,793				13,793	U
128	0605807F	Test and Evaluation Support	06	717,895				717,895	U
129	0605826F	Acq Workforce- Global Power	06	258,667				258,667	U
130	0605827F	Acq Workforce- Global Vig & Combat Sys	06	251,992				251,992	U
131	0605828F	Acq Workforce- Global Reach	06	149,191				149,191	U
132	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06	235,360				235,360	U
133	0605830F	Acq Workforce- Global Battle Mgmt	06	160,196				160,196	U
134	0605831F	Acq Workforce- Capability Integration	06	220,255				220,255	U
135	0605832F	Acq Workforce- Advanced Prgm Technology	06	42,392				42,392	U
136	0605833F	Acq Workforce- Nuclear Systems	06	133,231				133,231	U
137	0605898F	Management HQ - R&D	06	5,590				5,590	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
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138	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	135,507	187,216		187,216	U
139	0605978F	Facilities Sustainment - Test and Evaluation Support	06	28,720	28,888		28,888	U
140	0606017F	Requirements Analysis and Maturation	06	106,646	48,070		48,070	U
141	0606398F	Management HQ - T&E	06					U
142	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	18,980	20,435		20,435	U
143	0702806F	Acquisition and Management Support	06	14,706	12,367		12,367	U
144	0804731F	General Skill Training	06	457	448		448	U
145	0909999F	Financing for Cancelled Account Adjustments	06	391				U
146	1001004F	International Activities	06	4,418	3,998		3,998	U
147	1206116F	Space Test and Training Range Development	06	24,886	23,157		23,157	U
148	1206392F	Space and Missile Center (SMC) Civilian Workforce	06	175,247	169,912		169,912	U
149	1206398F	Space & Missile Systems Center - MHA	06	8,681	10,508		10,508	U
150	1206860F	Rocket Systems Launch Program (SPACE)	06	33,023	19,721		19,721	U
151	1206864F	Space Test Program (STP)	06	29,016	25,620		25,620	U
		Management Support		3,490,712	2,963,117		2,963,117	
152	0604003F	Advanced Battle Management System (ABMS)	07		27,883		27,883	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
138	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	88,445				88,445	U
139	0605978F	Facilities Sustainment - Test and Evaluation Support	06	29,424				29,424	U
140	0606017F	Requirements Analysis and Maturation	06	62,715				62,715	U
141	0606398F	Management HQ - T&E	06	5,013				5,013	U
142	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	17,128				17,128	U
143	0702806F	Acquisition and Management Support	06	5,913				5,913	U
144	0804731F	General Skill Training	06	1,475				1,475	U
145	0909999F	Financing for Cancelled Account Adjustments	06						U
146	1001004F	International Activities	06	4,071				4,071	U
147	1206116F	Space Test and Training Range Development	06	19,942				19,942	U
148	1206392F	Space and Missile Center (SMC) Civilian Workforce	06	167,810				167,810	U
149	1206398F	Space & Missile Systems Center - MHA	06	10,170				10,170	U
150	1206860F	Rocket Systems Launch Program (SPACE)	06	13,192				13,192	U
151	1206864F	Space Test Program (STP)	06	26,097				26,097	U
		Management Support		2,916,571				2,916,571	
152	0604003F	Advanced Battle Management System (ABMS)	07	35,611				35,611	U

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
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153	0604222F	Nuclear Weapons Support	07	26,672				U
154	0604233F	Specialized Undergraduate Flight Training	07	6,269	11,344		11,344	U
155	0604445F	Wide Area Surveillance	07	37,750				U
156	0604776F	Deployment & Distribution Enterprise R&D	07					U
157	0604840F	F-35 C2D2	07					U
158	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	17,298	41,058		41,058	U
159	0605024F	Anti-Tamper Technology Executive Agency	07	37,304	32,770		32,770	U
160	0605117F	Foreign Materiel Acquisition and Exploitation	07	66,653	68,368		68,368	U
161	0605278F	HC/MC-130 Recap RDT&E	07	30,784	16,174		16,174	U
162	0606018F	NC3 Integration	07	12,382	19,312		19,312	U
163	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07		87,800		87,800	U
164	0101113F	B-52 Squadrons	07	107,936	291,264	34,000	325,264	U
165	0101122F	Air-Launched Cruise Missile (ALCM)	07	446	5,955		5,955	U
166	0101126F	B-1B Squadrons	07	60,367	60,295		60,295	U
167	0101127F	B-2 Squadrons	07	89,781	105,508		105,508	U
168	0101213F	Minuteman Squadrons	07	204,208	154,733		154,733	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
153	0604222F	Nuclear Weapons Support	07						U
154	0604233F	Specialized Undergraduate Flight Training	07	2,584				2,584	U
155	0604445F	Wide Area Surveillance	07						U
156	0604776F	Deployment & Distribution Enterprise R&D	07	903				903	U
157	0604840F	F-35 C2D2	07	694,455				694,455	U
158	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	40,567				40,567	U
159	0605024F	Anti-Tamper Technology Executive Agency	07	47,193				47,193	U
160	0605117F	Foreign Materiel Acquisition and Exploitation	07	70,083				70,083	U
161	0605278F	HC/MC-130 Recap RDT&E	07	17,218				17,218	U
162	0606018F	NC3 Integration	07	25,917				25,917	U
163	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07						U
164	0101113F	B-52 Squadrons	07	325,974				325,974	U
165	0101122F	Air-Launched Cruise Missile (ALCM)	07	10,217				10,217	U
166	0101126F	B-1B Squadrons	07	1,000				1,000	U
167	0101127F	B-2 Squadrons	07	97,276				97,276	U
168	0101213F	Minuteman Squadrons	07	128,961				128,961	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
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169	0101313F	Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM	07	24,898				U
170	0101316F	Worldwide Joint Strategic Communications	07	12,868	18,442		18,442	U
171	0101324F	Integrated Strategic Planning & Analysis Network	07	10,757	22,833		22,833	U
172	0101328F	ICBM Reentry Vehicles	07		14,167		14,167	U
174	0102110F	UH-1N Replacement Program	07	188,259	258,022		258,022	U
175	0102326F	Region/Sector Operation Control Center Modernization Program	07	3,766	6,112		6,112	U
176	0205219F	MQ-9 UAV	07	184,353	104,345	4,500	108,845	U
177	0205671F	Joint Counter RCIED Electronic Warfare	07			4,000	4,000	U
178	0207131F	A-10 Squadrons	07	17,459	26,738	1,000	27,738	U
179	0207133F	F-16 Squadrons	07	250,264	185,864		185,864	U
180	0207134F	F-15E Squadrons	07	308,218	203,183		203,183	U
181	0207136F	Manned Destructive Suppression	07	11,735	15,238		15,238	U
182	0207138F	F-22A Squadrons	07	584,004	584,743		584,743	U
183	0207142F	F-35 Squadrons	07	325,224	503,928		503,928	U
184	0207161F	Tactical AIM Missiles	07	36,303	37,230		37,230	U
185	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	51,374	57,293		57,293	U
186	0207227F	Combat Rescue - Pararescue	07	685	647		647	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	See c
169	0101313F	Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM	07						U
170	0101316F	Worldwide Joint Strategic Communications	07	18,177				18,177	U
171	0101324F	Integrated Strategic Planning & Analysis Network	07	24,261				24,261	U
172	0101328F	ICBM Reentry Vehicles	07	75,571				75,571	U
174	0102110F	UH-1N Replacement Program	07	170,975				170,975	U
175	0102326F	Region/Sector Operation Control Center Modernization Program	07						U
176	0205219F	MQ-9 UAV	07	154,996				154,996	U
177	0205671F	Joint Counter RCIED Electronic Warfare	07			4,000	4,000	4,000	U
178	0207131F	A-10 Squadrons	07	36,816				36,816	U
179	0207133F	F-16 Squadrons	07	193,013				193,013	U
180	0207134F	F-15E Squadrons	07	336,079				336,079	U
181	0207136F	Manned Destructive Suppression	07	15,521				15,521	U
182	0207138F	F-22A Squadrons	07	496,298				496,298	U
183	0207142F	F-35 Squadrons	07	99,943				99,943	U
184	0207161F	Tactical AIM Missiles	07	10,314				10,314	U
185	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	55,384				55,384	U
186	0207227F	Combat Rescue - Pararescue	07	281				281	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-13A

Volume 3a - xxxvii

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se c
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187	0207247F	AF TENCAP	07					U
188	0207249F	Precision Attack Systems Procurement	07	1,651	14,891		14,891	U
189	0207253F	Compass Call	07	34,240	43,901		43,901	U
190	0207268F	Aircraft Engine Component Improvement Program	07	105,664	121,203		121,203	U
191	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	29,436	42,472		42,472	U
192	0207410F	Air & Space Operations Center (AOC)	07	86,456	104,954		104,954	U
193	0207412F	Control and Reporting Center (CRC)	07	2,374	6,413		6,413	U
194	0207417F	Airborne Warning and Control System (AWACS)	07	118,702	112,280		112,280	U
195	0207418F	Tactical Airborne Control Systems	07	3,522	2,659		2,659	U
197	0207431F	Combat Air Intelligence System Activities	07	15,821	10,316		10,316	U
198	0207444F	Tactical Air Control Party-Mod	07	10,623	6,149		6,149	U
199	0207448F	C2ISR Tactical Data Link	07	1,754	538		538	U
200	0207452F	DCAPES	07	12,423	13,248		13,248	U
201	0207573F	National Technical Nuclear Forensics	07	2,307	1,788		1,788	U
202	0207590F	Seek Eagle	07	25,304	24,699		24,699	U
203	0207601F	USAF Modeling and Simulation	07	9,803	17,078		17,078	U
204	0207605F	Wargaming and Simulation Centers	07	12,369	6,141		6,141	U
205	0207610F	Battlefield Abn Comm Node (BACN)	07			42,349	42,349	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
187	0207247F	AF TENCAP	07	21,365				21,365	U
188	0207249F	Precision Attack Systems Procurement	07	10,696				10,696	U
189	0207253F	Compass Call	07	15,888				15,888	U
190	0207268F	Aircraft Engine Component Improvement Program	07	112,505				112,505	U
191	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	78,498				78,498	U
192	0207410F	Air & Space Operations Center (AOC)	07	114,864				114,864	U
193	0207412F	Control and Reporting Center (CRC)	07	8,109				8,109	U
194	0207417F	Airborne Warning and Control System (AWACS)	07	67,996				67,996	U
195	0207418F	Tactical Airborne Control Systems	07	2,462				2,462	U
197	0207431F	Combat Air Intelligence System Activities	07	13,668				13,668	U
198	0207444F	Tactical Air Control Party-Mod	07	6,217				6,217	U
199	0207448F	C2ISR Tactical Data Link	07						U
200	0207452F	DCAPES	07	19,910				19,910	U
201	0207573F	National Technical Nuclear Forensics	07	1,788				1,788	U
202	0207590F	Seek Eagle	07	28,237				28,237	U
203	0207601F	USAF Modeling and Simulation	07	15,725				15,725	U
204	0207605F	Wargaming and Simulation Centers	07	4,316				4,316	U
205	0207610F	Battlefield Abn Comm Node (BACN)	07	26,946				26,946	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
206	0207697F	Distributed Training and Exercises	07	4,046	3,825		3,825	U
207	0208006F	Mission Planning Systems	07	82,054	63,074		63,074	U
208	0208007F	Tactical Deception	07	3,623	6,949		6,949	U
209	0208064F	OPERATIONAL HQ - CYBER	07					U
210	0208087F	Distributed Cyber Warfare Operations	07	38,241	40,168		40,168	U
211	0208088F	AF Defensive Cyberspace Operations	07	19,628	38,387		38,387	U
212	0208097F	Joint Cyber Command and Control (JCC2)	07		13,000		13,000	U
213	0208099F	Unified Platform (UP)	07		26,559		26,559	U
217	0208288F	Intel Data Applications	07			1,200	1,200	U
218	0301017F	Global Sensor Integrated on Network (GSIN)	07	3,439	3,579		3,579	U
219	0301025F	GeoBase	07					U
220	0301112F	Nuclear Planning and Execution System (NPES)	07	5,056	29,620		29,620	U
226	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	3,721	6,633		6,633	U
227	0302015F	E-4B National Airborne Operations Center (NAOC)	07	37,481	57,758		57,758	U
228	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	34,466	64,543		64,543	U
229	0303133F	High Frequency Radio Systems	07		51,612		51,612	U
230	0303140F	Information Systems Security Program	07	41,067	33,979		33,979	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
206	0207697F	Distributed Training and Exercises	07	4,303				4,303	U
207	0208006F	Mission Planning Systems	07	71,465				71,465	U
208	0208007F	Tactical Deception	07	7,446				7,446	U
209	0208064F	OPERATIONAL HQ - CYBER	07	7,602				7,602	U
210	0208087F	Distributed Cyber Warfare Operations	07	35,178				35,178	U
211	0208088F	AF Defensive Cyberspace Operations	07	16,609				16,609	U
212	0208097F	Joint Cyber Command and Control (JCC2)	07	11,603				11,603	U
213	0208099F	Unified Platform (UP)	07	84,702				84,702	U
217	0208288F	Intel Data Applications	07			1,200	1,200	1,200	U
218	0301017F	Global Sensor Integrated on Network (GSIN)	07						U
219	0301025F	GeoBase	07	2,723				2,723	U
220	0301112F	Nuclear Planning and Execution System (NPES)	07	44,190				44,190	U
226	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	3,575				3,575	U
227	0302015F	E-4B National Airborne Operations Center (NAOC)	07	70,173				70,173	U
228	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	13,543				13,543	U
229	0303133F	High Frequency Radio Systems	07	15,881				15,881	U
230	0303140F	Information Systems Security Program	07	27,726				27,726	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
231	0303141F	Global Combat Support System	07	101				U
232	0303142F	Global Force Management - Data Initiative	07	1,944	2,170		2,170	U
234	0304115F	Multi Domain Command and Control (MDC2)	07					U
235	0304260F	Airborne SIGINT Enterprise	07	116,186	109,873		109,873	U
236	0304310F	Commercial Economic Analysis	07	3,544	3,472		3,472	U
239	0305015F	C2 Air Operations Suite - C2 Info Services	07		8,608		8,608	U
240	0305020F	CCMD Intelligence Information Technology	07	1,542	1,586		1,586	U
241	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07					U
242	0305099F	Global Air Traffic Management (GATM)	07	4,887	4,106		4,106	U
243	0305111F	Weather Service	07	35,689	31,615	3,000	34,615	U
244	0305114F	Air Traffic Control, Approach, and Landing System (ATCALs)	07	5,791	13,271		13,271	U
245	0305116F	Aerial Targets	07	20,944	6,683		6,683	U
248	0305128F	Security and Investigative Activities	07	400	418		418	U
249	0305145F	Arms Control Implementation	07		21,374		21,374	U
250	0305146F	Defense Joint Counterintelligence Activities	07	4,520	3,845		3,845	U
252	0305179F	Integrated Broadcast Service (IBS)	07					U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
231	0303141F	Global Combat Support System	07						U
232	0303142F	Global Force Management - Data Initiative	07	2,210				2,210	U
234	0304115F	Multi Domain Command and Control (MDC2)	07	150,880				150,880	U
235	0304260F	Airborne SIGINT Enterprise	07	102,667				102,667	U
236	0304310F	Commercial Economic Analysis	07	3,431				3,431	U
239	0305015F	C2 Air Operations Suite - C2 Info Services	07	9,313				9,313	U
240	0305020F	CCMD Intelligence Information Technology	07	1,121				1,121	U
241	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07	19,000				19,000	U
242	0305099F	Global Air Traffic Management (GATM)	07	4,544				4,544	U
243	0305111F	Weather Service	07	25,461				25,461	U
244	0305114F	Air Traffic Control, Approach, and Landing System (ATCALs)	07	5,651				5,651	U
245	0305116F	Aerial Targets	07	7,448				7,448	U
248	0305128F	Security and Investigative Activities	07	425				425	U
249	0305145F	Arms Control Implementation	07	54,546				54,546	U
250	0305146F	Defense Joint Counterintelligence Activities	07	6,858				6,858	U
252	0305179F	Integrated Broadcast Service (IBS)	07	8,728				8,728	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
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253	0305202F	Dragon U-2	07	34,486	65,518	22,100	87,618	U
254	0305205F	Endurance Unmanned Aerial Vehicles	07	40,000	15,000		15,000	U
255	0305206F	Airborne Reconnaissance Systems	07	19,450	195,334		195,334	U
256	0305207F	Manned Reconnaissance Systems	07	14,297	14,223		14,223	U
257	0305208F	Distributed Common Ground/Surface Systems	07	38,064	24,554	29,500	54,054	U
258	0305220F	RQ-4 UAV	07	222,693	221,690		221,690	U
259	0305221F	Network-Centric Collaborative Targeting	07	14,837	14,288		14,288	U
260	0305238F	NATO AGS	07	44,729	51,527		51,527	U
261	0305240F	Support to DCGS Enterprise	07	26,349	26,579		26,579	U
262	0305600F	International Intelligence Technology and Architectures	07	9,491	8,464		8,464	U
263	0305881F	Rapid Cyber Acquisition	07	4,720	4,303		4,303	U
264	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,364	2,466		2,466	U
265	0307577F	Intelligence Mission Data (IMD)	07	8,684	4,117		4,117	U
266	0401115F	C-130 Airlift Squadron	07	10,219	105,988		105,988	U
267	0401119F	C-5 Airlift Squadrons (IF)	07	11,433	25,071		25,071	U
268	0401130F	C-17 Aircraft (IF)	07	21,701	48,299		48,299	U
269	0401132F	C-130J Program	07	24,908	15,409		15,409	U
270	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	5,095	4,334		4,334	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-17

Volume 3a - xliv

## UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	See
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253	0305202F	Dragon U-2	07	38,939				38,939	U
254	0305205F	Endurance Unmanned Aerial Vehicles	07						U
255	0305206F	Airborne Reconnaissance Systems	07	122,909				122,909	U
256	0305207F	Manned Reconnaissance Systems	07	11,787				11,787	U
257	0305208F	Distributed Common Ground/Surface Systems	07	25,009				25,009	U
258	0305220F	RQ-4 UAV	07	191,733				191,733	U
259	0305221F	Network-Centric Collaborative Targeting	07	10,757				10,757	U
260	0305238F	NATO AGS	07	32,567				32,567	U
261	0305240F	Support to DCGS Enterprise	07	37,774				37,774	U
262	0305600F	International Intelligence Technology and Architectures	07	13,515				13,515	U
263	0305881F	Rapid Cyber Acquisition	07	4,383				4,383	U
264	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,133				2,133	U
265	0307577F	Intelligence Mission Data (IMD)	07	8,614				8,614	U
266	0401115F	C-130 Airlift Squadron	07	140,425				140,425	U
267	0401119F	C-5 Airlift Squadrons (IF)	07	10,223				10,223	U
268	0401130F	C-17 Aircraft (IF)	07	25,101				25,101	U
269	0401132F	C-130J Program	07	8,640				8,640	U
270	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	5,424				5,424	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Page F-17A

Volume 3a - xlv

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
271	0401218F	KC-135s	07	8,645	3,493		3,493	U
272	0401219F	KC-10s	07	9,181	6,569		6,569	U
273	0401314F	Operational Support Airlift	07	5,196	3,172		3,172	U
274	0401318F	CV-22	07	17,744	16,502		16,502	U
275	0401840F	AMC Command and Control System	07	3,394	1,688		1,688	U
276	0408011F	Special Tactics / Combat Control	07	7,726	2,433		2,433	U
277	0702207F	Depot Maintenance (Non-IF)	07	1,517	1,897		1,897	U
278	0708055F	Maintenance, Repair & Overhaul System	07	28,726	50,933		50,933	U
279	0708610F	Logistics Information Technology (LOGIT)	07	23,332	13,479		13,479	U
280	0708611F	Support Systems Development	07	11,362	4,497		4,497	U
281	0804743F	Other Flight Training	07	1,998	2,022		2,022	U
282	0808716F	Other Personnel Activities	07	103	108		108	U
283	0901202F	Joint Personnel Recovery Agency	07	1,933	2,023		2,023	U
284	0901218F	Civilian Compensation Program	07	2,905	3,561		3,561	U
285	0901220F	Personnel Administration	07	5,404	4,258		4,258	U
286	0901226F	Air Force Studies and Analysis Agency	07	1,506	1,418		1,418	U
287	0901538F	Financial Management Information Systems Development	07	87,802	93,418		93,418	U
288	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07					U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
271	0401218F	KC-135s	07						U
272	0401219F	KC-10s	07	20				20	U
273	0401314F	Operational Support Airlift	07						U
274	0401318F	CV-22	07	17,906				17,906	U
275	0401840F	AMC Command and Control System	07						U
276	0408011F	Special Tactics / Combat Control	07	3,629				3,629	U
277	0702207F	Depot Maintenance (Non-IF)	07	1,890				1,890	U
278	0708055F	Maintenance, Repair & Overhaul System	07	10,311				10,311	U
279	0708610F	Logistics Information Technology (LOGIT)	07	16,065				16,065	U
280	0708611F	Support Systems Development	07	539				539	U
281	0804743F	Other Flight Training	07	2,057				2,057	U
282	0808716F	Other Personnel Activities	07	10				10	U
283	0901202F	Joint Personnel Recovery Agency	07	2,060				2,060	U
284	0901218F	Civilian Compensation Program	07	3,809				3,809	U
285	0901220F	Personnel Administration	07	6,476				6,476	U
286	0901226F	Air Force Studies and Analysis Agency	07	1,443				1,443	U
287	0901538F	Financial Management Information Systems Development	07	9,323				9,323	U
288	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07	46,789				46,789	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
289	1201017F	Global Sensor Integrated on Network (GSIN)	07					U
290	1201921F	Service Support to STRATCOM - Space Activities	07	13,769	14,161		14,161	U
291	1202140F	Service Support to SPACECOM Activities	07					U
292	1202247F	AF TENCAP	07	80,726	26,986	5,000	31,986	U
293	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07	26,262	60,168		60,168	U
294	1203110F	Satellite Control Network (SPACE)	07	18,133	26,440		26,440	U
296	1203165F	NAVSTAR Global Positioning System (Space and Control Segments)	07	7,681	8,937		8,937	U
297	1203173F	Space and Missile Test and Evaluation Center	07	43,715	79,935		79,935	U
298	1203174F	Space Innovation, Integration and Rapid Technology Development	07	9,081	21,019		21,019	U
299	1203179F	Integrated Broadcast Service (IBS)	07	8,747	8,568		8,568	U
300	1203182F	Spacelift Range System (SPACE)	07	20,035	20,168		20,168	U
301	1203265F	GPS III Space Segment	07	233,043	141,892		141,892	U
302	1203400F	Space Superiority Intelligence	07	10,691	16,278		16,278	U
303	1203614F	JSpOC Mission System	07	125,191	70,383		70,383	U
304	1203620F	National Space Defense Center	07	18,052	55,309		55,309	U
305	1203699F	Shared Early Warning (SEW)	07	1,327				U
306	1203873F	Ballistic Missile Defense Radars	07					U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
289	1201017F	Global Sensor Integrated on Network (GSIN)	07	3,647				3,647	U
290	1201921F	Service Support to STRATCOM - Space Activities	07	988				988	U
291	1202140F	Service Support to SPACECOM Activities	07	11,863				11,863	U
292	1202247F	AF TENCAP	07						U
293	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07	197,388				197,388	U
294	1203110F	Satellite Control Network (SPACE)	07	61,891				61,891	U
296	1203165F	NAVSTAR Global Positioning System (Space and Control Segments)	07						U
297	1203173F	Space and Missile Test and Evaluation Center	07	4,566				4,566	U
298	1203174F	Space Innovation, Integration and Rapid Technology Development	07	43,292				43,292	U
299	1203179F	Integrated Broadcast Service (IBS)	07						U
300	1203182F	Spacelift Range System (SPACE)	07	10,837				10,837	U
301	1203265F	GPS III Space Segment	07	42,440				42,440	U
302	1203400F	Space Superiority Intelligence	07	14,428				14,428	U
303	1203614F	JSpOC Mission System	07	72,762				72,762	U
304	1203620F	National Space Defense Center	07	2,653				2,653	U
305	1203699F	Shared Early Warning (SEW)	07						U
306	1203873F	Ballistic Missile Defense Radars	07	15,881				15,881	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 19, 2019 at 15:33:03

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
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307	1203906F	NCMC - TW/AA System	07	5,000				U
308	1203913F	NUDET Detection System (SPACE)	07	31,304	19,778		19,778	U
309	1203940F	Space Situation Awareness Operations	07	86,173	19,572		19,572	U
310	1206423F	Global Positioning System III - Operational Control Segment	07	492,986	509,258		509,258	U
311	1206770F	Enterprise Ground Services	07					U
9999	9999999999	Classified Programs		16,789,633	16,859,524	161,790	17,021,314	U
		Operational Systems Development		22,442,379	23,153,697	308,439	23,462,136	
Total Research, Development, Test & Eval, AF				38,077,597	41,166,683	321,934	41,488,617	

UNCLASSIFIED

Department of the Air Force  
 FY 2020 President's Budget  
 Exhibit R-1 FY 2020 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

19 Feb 2019

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

Line No	Element Number	Program Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	See
307	1203906F	NCMC - TW/AA System	07						U
308	1203913F	NUDET Detection System (SPACE)	07	49,300				49,300	U
309	1203940F	Space Situation Awareness Operations	07	17,834				17,834	U
310	1206423F	Global Positioning System III - Operational Control Segment	07	445,302				445,302	U
311	1206770F	Enterprise Ground Services	07	138,870				138,870	U
9999	9999999999	Classified Programs		18,029,506	322,000	78,713	400,713	18,430,219	U
		Operational Systems Development		24,529,488		83,913	405,913	24,935,401	
Total Research, Development, Test & Eval, AF				45,616,122		128,248	450,248	46,066,370	

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Air Force • Budget Estimates FY 2020 • RDT&E Program

**Master Program Element Table of Contents (by Budget Activity then Line Item Number)**

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
1	01	0601102F	Defense Research Sciences.....	Volume 1 - 1
2	01	0601103F	University Research Initiatives.....	Volume 1 - 17
3	01	0601108F	High Energy Laser Research Initiatives.....	Volume 1 - 23

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
4	02	0602102F	Materials.....	Volume 1 - 27
5	02	0602201F	Aerospace Vehicle Technologies.....	Volume 1 - 45
6	02	0602202F	Human Effectiveness Applied Research.....	Volume 1 - 63
7	02	0602203F	Aerospace Propulsion.....	Volume 1 - 79
8	02	0602204F	Aerospace Sensors.....	Volume 1 - 105
9	02	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358).....	Volume 1 - 137
10	02	0602298F	Science and Technology Management - Major Headquarters Activities.....	Volume 1 - 141

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
11	02	0602601F	Space Technology.....	Volume 1 - 145
12	02	0602602F	Conventional Munitions.....	Volume 1 - 159
13	02	0602605F	Directed Energy Technology.....	Volume 1 - 173
14	02	0602788F	Dominant Information Sciences and Methods.....	Volume 1 - 183
15	02	0602890F	High Energy Laser Research.....	Volume 1 - 209
16	02	1206601F	Space Technology.....	Volume 1 - 217

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
17	03	0603112F	Advanced Materials for Weapon Systems.....	Volume 1 - 237
18	03	0603199F	Sustainment Science and Technology (S&T).....	Volume 1 - 251
19	03	0603203F	Advanced Aerospace Sensors.....	Volume 1 - 257
20	03	0603211F	Aerospace Technology Dev/Demo.....	Volume 1 - 271
21	03	0603216F	Aerospace Propulsion and Power Technology.....	Volume 1 - 279
22	03	0603270F	Electronic Combat Technology.....	Volume 1 - 299
23	03	0603401F	Advanced Spacecraft Technology.....	Volume 1 - 313

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
24	03	0603444F	Maui Space Surveillance System (MSSS).....	Volume 1 - 331
25	03	0603456F	Human Effectiveness Advanced Technology Development.....	Volume 1 - 335
26	03	0603601F	Conventional Weapons Technology.....	Volume 1 - 345
27	03	0603605F	Advanced Weapons Technology.....	Volume 1 - 355
28	03	0603680F	Manufacturing Technology Program.....	Volume 1 - 363
29	03	0603788F	Battlespace Knowledge Development and Demonstration.....	Volume 1 - 367
30	03	0303467F	SENSR Spectrum Pipeline SRF.....	Volume 1 - 387

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
31	04	0603260F	Intelligence Advanced Development.....	Volume 2 - 1
32	04	0603742F	Combat Identification Technology.....	Volume 2 - 15
33	04	0603790F	NATO Research and Development.....	Volume 2 - 43
34	04	0603851F	Intercontinental Ballistic Missile - Dem/Val.....	Volume 2 - 51
35	04	0603859F	Pollution Prevention - Dem/Val.....	Volume 2 - 81
36	04	0604002F	Air Force Weather Services Research.....	Volume 2 - 87

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

**Appropriation 3600: Research, Development, Test & Evaluation, Air Force**

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
37	04	0604004F	Advanced Engine Development.....	Volume 2 - 95
38	04	0604015F	Long Range Strike - Bomber.....	Volume 2 - 101
39	04	0604032F	Directed Energy Prototyping.....	Volume 2 - 107
40	04	0604033F	Hypersonics Prototyping.....	Volume 2 - 115
41	04	0604201F	PNT Resiliency, Mods, and Improvements.....	Volume 2 - 129
42	04	0604257F	Advanced Technology and Sensors.....	Volume 2 - 143
43	04	0604288F	National Airborne Ops Center (NAOC) Recap.....	Volume 2 - 163
44	04	0604317F	Technology Transfer.....	Volume 2 - 169
45	04	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program.....	Volume 2 - 181
46	04	0604414F	Cyber Resiliency of Weapon Systems-ACS.....	Volume 2 - 191
47	04	0604776F	Deployment & Distribution Enterprise R&D.....	Volume 2 - 219
48	04	0604858F	Tech Transition Program.....	Volume 2 - 247
49	04	0605230F	Ground Based Strategic Deterrent.....	Volume 2 - 273
50	04	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons.....	Volume 2 - 289
51	04	0207110F	Next Generation Air Dominance.....	Volume 2 - 295
52	04	0207455F	Three Dimensional Long-Range Radar (3DELRR).....	Volume 2 - 309
53	04	0208099F	Unified Platform (UP).....	Volume 2 - 319
54	04	0305236F	Common Data Link Executive Agent (CDL EA).....	Volume 2 - 333

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
55	04	0305251F	Cyberspace Operations Forces and Force Support.....	Volume 2 - 345
56	04	0305601F	Mission Partner Environments.....	Volume 2 - 351
57	04	0306250F	Cyber Operations Technology Development.....	Volume 2 - 359
58	04	0306415F	Enabled Cyber Activities.....	Volume 2 - 371
59	04	0408011F	Special Tactics / Combat Control.....	Volume 2 - 377
60	04	0901410F	Contracting Information Technology System.....	Volume 2 - 383
61	04	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE).....	Volume 2 - 391
62	04	1203710F	EO/IR Weather Systems.....	Volume 2 - 403
63	04	1206422F	Weather System Follow-on.....	Volume 2 - 409
64	04	1206425F	Space Situation Awareness Systems.....	Volume 2 - 421
65	04	1206427F	Space Systems Prototype Transitions (SSPT).....	Volume 2 - 429
66	04	1206434F	Midterm Polar MILSATCOM System.....	Volume 2 - 437
67	04	1206438F	Space Control Technology.....	Volume 2 - 445
68	04	1206730F	Space Security and Defense Program.....	Volume 2 - 455
69	04	1206760F	Protected Tactical Enterprise Service (PTES).....	Volume 2 - 463
70	04	1206761F	Protected Tactical Service (PTS).....	Volume 2 - 471
71	04	1206855F	Evolved Strategic SATCOM (ESS).....	Volume 2 - 479
72	04	1206857F	Space Rapid Capabilities Office.....	Volume 2 - 489

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
73	05	0604200F	Future Advanced Weapon Analysis & Programs.....	Volume 2 - 501
74	05	0604201F	PNT Resiliency, Mods, and Improvements.....	Volume 2 - 509
75	05	0604222F	Nuclear Weapons Support.....	Volume 2 - 519
76	05	0604270F	Electronic Warfare Development.....	Volume 2 - 533
77	05	0604281F	Tactical Data Networks Enterprise.....	Volume 2 - 543
78	05	0604287F	Physical Security Equipment.....	Volume 2 - 569
79	05	0604329F	Small Diameter Bomb (SDB) - EMD.....	Volume 2 - 581
80	05	0604429F	Airborne Electronic Attack.....	Volume 2 - 593
81	05	0604602F	Armament/Ordnance Development.....	Volume 2 - 599
82	05	0604604F	Submunitions.....	Volume 2 - 619
83	05	0604617F	Agile Combat Support.....	Volume 2 - 627
84	05	0604706F	Life Support Systems.....	Volume 2 - 643
85	05	0604735F	Combat Training Ranges.....	Volume 2 - 653
86	05	0604800F	F-35 - EMD.....	Volume 2 - 667
87	05	0604932F	Long Range Standoff Weapon.....	Volume 2 - 691
88	05	0604933F	ICBM Fuze Modernization.....	Volume 2 - 701

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
89	05	0605030F	Joint Tactical Network Center (JTNC).....	Volume 2 - 711
90	05	0605031F	Joint Tactical Network (JTN).....	Volume 2 - 719
91	05	0605056F	Open Architecture Management.....	Volume 2 - 725
92	05	0605213F	F-22 Modernization Increment 3.2B.....	Volume 2 - 733
93	05	0605221F	KC-46.....	Volume 2 - 741
94	05	0605223F	Advanced Pilot Training.....	Volume 2 - 761
95	05	0605229F	Combat Rescue Helicopter.....	Volume 2 - 769
96	05	0605458F	Air & Space Ops Center 10.2 RDT&E.....	Volume 2 - 779
97	05	0605830F	Acq Workforce- Global Battle Mgmt.....	Volume 2 - 785
98	05	0605931F	B-2 Defensive Management System.....	Volume 2 - 793
99	05	0101125F	Nuclear Weapons Modernization.....	Volume 2 - 801
100	05	0101213F	Minuteman Squadrons.....	Volume 2 - 811
101	05	0207171F	F-15 EPAWSS.....	Volume 2 - 813
102	05	0207328F	Stand In Attack Weapon.....	Volume 2 - 821
103	05	0207701F	Full Combat Mission Training.....	Volume 2 - 831
104	05	0303267F	Auctioned Spectrum Relocation Fund.....	Volume 2 - 849
105	05	0307581F	JSTARS Recap.....	Volume 2 - 855
106	05	0401310F	C-32 Executive Transport Recapitalization.....	Volume 2 - 863

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
107	05	0401319F	VC-25B.....	Volume 2 - 869
108	05	0701212F	Automated Test Systems.....	Volume 2 - 877
109	05	1203176F	Combat Survivor Evader Locator.....	Volume 2 - 885
110	05	1203269F	GPS III Follow-On (GPS IIIF).....	Volume 2 - 893
111	05	1203940F	Space Situation Awareness Operations.....	Volume 2 - 901
112	05	1206421F	Counterspace Systems.....	Volume 2 - 907
113	05	1206422F	Weather System Follow-on.....	Volume 2 - 925
114	05	1206425F	Space Situation Awareness Systems.....	Volume 2 - 931
115	05	1206426F	Space Fence.....	Volume 2 - 939
116	05	1206431F	Advanced EHF MILSATCOM (SPACE).....	Volume 2 - 947
117	05	1206432F	Polar MILSATCOM (SPACE).....	Volume 2 - 957
118	05	1206433F	Wideband Global SATCOM (SPACE).....	Volume 2 - 971
119	05	1206441F	Space Based Infrared System (SBIRS) High EMD.....	Volume 2 - 983
120	05	1206442F	Next Generation OPIR.....	Volume 2 - 991
121	05	1206445F	Commercial SATCOM (COMSATCOM) Integration.....	Volume 2 - 1019
122	05	1206853F	National Security Space Launch Program (SPACE) - EMD.....	Volume 2 - 1027

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
123	06	0604256F	Threat Simulator Development.....	Volume 2 - 1037
124	06	0604759F	Major T&E Investment.....	Volume 2 - 1047
125	06	0605101F	RAND Project Air Force.....	Volume 2 - 1057
126	06	0605502F	Small Business Innovation Research.....	Volume 2 - 1063
127	06	0605712F	Initial Operational Test & Evaluation.....	Volume 2 - 1065
128	06	0605807F	Test and Evaluation Support.....	Volume 2 - 1073
129	06	0605826F	Acq Workforce- Global Power.....	Volume 2 - 1079
130	06	0605827F	Acq Workforce- Global Vig & Combat Sys.....	Volume 2 - 1083
131	06	0605828F	Acq Workforce- Global Reach.....	Volume 2 - 1087
132	06	0605829F	Acq Workforce- Cyber, Network, & Bus Sys.....	Volume 2 - 1091
133	06	0605830F	Acq Workforce- Global Battle Mgmt.....	Volume 2 - 1095
134	06	0605831F	Acq Workforce- Capability Integration.....	Volume 2 - 1099
135	06	0605832F	Acq Workforce- Advanced Prgm Technology.....	Volume 2 - 1103
136	06	0605833F	Acq Workforce- Nuclear Systems.....	Volume 2 - 1107
137	06	0605898F	Management HQ - R&D.....	Volume 2 - 1111
138	06	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support.....	Volume 2 - 1117

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
139	06	0605978F	Facilities Sustainment - Test and Evaluation Support.....	Volume 2 - 1123
140	06	0606017F	Requirements Analysis and Maturation.....	Volume 2 - 1127
141	06	0606398F	Management HQ - T&E.....	Volume 2 - 1135
142	06	0308602F	ENTEPRISE INFORMATION SERVICES (EIS).....	Volume 2 - 1139
143	06	0702806F	Acquisition and Management Support.....	Volume 2 - 1145
144	06	0804731F	General Skill Training.....	Volume 2 - 1153
146	06	1001004F	International Activities.....	Volume 2 - 1155
147	06	1206116F	Space Test and Training Range Development.....	Volume 2 - 1161
148	06	1206392F	Space and Missile Center (SMC) Civilian Workforce.....	Volume 2 - 1165
149	06	1206398F	Space & Missile Systems Center - MHA.....	Volume 2 - 1169
150	06	1206860F	Rocket Systems Launch Program (SPACE).....	Volume 2 - 1173
151	06	1206864F	Space Test Program (STP).....	Volume 2 - 1177

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
152	07	0604003F	Advanced Battle Management System (ABMS).....	Volume 3a - 1

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
153	07	0604222F	Nuclear Weapons Support.....	Volume 3a - 7
154	07	0604233F	Specialized Undergraduate Flight Training.....	Volume 3a - 15
155	07	0604445F	Wide Area Surveillance.....	Volume 3a - 39
156	07	0604776F	Deployment & Distribution Enterprise R&D.....	Volume 3a - 47
157	07	0604840F	F-35 C2D2.....	Volume 3a - 53
158	07	0605018F	AF Integrated Personnel and Pay System (AF-IPPS).....	Volume 3a - 69
159	07	0605024F	Anti-Tamper Technology Executive Agency.....	Volume 3a - 79
160	07	0605117F	Foreign Materiel Acquisition and Exploitation.....	Volume 3a - 87
161	07	0605278F	HC/MC-130 Recap RDT&E.....	Volume 3a - 95
162	07	0606018F	NC3 Integration.....	Volume 3a - 109
163	07	0606942F	Assessments and Evaluations Cyber Vulnerabilities.....	Volume 3a - 117
164	07	0101113F	B-52 Squadrons.....	Volume 3a - 125
165	07	0101122F	Air-Launched Cruise Missile (ALCM).....	Volume 3a - 209
166	07	0101126F	B-1B Squadrons.....	Volume 3a - 217
167	07	0101127F	B-2 Squadrons.....	Volume 3a - 229
168	07	0101213F	Minuteman Squadrons.....	Volume 3a - 255
169	07	0101313F	Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM.....	Volume 3a - 299
170	07	0101316F	Worldwide Joint Strategic Communications.....	Volume 3a - 307

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

**Appropriation 3600: Research, Development, Test & Evaluation, Air Force**

Line #	Budget Activity	Program Element Number	Program Element Title	Page
171	07	0101324F	Integrated Strategic Planning & Analysis Network.....	Volume 3a - 315
172	07	0101328F	ICBM Reentry Vehicles.....	Volume 3a - 323
174	07	0102110F	UH-1N Replacement Program.....	Volume 3a - 331
175	07	0102326F	Region/Sector Operation Control Center Modernization Program.....	Volume 3a - 339
176	07	0205219F	MQ-9 UAV.....	Volume 3a - 345
177	07	0205671F	Joint Counter RCIED Electronic Warfare.....	Volume 3a - 379
178	07	0207131F	A-10 Squadrons.....	Volume 3a - 385
179	07	0207133F	F-16 Squadrons.....	Volume 3a - 395
180	07	0207134F	F-15E Squadrons.....	Volume 3a - 411
181	07	0207136F	Manned Destructive Suppression.....	Volume 3a - 431
182	07	0207138F	F-22A Squadrons.....	Volume 3a - 439
183	07	0207142F	F-35 Squadrons.....	Volume 3a - 459
184	07	0207161F	Tactical AIM Missiles.....	Volume 3a - 487
185	07	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM).....	Volume 3a - 497
186	07	0207227F	Combat Rescue - Pararescue.....	Volume 3a - 505
187	07	0207247F	AF TENCAP.....	Volume 3a - 513
188	07	0207249F	Precision Attack Systems Procurement.....	Volume 3a - 521
189	07	0207253F	Compass Call.....	Volume 3a - 527

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

---

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
190	07	0207268F	Aircraft Engine Component Improvement Program.....	Volume 3a - 535
191	07	0207325F	Joint Air-to-Surface Standoff Missile (JASSM).....	Volume 3a - 553
192	07	0207410F	Air & Space Operations Center (AOC).....	Volume 3a - 563
193	07	0207412F	Control and Reporting Center (CRC).....	Volume 3a - 587
194	07	0207417F	Airborne Warning and Control System (AWACS).....	Volume 3a - 595
195	07	0207418F	Tactical Airborne Control Systems.....	Volume 3a - 609
197	07	0207431F	Combat Air Intelligence System Activities.....	Volume 3a - 617
198	07	0207444F	Tactical Air Control Party-Mod.....	Volume 3a - 635
199	07	0207448F	C2ISR Tactical Data Link.....	Volume 3a - 647
200	07	0207452F	DCAPES.....	Volume 3a - 655
201	07	0207573F	National Technical Nuclear Forensics.....	Volume 3a - 673
202	07	0207590F	Seek Eagle.....	Volume 3a - 679
203	07	0207601F	USAF Modeling and Simulation.....	Volume 3a - 689
204	07	0207605F	Wargaming and Simulation Centers.....	Volume 3a - 703
205	07	0207610F	Battlefield Abn Comm Node (BACN).....	Volume 3a - 713
206	07	0207697F	Distributed Training and Exercises.....	Volume 3a - 727
207	07	0208006F	Mission Planning Systems.....	Volume 3a - 735
208	07	0208007F	Tactical Deception.....	Volume 3a - 765

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
209	07	0208064F	OPERATIONAL HQ - CYBER.....	Volume 3a - 771
210	07	0208087F	Distributed Cyber Warfare Operations.....	Volume 3a - 777
211	07	0208088F	AF Defensive Cyberspace Operations.....	Volume 3a - 805
212	07	0208097F	Joint Cyber Command and Control (JCC2).....	Volume 3a - 833
213	07	0208099F	Unified Platform (UP).....	Volume 3a - 841
217	07	0208288F	Intel Data Applications.....	Volume 3a - 851
218	07	0301017F	Global Sensor Integrated on Network (GSIN).....	Volume 3b - 1
219	07	0301025F	GeoBase.....	Volume 3b - 9
220	07	0301112F	Nuclear Planning and Execution System (NPES).....	Volume 3b - 15
226	07	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness.....	Volume 3b - 29
227	07	0302015F	E-4B National Airborne Operations Center (NAOC).....	Volume 3b - 35
228	07	0303131F	Minimum Essential Emergency Communications Network (MEECN).....	Volume 3b - 43
229	07	0303133F	High Frequency Radio Systems.....	Volume 3b - 71
230	07	0303140F	Information Systems Security Program.....	Volume 3b - 77
231	07	0303141F	Global Combat Support System.....	Volume 3b - 97
232	07	0303142F	Global Force Management - Data Initiative.....	Volume 3b - 103
234	07	0304115F	Multi Domain Command and Control (MDC2).....	Volume 3b - 111
235	07	0304260F	Airborne SIGINT Enterprise.....	Volume 3b - 119

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
236	07	0304310F	Commercial Economic Analysis.....	Volume 3b - 143
239	07	0305015F	C2 Air Operations Suite - C2 Info Services.....	Volume 3b - 151
240	07	0305020F	CCMD Intelligence Information Technology.....	Volume 3b - 165
241	07	0305022F	ISR Modernization & Automation Dvmt (IMAD).....	Volume 3b - 177
242	07	0305099F	Global Air Traffic Management (GATM).....	Volume 3b - 189
243	07	0305111F	Weather Service.....	Volume 3b - 197
244	07	0305114F	Air Traffic Control, Approach, and Landing System (ATCAL).....	Volume 3b - 211
245	07	0305116F	Aerial Targets.....	Volume 3b - 223
248	07	0305128F	Security and Investigative Activities.....	Volume 3b - 241
249	07	0305145F	Arms Control Implementation.....	Volume 3b - 247
250	07	0305146F	Defense Joint Counterintelligence Activities.....	Volume 3b - 255
252	07	0305179F	Integrated Broadcast Service (IBS).....	Volume 3b - 261
253	07	0305202F	Dragon U-2.....	Volume 3b - 269
254	07	0305205F	Endurance Unmanned Aerial Vehicles.....	Volume 3b - 277
255	07	0305206F	Airborne Reconnaissance Systems.....	Volume 3b - 283
256	07	0305207F	Manned Reconnaissance Systems.....	Volume 3b - 323
257	07	0305208F	Distributed Common Ground/Surface Systems.....	Volume 3b - 331
258	07	0305220F	RQ-4 UAV.....	Volume 3b - 349

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
259	07	0305221F	Network-Centric Collaborative Targeting.....	Volume 3b - 381
260	07	0305238F	NATO AGS.....	Volume 3b - 393
261	07	0305240F	Support to DCGS Enterprise.....	Volume 3b - 401
262	07	0305600F	International Intelligence Technology and Architectures.....	Volume 3b - 415
263	07	0305881F	Rapid Cyber Acquisition.....	Volume 3b - 425
264	07	0305984F	Personnel Recovery Command & Ctrl (PRC2).....	Volume 3b - 435
265	07	0307577F	Intelligence Mission Data (IMD).....	Volume 3b - 443
266	07	0401115F	C-130 Airlift Squadron.....	Volume 3b - 455
267	07	0401119F	C-5 Airlift Squadrons (IF).....	Volume 3b - 473
268	07	0401130F	C-17 Aircraft (IF).....	Volume 3b - 495
269	07	0401132F	C-130J Program.....	Volume 3b - 503
270	07	0401134F	Large Aircraft IR Countermeasures (LAIRCM).....	Volume 3b - 513
271	07	0401218F	KC-135s.....	Volume 3b - 523
272	07	0401219F	KC-10s.....	Volume 3b - 529
273	07	0401314F	Operational Support Airlift.....	Volume 3b - 537
274	07	0401318F	CV-22.....	Volume 3b - 543
275	07	0401840F	AMC Command and Control System.....	Volume 3b - 553
276	07	0408011F	Special Tactics / Combat Control.....	Volume 3b - 559

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
277	07	0702207F	Depot Maintenance (Non-IF).....	Volume 3b - 567
278	07	0708055F	Maintenance, Repair & Overhaul System.....	Volume 3b - 575
279	07	0708610F	Logistics Information Technology (LOGIT).....	Volume 3b - 593
280	07	0708611F	Support Systems Development.....	Volume 3b - 613
281	07	0804743F	Other Flight Training.....	Volume 3b - 621
282	07	0808716F	Other Personnel Activities.....	Volume 3b - 629
283	07	0901202F	Joint Personnel Recovery Agency.....	Volume 3b - 635
284	07	0901218F	Civilian Compensation Program.....	Volume 3b - 641
285	07	0901220F	Personnel Administration.....	Volume 3b - 647
286	07	0901226F	Air Force Studies and Analysis Agency.....	Volume 3b - 661
287	07	0901538F	Financial Management Information Systems Development.....	Volume 3b - 667
288	07	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS).....	Volume 3b - 701
289	07	1201017F	Global Sensor Integrated on Network (GSIN).....	Volume 3b - 719
290	07	1201921F	Service Support to STRATCOM - Space Activities.....	Volume 3b - 727
291	07	1202140F	Service Support to U.S. SPACECOM Activities.....	Volume 3b - 747
292	07	1202247F	AF TENCAP.....	Volume 3b - 761
293	07	1203001F	Family of Advanced BLoS Terminals (FAB-T).....	Volume 3b - 769
294	07	1203110F	Satellite Control Network (SPACE).....	Volume 3b - 791

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

***Appropriation 3600: Research, Development, Test & Evaluation, Air Force***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
296	07	1203165F	NAVSTAR Global Positioning System (Space and Control Segments).....	Volume 3b - 801
297	07	1203173F	Space and Missile Test and Evaluation Center.....	Volume 3b - 807
298	07	1203174F	Space Innovation, Integration and Rapid Technology Development.....	Volume 3b - 827
299	07	1203179F	Integrated Broadcast Service (IBS).....	Volume 3b - 837
300	07	1203182F	Spacelift Range System (SPACE).....	Volume 3b - 847
301	07	1203265F	GPS III Space Segment.....	Volume 3b - 855
302	07	1203400F	Space Superiority Intelligence.....	Volume 3b - 877
303	07	1203614F	JSpOC Mission System.....	Volume 3b - 885
304	07	1203620F	National Space Defense Center.....	Volume 3b - 905
305	07	1203699F	Shared Early Warning (SEW).....	Volume 3b - 917
306	07	1203873F	Ballistic Missile Defense Radars.....	Volume 3b - 923
307	07	1203906F	NCMC - TW/AA System.....	Volume 3b - 929
308	07	1203913F	NUDET Detection System (SPACE).....	Volume 3b - 935
309	07	1203940F	Space Situation Awareness Operations.....	Volume 3b - 945
310	07	1206423F	Global Positioning System III - Operational Control Segment.....	Volume 3b - 961
311	07	1206770F	Enterprise Ground Services.....	Volume 3b - 979

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

**Master Program Element Table of Contents (Alphabetically by Program Element Title)**

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
A-10 Squadrons	0207131F	178	07.....	Volume 3a - 385
AF Defensive Cyberspace Operations	0208088F	211	07.....	Volume 3a - 805
AF Integrated Personnel and Pay System (AF-IPPS)	0605018F	158	07.....	Volume 3a - 69
AF TENCAP	0207247F	187	07.....	Volume 3a - 513
AF TENCAP	1202247F	292	07.....	Volume 3b - 761
AMC Command and Control System	0401840F	275	07.....	Volume 3b - 553
Acq Workforce- Advanced Prgm Technology	0605832F	135	06.....	Volume 2 - 1103
Acq Workforce- Capability Integration	0605831F	134	06.....	Volume 2 - 1099
Acq Workforce- Cyber, Network, & Bus Sys	0605829F	132	06.....	Volume 2 - 1091
Acq Workforce- Global Battle Mgmt	0605830F	97	05.....	Volume 2 - 785
Acq Workforce- Global Battle Mgmt	0605830F	133	06.....	Volume 2 - 1095
Acq Workforce- Global Power	0605826F	129	06.....	Volume 2 - 1079
Acq Workforce- Global Reach	0605828F	131	06.....	Volume 2 - 1087
Acq Workforce- Global Vig & Combat Sys	0605827F	130	06.....	Volume 2 - 1083
Acq Workforce- Nuclear Systems	0605833F	136	06.....	Volume 2 - 1107
Acquisition and Management Support	0702806F	143	06.....	Volume 2 - 1145
Advanced Aerospace Sensors	0603203F	19	03.....	Volume 1 - 257

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Advanced Battle Management System (ABMS)	0604003F	152	07.....	Volume 3a - 1
Advanced EHF MILSATCOM (SPACE)	1206431F	116	05.....	Volume 2 - 947
Advanced Engine Development	0604004F	37	04.....	Volume 2 - 95
Advanced Materials for Weapon Systems	0603112F	17	03.....	Volume 1 - 237
Advanced Medium Range Air-to-Air Missile (AMRAAM)	0207163F	185	07.....	Volume 3a - 497
Advanced Pilot Training	0605223F	94	05.....	Volume 2 - 761
Advanced Spacecraft Technology	0603401F	23	03.....	Volume 1 - 313
Advanced Technology and Sensors	0604257F	42	04.....	Volume 2 - 143
Advanced Weapons Technology	0603605F	27	03.....	Volume 1 - 355
Aerial Targets	0305116F	245	07.....	Volume 3b - 223
Aerospace Propulsion	0602203F	7	02.....	Volume 1 - 79
Aerospace Propulsion and Power Technology	0603216F	21	03.....	Volume 1 - 279
Aerospace Sensors	0602204F	8	02.....	Volume 1 - 105
Aerospace Technology Dev/Demo	0603211F	20	03.....	Volume 1 - 271
Aerospace Vehicle Technologies	0602201F	5	02.....	Volume 1 - 45
Agile Combat Support	0604617F	83	05.....	Volume 2 - 627
Air & Space Operations Center (AOC)	0207410F	192	07.....	Volume 3a - 563
Air & Space Ops Center 10.2 RDT&E	0605458F	96	05.....	Volume 2 - 779
Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	0301401F	226	07.....	Volume 3b - 29

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Air Force Studies and Analysis Agency	0901226F	286	07.....	Volume 3b - 661
Air Force Weather Services Research	0604002F	36	04.....	Volume 2 - 87
Air Traffic Control, Approach, and Landing System (ATCALs)	0305114F	244	07.....	Volume 3b - 211
Air-Launched Cruise Missile (ALCM)	0101122F	165	07.....	Volume 3a - 209
Airborne Electronic Attack	0604429F	80	05.....	Volume 2 - 593
Airborne Reconnaissance Systems	0305206F	255	07.....	Volume 3b - 283
Airborne SIGINT Enterprise	0304260F	235	07.....	Volume 3b - 119
Airborne Warning and Control System (AWACS)	0207417F	194	07.....	Volume 3a - 595
Aircraft Engine Component Improvement Program	0207268F	190	07.....	Volume 3a - 535
Anti-Tamper Technology Executive Agency	0605024F	159	07.....	Volume 3a - 79
Armament/Ordnance Development	0604602F	81	05.....	Volume 2 - 599
Arms Control Implementation	0305145F	249	07.....	Volume 3b - 247
Assessments and Evaluations Cyber Vulnerabilities	0606942F	163	07.....	Volume 3a - 117
Auctioned Spectrum Relocation Fund	0303267F	104	05.....	Volume 2 - 849
Automated Test Systems	0701212F	108	05.....	Volume 2 - 877
B-1B Squadrons	0101126F	166	07.....	Volume 3a - 217
B-2 Defensive Management System	0605931F	98	05.....	Volume 2 - 793
B-2 Squadrons	0101127F	167	07.....	Volume 3a - 229
B-52 Squadrons	0101113F	164	07.....	Volume 3a - 125

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Ballistic Missile Defense Radars	1203873F	306	07.....	Volume 3b - 923
Battlefield Abn Comm Node (BACN)	0207610F	205	07.....	Volume 3a - 713
Battlespace Knowledge Development and Demonstration	0603788F	29	03.....	Volume 1 - 367
C-130 Airlift Squadron	0401115F	266	07.....	Volume 3b - 455
C-130J Program	0401132F	269	07.....	Volume 3b - 503
C-17 Aircraft (IF)	0401130F	268	07.....	Volume 3b - 495
C-32 Executive Transport Recapitalization	0401310F	106	05.....	Volume 2 - 863
C-5 Airlift Squadrons (IF)	0401119F	267	07.....	Volume 3b - 473
C2 Air Operations Suite - C2 Info Services	0305015F	239	07.....	Volume 3b - 151
C2ISR Tactical Data Link	0207448F	199	07.....	Volume 3a - 647
CCMD Intelligence Information Technology	0305020F	240	07.....	Volume 3b - 165
CV-22	0401318F	274	07.....	Volume 3b - 543
Civilian Compensation Program	0901218F	284	07.....	Volume 3b - 641
Combat Air Intelligence System Activities	0207431F	197	07.....	Volume 3a - 617
Combat Identification Technology	0603742F	32	04.....	Volume 2 - 15
Combat Rescue - Pararescue	0207227F	186	07.....	Volume 3a - 505
Combat Rescue Helicopter	0605229F	95	05.....	Volume 2 - 769
Combat Survivor Evader Locator	1203176F	109	05.....	Volume 2 - 885
Combat Training Ranges	0604735F	85	05.....	Volume 2 - 653

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Commercial Economic Analysis	0304310F	236	07.....	Volume 3b - 143
Commercial SATCOM (COMSATCOM) Integration	1206445F	121	05.....	Volume 2 - 1019
Common Data Link Executive Agent (CDL EA)	0305236F	54	04.....	Volume 2 - 333
Compass Call	0207253F	189	07.....	Volume 3a - 527
Contracting Information Technology System	0901410F	60	04.....	Volume 2 - 383
Control and Reporting Center (CRC)	0207412F	193	07.....	Volume 3a - 587
Conventional Munitions	0602602F	12	02.....	Volume 1 - 159
Conventional Weapons Technology	0603601F	26	03.....	Volume 1 - 345
Counterspace Systems	1206421F	112	05.....	Volume 2 - 907
Cyber Operations Technology Development	0306250F	57	04.....	Volume 2 - 359
Cyber Resiliency of Weapon Systems-ACS	0604414F	46	04.....	Volume 2 - 191
Cyberspace Operations Forces and Force Support	0305251F	55	04.....	Volume 2 - 345
DCAPES	0207452F	200	07.....	Volume 3a - 655
Defense Enterprise Acntng and Mgt Sys (DEAMS)	0901554F	288	07.....	Volume 3b - 701
Defense Joint Counterintelligence Activities	0305146F	250	07.....	Volume 3b - 255
Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	0602212F	9	02.....	Volume 1 - 137
Defense Research Sciences	0601102F	1	01.....	Volume 1 - 1
Deployment & Distribution Enterprise R&D	0604776F	47	04.....	Volume 2 - 219
Deployment & Distribution Enterprise R&D	0604776F	156	07.....	Volume 3a - 47

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Depot Maintenance (Non-IF)	0702207F	277	07.....	Volume 3b - 567
Directed Energy Prototyping	0604032F	39	04.....	Volume 2 - 107
Directed Energy Technology	0602605F	13	02.....	Volume 1 - 173
Distributed Common Ground/Surface Systems	0305208F	257	07.....	Volume 3b - 331
Distributed Cyber Warfare Operations	0208087F	210	07.....	Volume 3a - 777
Distributed Training and Exercises	0207697F	206	07.....	Volume 3a - 727
Dominant Information Sciences and Methods	0602788F	14	02.....	Volume 1 - 183
Dragon U-2	0305202F	253	07.....	Volume 3b - 269
E-4B National Airborne Operations Center (NAOC)	0302015F	227	07.....	Volume 3b - 35
ENTEPRISE INFORMATION SERVICES (EIS)	0308602F	142	06.....	Volume 2 - 1139
EO/IR Weather Systems	1203710F	62	04.....	Volume 2 - 403
Electronic Combat Technology	0603270F	22	03.....	Volume 1 - 299
Electronic Warfare Development	0604270F	76	05.....	Volume 2 - 533
Enabled Cyber Activities	0306415F	58	04.....	Volume 2 - 371
Endurance Unmanned Aerial Vehicles	0305205F	254	07.....	Volume 3b - 277
Enterprise Ground Services	1206770F	311	07.....	Volume 3b - 979
Evolved Strategic SATCOM (ESS)	1206855F	71	04.....	Volume 2 - 479
F-15 EPAWSS	0207171F	101	05.....	Volume 2 - 813
F-15E Squadrons	0207134F	180	07.....	Volume 3a - 411

**UNCLASSIFIED**

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Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
F-16 Squadrons	0207133F	179	07.....	Volume 3a - 395
F-22 Modernization Increment 3.2B	0605213F	92	05.....	Volume 2 - 733
F-22A Squadrons	0207138F	182	07.....	Volume 3a - 439
F-35 - EMD	0604800F	86	05.....	Volume 2 - 667
F-35 C2D2	0604840F	157	07.....	Volume 3a - 53
F-35 Squadrons	0207142F	183	07.....	Volume 3a - 459
Facilities Restoration and Modernization - Test and Evaluation Support	0605976F	138	06.....	Volume 2 - 1117
Facilities Sustainment - Test and Evaluation Support	0605978F	139	06.....	Volume 2 - 1123
Family of Advanced BLoS Terminals (FAB-T)	1203001F	293	07.....	Volume 3b - 769
Financial Management Information Systems Development	0901538F	287	07.....	Volume 3b - 667
Foreign Materiel Acquisition and Exploitation	0605117F	160	07.....	Volume 3a - 87
Full Combat Mission Training	0207701F	103	05.....	Volume 2 - 831
Future Advanced Weapon Analysis & Programs	0604200F	73	05.....	Volume 2 - 501
GPS III Follow-On (GPS IIIF)	1203269F	110	05.....	Volume 2 - 893
GPS III Space Segment	1203265F	301	07.....	Volume 3b - 855
General Skill Training	0804731F	144	06.....	Volume 2 - 1153
GeoBase	0301025F	219	07.....	Volume 3b - 9
Global Air Traffic Management (GATM)	0305099F	242	07.....	Volume 3b - 189
Global Combat Support System	0303141F	231	07.....	Volume 3b - 97

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Global Force Management - Data Initiative	0303142F	232	07.....	Volume 3b - 103
Global Positioning System III - Operational Control Segment	1206423F	310	07.....	Volume 3b - 961
Global Sensor Integrated on Network (GSIN)	0301017F	218	07.....	Volume 3b - 1
Global Sensor Integrated on Network (GSIN)	1201017F	289	07.....	Volume 3b - 719
Ground Based Strategic Deterrent	0605230F	49	04.....	Volume 2 - 273
HC/MC-130 Recap RDT&E	0605278F	161	07.....	Volume 3a - 95
Hard and Deeply Buried Target Defeat System (HDBTDS) Program	0604327F	45	04.....	Volume 2 - 181
High Energy Laser Research	0602890F	15	02.....	Volume 1 - 209
High Energy Laser Research Initiatives	0601108F	3	01.....	Volume 1 - 23
High Frequency Radio Systems	0303133F	229	07.....	Volume 3b - 71
Human Effectiveness Advanced Technology Development	0603456F	25	03.....	Volume 1 - 335
Human Effectiveness Applied Research	0602202F	6	02.....	Volume 1 - 63
Hypersonics Prototyping	0604033F	40	04.....	Volume 2 - 115
ICBM Fuze Modernization	0604933F	88	05.....	Volume 2 - 701
ICBM Reentry Vehicles	0101328F	172	07.....	Volume 3a - 323
ISR Modernization & Automation Dvmt (IMAD)	0305022F	241	07.....	Volume 3b - 177
Information Systems Security Program	0303140F	230	07.....	Volume 3b - 77
Initial Operational Test & Evaluation	0605712F	127	06.....	Volume 2 - 1065
Integrated Broadcast Service (IBS)	0305179F	252	07.....	Volume 3b - 261

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Integrated Broadcast Service (IBS)	1203179F	299	07.....	Volume 3b - 837
Integrated Strategic Planning & Analysis Network	0101324F	171	07.....	Volume 3a - 315
Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM	0101313F	169	07.....	Volume 3a - 299
Intel Data Applications	0208288F	217	07.....	Volume 3a - 851
Intelligence Advanced Development	0603260F	31	04.....	Volume 2 - 1
Intelligence Mission Data (IMD)	0307577F	265	07.....	Volume 3b - 443
Intercontinental Ballistic Missile - Dem/Val	0603851F	34	04.....	Volume 2 - 51
International Activities	1001004F	146	06.....	Volume 2 - 1155
International Intelligence Technology and Architectures	0305600F	262	07.....	Volume 3b - 415
JSTARS Recap	0307581F	105	05.....	Volume 2 - 855
JSpOC Mission System	1203614F	303	07.....	Volume 3b - 885
Joint Air-to-Surface Standoff Missile (JASSM)	0207325F	191	07.....	Volume 3a - 553
Joint Counter RCIED Electronic Warfare	0205671F	177	07.....	Volume 3a - 379
Joint Cyber Command and Control (JCC2)	0208097F	212	07.....	Volume 3a - 833
Joint Personnel Recovery Agency	0901202F	283	07.....	Volume 3b - 635
Joint Tactical Network (JTN)	0605031F	90	05.....	Volume 2 - 719
Joint Tactical Network Center (JTNC)	0605030F	89	05.....	Volume 2 - 711
KC-10s	0401219F	272	07.....	Volume 3b - 529
KC-135s	0401218F	271	07.....	Volume 3b - 523

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
KC-46	0605221F	93	05.....	Volume 2 - 741
Large Aircraft IR Countermeasures (LAIRCM)	0401134F	270	07.....	Volume 3b - 513
Life Support Systems	0604706F	84	05.....	Volume 2 - 643
Light Attack Armed Reconnaissance (LAAR) Squadrons	0207100F	50	04.....	Volume 2 - 289
Logistics Information Technology (LOGIT)	0708610F	279	07.....	Volume 3b - 593
Long Range Standoff Weapon	0604932F	87	05.....	Volume 2 - 691
Long Range Strike - Bomber	0604015F	38	04.....	Volume 2 - 101
MQ-9 UAV	0205219F	176	07.....	Volume 3a - 345
Maintenance, Repair & Overhaul System	0708055F	278	07.....	Volume 3b - 575
Major T&E Investment	0604759F	124	06.....	Volume 2 - 1047
Management HQ - R&D	0605898F	137	06.....	Volume 2 - 1111
Management HQ - T&E	0606398F	141	06.....	Volume 2 - 1135
Manned Destructive Suppression	0207136F	181	07.....	Volume 3a - 431
Manned Reconnaissance Systems	0305207F	256	07.....	Volume 3b - 323
Manufacturing Technology Program	0603680F	28	03.....	Volume 1 - 363
Materials	0602102F	4	02.....	Volume 1 - 27
Maui Space Surveillance System (MSSS)	0603444F	24	03.....	Volume 1 - 331
Midterm Polar MILSATCOM System	1206434F	66	04.....	Volume 2 - 437
Minimum Essential Emergency Communications Network (MEECN)	0303131F	228	07.....	Volume 3b - 43

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Minuteman Squadrons	0101213F	100	05.....	Volume 2 - 811
Minuteman Squadrons	0101213F	168	07.....	Volume 3a - 255
Mission Partner Environments	0305601F	56	04.....	Volume 2 - 351
Mission Planning Systems	0208006F	207	07.....	Volume 3a - 735
Multi Domain Command and Control (MDC2)	0304115F	234	07.....	Volume 3b - 111
NATO AGS	0305238F	260	07.....	Volume 3b - 393
NATO Research and Development	0603790F	33	04.....	Volume 2 - 43
NAVSTAR Global Positioning System (Space and Control Segments)	1203165F	296	07.....	Volume 3b - 801
NAVSTAR Global Positioning System (User Equipment) (SPACE)	1203164F	61	04.....	Volume 2 - 391
NC3 Integration	0606018F	162	07.....	Volume 3a - 109
NCMC - TW/AA System	1203906F	307	07.....	Volume 3b - 929
NUDET Detection System (SPACE)	1203913F	308	07.....	Volume 3b - 935
National Airborne Ops Center (NAOC) Recap	0604288F	43	04.....	Volume 2 - 163
National Security Space Launch Program (SPACE) - EMD	1206853F	122	05.....	Volume 2 - 1027
National Space Defense Center	1203620F	304	07.....	Volume 3b - 905
National Technical Nuclear Forensics	0207573F	201	07.....	Volume 3a - 673
Network-Centric Collaborative Targeting	0305221F	259	07.....	Volume 3b - 381
Next Generation Air Dominance	0207110F	51	04.....	Volume 2 - 295
Next Generation OPIR	1206442F	120	05.....	Volume 2 - 991

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Nuclear Planning and Execution System (NPES)	0301112F	220	07.....	Volume 3b - 15
Nuclear Weapons Modernization	0101125F	99	05.....	Volume 2 - 801
Nuclear Weapons Support	0604222F	75	05.....	Volume 2 - 519
Nuclear Weapons Support	0604222F	153	07.....	Volume 3a - 7
OPERATIONAL HQ - CYBER	0208064F	209	07.....	Volume 3a - 771
Open Architecture Management	0605056F	91	05.....	Volume 2 - 725
Operational Support Airlift	0401314F	273	07.....	Volume 3b - 537
Other Flight Training	0804743F	281	07.....	Volume 3b - 621
Other Personnel Activities	0808716F	282	07.....	Volume 3b - 629
PNT Resiliency, Mods, and Improvements	0604201F	41	04.....	Volume 2 - 129
PNT Resiliency, Mods, and Improvements	0604201F	74	05.....	Volume 2 - 509
Personnel Administration	0901220F	285	07.....	Volume 3b - 647
Personnel Recovery Command & Ctrl (PRC2)	0305984F	264	07.....	Volume 3b - 435
Physical Security Equipment	0604287F	78	05.....	Volume 2 - 569
Polar MILSATCOM (SPACE)	1206432F	117	05.....	Volume 2 - 957
Pollution Prevention - Dem/Val	0603859F	35	04.....	Volume 2 - 81
Precision Attack Systems Procurement	0207249F	188	07.....	Volume 3a - 521
Protected Tactical Enterprise Service (PTES)	1206760F	69	04.....	Volume 2 - 463
Protected Tactical Service (PTS)	1206761F	70	04.....	Volume 2 - 471

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
RAND Project Air Force	0605101F	125	06.....	Volume 2 - 1057
RQ-4 UAV	0305220F	258	07.....	Volume 3b - 349
Rapid Cyber Acquisition	0305881F	263	07.....	Volume 3b - 425
Region/Sector Operation Control Center Modernization Program	0102326F	175	07.....	Volume 3a - 339
Requirements Analysis and Maturation	0606017F	140	06.....	Volume 2 - 1127
Rocket Systems Launch Program (SPACE)	1206860F	150	06.....	Volume 2 - 1173
SENSR Spectrum Pipeline SRF	0303467F	30	03.....	Volume 1 - 387
Satellite Control Network (SPACE)	1203110F	294	07.....	Volume 3b - 791
Science and Technology Management - Major Headquarters Activities	0602298F	10	02.....	Volume 1 - 141
Security and Investigative Activities	0305128F	248	07.....	Volume 3b - 241
Seek Eagle	0207590F	202	07.....	Volume 3a - 679
Service Support to STRATCOM - Space Activities	1201921F	290	07.....	Volume 3b - 727
Service Support to U.S. SPACECOM Activities	1202140F	291	07.....	Volume 3b - 747
Shared Early Warning (SEW)	1203699F	305	07.....	Volume 3b - 917
Small Business Innovation Research	0605502F	126	06.....	Volume 2 - 1063
Small Diameter Bomb (SDB) - EMD	0604329F	79	05.....	Volume 2 - 581
Space & Missile Systems Center - MHA	1206398F	149	06.....	Volume 2 - 1169
Space Based Infrared System (SBIRS) High EMD	1206441F	119	05.....	Volume 2 - 983
Space Control Technology	1206438F	67	04.....	Volume 2 - 445

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Space Fence	1206426F	115	05.....	Volume 2 - 939
Space Innovation, Integration and Rapid Technology Development	1203174F	298	07.....	Volume 3b - 827
Space Rapid Capabilities Office	1206857F	72	04.....	Volume 2 - 489
Space Security and Defense Program	1206730F	68	04.....	Volume 2 - 455
Space Situation Awareness Operations	1203940F	111	05.....	Volume 2 - 901
Space Situation Awareness Operations	1203940F	309	07.....	Volume 3b - 945
Space Situation Awareness Systems	1206425F	64	04.....	Volume 2 - 421
Space Situation Awareness Systems	1206425F	114	05.....	Volume 2 - 931
Space Superiority Intelligence	1203400F	302	07.....	Volume 3b - 877
Space Systems Prototype Transitions (SSPT)	1206427F	65	04.....	Volume 2 - 429
Space Technology	0602601F	11	02.....	Volume 1 - 145
Space Technology	1206601F	16	02.....	Volume 1 - 217
Space Test Program (STP)	1206864F	151	06.....	Volume 2 - 1177
Space Test and Training Range Development	1206116F	147	06.....	Volume 2 - 1161
Space and Missile Center (SMC) Civilian Workforce	1206392F	148	06.....	Volume 2 - 1165
Space and Missile Test and Evaluation Center	1203173F	297	07.....	Volume 3b - 807
Spacelift Range System (SPACE)	1203182F	300	07.....	Volume 3b - 847
Special Tactics / Combat Control	0408011F	59	04.....	Volume 2 - 377
Special Tactics / Combat Control	0408011F	276	07.....	Volume 3b - 559

**UNCLASSIFIED**

**UNCLASSIFIED**

Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Specialized Undergraduate Flight Training	0604233F	154	07.....	Volume 3a - 15
Stand In Attack Weapon	0207328F	102	05.....	Volume 2 - 821
Submunitions	0604604F	82	05.....	Volume 2 - 619
Support Systems Development	0708611F	280	07.....	Volume 3b - 613
Support to DCGS Enterprise	0305240F	261	07.....	Volume 3b - 401
Sustainment Science and Technology (S&T)	0603199F	18	03.....	Volume 1 - 251
Tactical AIM Missiles	0207161F	184	07.....	Volume 3a - 487
Tactical Air Control Party-Mod	0207444F	198	07.....	Volume 3a - 635
Tactical Airborne Control Systems	0207418F	195	07.....	Volume 3a - 609
Tactical Data Networks Enterprise	0604281F	77	05.....	Volume 2 - 543
Tactical Deception	0208007F	208	07.....	Volume 3a - 765
Tech Transition Program	0604858F	48	04.....	Volume 2 - 247
Technology Transfer	0604317F	44	04.....	Volume 2 - 169
Test and Evaluation Support	0605807F	128	06.....	Volume 2 - 1073
Threat Simulator Development	0604256F	123	06.....	Volume 2 - 1037
Three Dimensional Long-Range Radar (3DELRR)	0207455F	52	04.....	Volume 2 - 309
UH-1N Replacement Program	0102110F	174	07.....	Volume 3a - 331
USAF Modeling and Simulation	0207601F	203	07.....	Volume 3a - 689
Unified Platform (UP)	0208099F	53	04.....	Volume 2 - 319

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Air Force • Budget Estimates FY 2020 • RDT&E Program

<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
Unified Platform (UP)	0208099F	213	07.....	Volume 3a - 841
University Research Initiatives	0601103F	2	01.....	Volume 1 - 17
VC-25B	0401319F	107	05.....	Volume 2 - 869
Wargaming and Simulation Centers	0207605F	204	07.....	Volume 3a - 703
Weather Service	0305111F	243	07.....	Volume 3b - 197
Weather System Follow-on	1206422F	63	04.....	Volume 2 - 409
Weather System Follow-on	1206422F	113	05.....	Volume 2 - 925
Wide Area Surveillance	0604445F	155	07.....	Volume 3a - 39
Wideband Global SATCOM (SPACE)	1206433F	118	05.....	Volume 2 - 971
Worldwide Joint Strategic Communications	0101316F	170	07.....	Volume 3a - 307

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**Fiscal Year (FY) 2020 Budget Estimates**

**RDT&E Exhibits in Budget Activity 7**

**are split into two books:**

**Vol-III Part 1**

**Vol-III Part 2**

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**The following Program Elements are not providing RDT&E exhibits due to classification:**

0101815F ADVANCED STRATEGIC PROGRAM  
0207424F EVALUATION AND ANALYSIS PROGRAM  
0208161F SPECIAL EVALUATION SYSTEM  
0208162F ADVANCED TECHNOLOGY PROGRAM  
0301310F NATIONAL AIR INTELLIGENCE CENTER  
0301314F COBRA BALL  
0301315F MISSILE AND SPACE TECHICAL COLLECTION  
0301324F FOREST GREEN  
0301386F GDIP COLLECTION MANAGEMENT  
0304111F SPECIAL ACTIVITES  
0304311F SELECTED ACTIVITIES  
0304348F ADVANCED GEOSPATIAL INTELLIGENCE (AGI)  
0305124F SPECIAL APPLICATIONS PROGRAM  
0305127F FOREIGN COUNTERINTELLIGENCE ACTIVITES  
0305159F DEFENSE RECONNAISSANCE SUPPORT ACTIVITIES  
0305172F COMBINED ADVANCED APPLICATIONS  
0604446F WIDE AREA SURVEILLANCE - SP  
0605798F ANALYSIS SUPPORT GROUP

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	27.883	35.611	0.000	35.611	51.104	164.964	218.771	177.089	Continuing	Continuing
67411L: <i>Advanced Battle Management System</i>	-	0.000	27.883	35.611	0.000	35.611	51.104	164.964	218.771	177.089	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Advanced Battle Management System (ABMS) is a family of systems construct that provides battle management and command and control capability by networking, ingesting, fusing, and prioritizing data from disaggregated sensors. ABMS is not a single program of record but a capability that is provided by multiple integrated systems and programs and will be horizontally managed by the ABMS Architect. ABMS will develop sensors, battle management and command and control systems, and communications through a three phased strategy. Funding in this program element will be used for execution of efforts under the ABMS Architect Activities: sensor development, prototyping and risk reduction, architecture analysis, development and management of open architecture standards, Phase 1 and Phase 2 bridge capabilities, and Phase 3 development. Funding may be used to fund other programs within the ABMS architecture.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ABMS. 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	27.883	35.611	0.000	35.611
Total Adjustments	0.000	27.883	35.611	0.000	35.611
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	27.883			
• 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	35.611	0.000	35.611

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> ABMS Architect Tasks	-	27.883	35.611	0.000	35.611
<b>Description:</b> Funds ABMS major tasks overseen and integrated by the ABMS Architect. Tasks and activities include: ABMS GMTI radar development, architecture analysis and design, development and management of open architecture standards, ABMS Phase 1 and Phase 2 bridge capabilities, and ABMS Phase 3 development.					
<b>FY 2019 Plans:</b> ABMS GMTI radar development, mode development and management, and sensor standard maturation.					
<b>FY 2020 Base Plans:</b> Continue major tasks overseen and integrated by the ABMS Architect. Tasks and activities include: ABMS GMTI radar development, architecture analysis and design, development and management of open architecture standards, ABMS Phase 1 and Phase 2 bridge capabilities, and ABMS Phase 3 development.					
<b>FY 2020 OCO Plans:</b> TBD					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to FY20 being the first year service-programmed funding will be executed for ABMS. FY19 funds were a Congressional Add.					
<b>Accomplishments/Planned Programs Subtotals</b>	-	27.883	35.611	0.000	35.611

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>E. Acquisition Strategy</b> The Advanced Battle Management System (ABMS) will provide capability through existing programs of record and their respective contracts and agreements. ABMS is not a single program of record, but many programs that are horizontally integrated by a single lead Architect. Program execution (cost, schedule, performance) is vertically managed by program executive officers and their respective program offices. Funding for programs that are directly or indirectly supporting ABMS will be executed through existing program elements. ABMS may execute funding from this program element to supplement supporting programs, or fully fund discrete components of ABMS specific technologies.		
<b>F. Performance Metrics</b> 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	<b>Project (Number/Name)</b> 67411L / <i>Advanced Battle Management System</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>ABMS Development</b>																												
ABMS GMTI Radar Development																												
ABMS Architect Activities																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	<b>Project (Number/Name)</b> 67411L / <i>Advanced Battle Management System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>ABMS Development</i></b>				
ABMS GMTI Radar Development	3	2019	4	2021
ABMS Architect Activities	2	2020	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	26.672	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	26.672
674237: <i>EMP Certification</i>	-	26.672	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	26.672

**A. Mission Description and Budget Item Justification**

This program executes and provides technical and programmatic support to the testing, evaluation, and mitigation of effects of nuclear weapon employment that impact Air Force systems with initial emphasis on existing nuclear weapons, their delivery systems, and associated communications systems. It includes facilities and equipment required to perform testing, risk assessments, survivability/vulnerability studies, and effectiveness evaluation of various mitigation strategies. It includes modeling and simulation efforts for systems of systems analysis where assessments are not possible through testing alone. This program will recommend upgrades to existing/fielded systems as well as informing requirements for future (modernization/recapitalization) systems.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver nuclear weapon support capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605833F Acquisition Workforce - Nuclear Systems.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	27.579	0.000	0.000	0.000	0.000
Current President's Budget	26.672	0.000	0.000	0.000	0.000
Total Adjustments	-0.907	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	-0.907	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force Date: February 2019

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
PE 0604222F / *Nuclear Weapons Support*

**Change Summary Explanation**

No Significant Changes

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0604222F / Nuclear Weapons Support				<b>Project (Number/Name)</b> 674237 / EMP Certification			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674237: EMP Certification	-	26.672	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	26.672
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program executes and provides technical and programmatic support to the testing, evaluation, and mitigation of effects of nuclear weapon employment that impact Air Force systems with initial emphasis on existing nuclear weapons, their delivery systems, and associated communications systems. It includes facilities and equipment required to perform testing, risk assessments, survivability/vulnerability studies, and effectiveness evaluation of various mitigation strategies. It includes modeling and simulation efforts for systems of systems analysis where assessments are not possible through testing alone. This program will recommend upgrades to existing/fielded systems as well as informing requirements for future (modernization/recapitalization) systems.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Electronic Magnetic Pulse (EMP)	26.672	0.000	-
<b>Description:</b> Provide technical and programmatic support required to test, evaluate, and mitigate Electromagnetic Pulse (EMP) impacts across all Air Force systems with initial emphasis on existing nuclear weapons, their delivery systems, and associated communications systems			
<b>FY 2019 Plans:</b> N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> This effort is a one year (FY18) program and there is no subsequent activity.			
<b>Accomplishments/Planned Programs Subtotals</b>	26.672	0.000	-

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 05 64222F/654236: <i>Engineering Analysis</i>	2.910	2.979	2.421	-	2.421	4.466	5.410	5.107	4.420	Continuing	Continuing
• RDTE 05 64222F/655708: <i>Weapon Storage Facility Material Handling System</i>	0.000	1.489	1.985	-	1.985	11.910	6.950	1.986	2.022	Continuing	Continuing

**Remarks**

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 674237 / <i>EMP Certification</i>
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**D. Acquisition Strategy**

FY2018 Funds will be provided to the Navy (NWC) at Patuxent River, OC-ALC Compass Rose at Tinker AFB and Test Facilities at Hill AFB to provide support to facilities and equipment that perform required testing, assessments, studies and evaluation of AF aircraft/systems.

**E. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 674237 / <i>EMP Certification</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>EMP Certification</b>	
Acceptances and Awards	[REDACTED]
Final Reports	[REDACTED]

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 674237 / <i>EMP Certification</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>EMP Certification</i></b>				
Acceptances and Awards	4	2018	4	2019
Final Reports	1	2019	1	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	6.269	11.344	2.584	0.000	2.584	5.368	3.613	2.041	2.502	Continuing	Continuing
674101: <i>Undergraduate Remotely Piloted Aircraft Training</i>	-	0.731	0.771	0.796	0.000	0.796	0.810	0.827	0.842	0.857	Continuing	Continuing
676035: <i>T-6 Operational System Development</i>	-	3.600	1.776	1.183	0.000	1.183	2.105	0.226	0.232	0.391	Continuing	Continuing
676037: <i>T-38 Operational System Development</i>	-	1.938	8.797	0.605	0.000	0.605	2.453	2.560	0.967	1.254	Continuing	Continuing

**Note**

This program, BA 7, PE 0604233F, project 676035, Next Generation On-Board Oxygen Generation System, is a new start.  
 This program, BA 7, PE 0604233F, project 676035, Controlled Flight Into Terrain - Prevention (CFIT-Prevention), is a new start.

**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 444 aircraft in the Air Force inventory. The aircraft were designed with a 24 year service life. Remaining service life is up to 16 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 DMS issues and the regular block upgrades 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>
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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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

The FY 2020 funding request was reduced by \$0.659 million to account for the availability of prior year execution balances.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	5.776	11.344	3.243	0.000	3.243
Current President's Budget	6.269	11.344	2.584	0.000	2.584
Total Adjustments	0.493	0.000	-0.659	0.000	-0.659
• 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	0.700	0.000			
• SBIR/STTR Transfer	-0.207	0.000			
• Other Adjustments	0.000	0.000	-0.659	0.000	-0.659

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				<b>Project (Number/Name)</b> 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674101: <i>Undergraduate Remotely Piloted Aircraft Training</i>	-	0.731	0.771	0.796	0.000	0.796	0.810	0.827	0.842	0.857	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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Predator Reaper Integrated Mission Environment (PRIME) support	0.731	0.771	0.796	0.000	0.796
<b>Description:</b> Add Phase 8 operational capabilities.					
<b>FY 2019 Plans:</b>					
-Plan, develop, and implement Phase 8 enhancements.					
-Continue to extend and enhance interoperability between PRIME and Modern Air Combat Environment (MACE) software for instructor operations and entity generation.					
-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.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>-Increase functionality/variety/fidelity of MACE PRIME entities.</p> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>-Continue development and implementation of Phase 8 enhancements.</li> <li>-Continue to extend and enhance interoperability between PRIME and Modern Air Combat Environment (MACE) software for instructor operations and entity generation.</li> <li>-Add metadata crosshair coordinates option in MGRS format (10 digit precision).</li> <li>-Add multisegment line drawing tool to tracker screen.</li> <li>-Add aircraft response to icing.</li> <li>-Add load/save capability.</li> <li>-Implement altimeter display, status messages, and engine feedback on HUD.</li> <li>-Increase functionality/variety/fidelity of MACE PRIME entities.</li> </ul> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Inflation adjustment</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	0.731	0.771	0.796	0.000	0.796

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

**Remarks**

**D. Acquisition Strategy**  
Contract via Training Systems Acquisition III (TSA III) to Cubic Corporation, parent company of PRIME software data rights owner (Intific).

**E. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Predator Reaper Integrated Mission Environment (PRIME) Support</i></b>																												
Phase 7 Design/Development continued																												
Phase 8 Planning																												
Phase 8 Design/Development																												
Phase 8 Design/Development continued																												
Phase 9 Planning																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 674101 / <i>Undergraduate Remotely Piloted Aircraft Training</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Predator Reaper Integrated Mission Environment (PRIME) Support</i></b>				
Phase 7 Design/Development continued	2	2018	4	2018
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

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676035: <i>T-6 Operational System Development</i>	-	3.600	1.776	1.183	0.000	1.183	2.105	0.226	0.232	0.391	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0604233F, project 676035, Next Generation On-Board Oxygen Generation System, is a new start.  
 This program, BA 7, PE 0604233F, project 676035, Controlled Flight Into Terrain - Prevention (CFIT-Prevention), is a new start.

**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 444 aircraft in the Air Force inventory. The aircraft were designed with a 24 year service life. Remaining service life is up to 16 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.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> T-6A (JPATS) Studies and Analysis	2.549	1.576	0.100	-	0.100
<b>Description:</b> 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 PMA costs.					
<b>FY 2019 Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
T-6A Aircraft studies and development activities including but not limited to: Engine Preservation development, Physiological Events (PE) Analysis, On-Board Oxygen Generation System Characterization Study, Next Generation On-Board Oxygen Generation System Study, and Cockpit Environmental Monitoring/Analysis.  <b>FY 2020 Base Plans:</b> 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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funds decreased \$1.4M supporting T-6 studies and development activities.					
<b>Title:</b> Next Generation On-Board Oxygen Generation System  <b>Description:</b> 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.  <b>FY 2020 Base Plans:</b> 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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Next Generation On-Board Oxygen Generation System is a new start program with the acquisition lifecycle beginning in Fiscal Year 2020. Therefore, the increase in required funding from FY19 to FY20 is a direct result of the program initiating RDT&E activities.	-	-	0.703	-	0.703
<b>Title:</b> Crash Survivable Recorder (CSR)  <b>Description:</b> 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.  <b>FY 2019 Plans:</b>	0.000	0.200	0.280	-	0.280

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p>Begin RDT&amp;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.</p> <p><b>FY 2020 Base Plans:</b> Continue RDT&amp;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.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The Crash Survivable Recorder (CSR) program starts its acquisition lifecycle beginning in Fiscal Year 2019. Therefore, the increase in the required funding from FY19 to FY20 is a direct result of the program ramping up RDT&amp;E activities.</p>					
<p><b>Title:</b> Controlled Flight Into Terrain - Prevention (CFIT-Prevention)</p> <p><b>Description:</b> Controlled Flight Into Terrain - Prevention (CFIT-Prevention) enhances pilot situational awareness (SA) by providing cues and warnings to prevent an aircraft from being flown into land, water or obstacles. The development and fielding of this capability will directly enhance the safety of pilot training and prevent loss of aircraft and more importantly aircrew. This acquisition is a direct response to the Secretary of Defense Memo of 22 June 06, Reducing Preventable Accidents. Includes engineering, contractor support/services and PMA costs.</p> <p><b>FY 2020 Base Plans:</b> Begin RDT&amp;E activities to include but not limited to: development, integration, test and certification of the Controlled Flight Into Terrain - Prevention (CFIT-Prevention) to comply with the Secretary of Defense Memo of 22 June 06, Reducing Preventable Accidents.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Controlled Flight Into Terrain - Prevention (CFIT-Prevention) is a new start program with the acquisition lifecycle beginning in Fiscal Year 2020. Therefore, the increase in required funding from FY19 to FY20 is a direct result of the program initiating RDT&amp;E activities.</p>	-	-	0.100	-	0.100
<p><b>Title:</b> Pilot Training Next (PTN)</p>	0.000	0.000	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Description:</b> Pilot Training Next (PTN) is development of experimental/advanced aircrew training concepts, methods and aircraft equipment associated with programs that directly aid Air Education Training Command's (AETC) flight training enterprise, reduce overall pilot training costs and continue AETC's overall pilot production increase starting in FY 2020 thus reducing the USAF Pilot Shortage.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Base Plans:</b> Begin RDT&amp;E activities to include but not limited to: development, integration, test and evaluation of the Pilot Training Next (PTN) experimental/advanced aircrew training concepts to aid Air Education Training Command (AETC).</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Pilot Training Next program acquisition lifecycle beginning in Fiscal Year 2020. Therefore, the increase in required funding from FY19 to FY20 is a direct result of the program initiating RDT&amp;E activities.</p>					
<p><b>Title:</b> T-6 Avionics Upgrades for FAA (Federal Aviation Administration) Compliance</p> <p><b>Description:</b> The T-6 Automatic Dependent Surveillance Broadcast (ADS-B) Out program includes but is not limited to the component selection, integration, test and certification of ADS-B Out capability for the T-6A aircraft and Ground Based Training System (GBTS) to meet FAA compliance. Includes engineering and contractor support/services and PMA costs.</p> <p><b>FY 2019 Plans:</b> The Automatic Dependent Surveillance Broadcast (ADS-B Out) program will begin full rate production in FY19. As such, RDT&amp;E activities for ADS-B Out is planned to conclude after FY18 which would result in a zero dollar requirement for FY19.</p> <p><b>FY 2020 Base Plans:</b></p>	1.051	0.000	0.000	-	0.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The Automatic Dependent Surveillance Broadcast (ADS-B Out) program will begin full rate production in FY19. As such, RDT&E activities for ADS-B Out is planned to conclude after FY18 which would result in a zero dollar requirement for FY20.					
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	3.600	1.776	1.183	0.000	1.183

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts</i>	2.046	0.590	0.100	-	0.100	1.568	2.092	0.571	1.916	Continuing	Continuing
• APAF 05 Line Item JPAT00: <i>T-6</i>	35.706	22.550	11.609	-	11.609	32.059	14.161	6.157	3.214	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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
T-6 Operational System Development Avionics Upgrades for FAA Compliance	C/FFP	Scientific Research Corp : Atlanta, GA	-	1.051	Mar 2018	-		-		-		-	Continuing	Continuing	3.536
T-6 Operational System Development Crash Survivable Recorder	C/FFP	TBD : TBD	-	-		0.200	Aug 2019	0.280	Dec 2019	-		0.280	Continuing	Continuing	-
T-6 Operational System Development Controlled Flight Into Terrain - Prevention	C/FFP	TBD : TBD	-	-		-		0.100	Aug 2020	-		0.100	Continuing	Continuing	-
T-6 Operational System Development Alternative On-Board Oxygen Generation System	C/CPAF	Not specified. : TBD	-	-		-		0.703	Feb 2020	-		0.703	Continuing	Continuing	-
<b>Subtotal</b>			-	1.051		0.200		1.083		-		1.083	Continuing	Continuing	N/A

**Remarks**

The first piece of the Automatic Surveillance Broadcast Out (ADS-B Out) RDT&E effort was awarded in 4Q FY17. The second piece of the ADS-B Out RDT&E effort was awarded in 1Q FY18.

The first piece of the Crash Survivable Recorder RDT&E effort is planned to begin in 4Q FY19. The second piece of the Crash Survivable Recorder RDT&E effort will be awarded in 1Q 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.

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Physiological Event's: Edwards Test Center	PO	Edwards Test Center : Edwards, CA	-	1.670	Apr 2018	1.516	Oct 2018	0.100	Oct 2019	-		0.100	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Physiological Event's: 711th Human Performance Wing	MIPR	Wright Patterson AFB : WPAFB, OH	-	0.452	May 2018	-		-		-		-	Continuing	Continuing	-
Avionics System Flight Test	MIPR	VX-20: NAS Patuxent River : MD	-	0.340	Jan 2018	-		-		-		-	Continuing	Continuing	-
Spectrum Management Support	Various	Not specified. : OH	-	0.022	Mar 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	2.484		1.516		0.100		-		0.100	Continuing	Continuing	N/A

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

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Support	C/FFP	Not specified. : TBD	-	0.010	Sep 2018	0.010	Sep 2019	-		-		-	Continuing	Continuing	-
Government Travel	Various	Not specified. : TBD	-	0.055	Sep 2018	0.050	Sep 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.065		0.060		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	3.600	1.776	1.183	1.183	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Joint Primary Aircraft Training System</b>																												
T-6 (JPATS) Studies																												
<b>Avionics Systems Development</b>																												
T-6 Avionics Upgrades for FAA Compliance																												
T-6 Crash Survivable Recorder																												
T-6 Controlled Flight Into Terrain - Prevention																												
<b>Crew Systems Development</b>																												
T-6 Alternative On-Board Oxygen Generation System																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676035 / <i>T-6 Operational System Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Joint Primary Aircraft Training System</b>				
T-6 (JPATS) Studies	1	2018	4	2024
<b>Avionics Systems Development</b>				
T-6 Avionics Upgrades for FAA Compliance	1	2018	4	2018
T-6 Crash Survivable Recorder	4	2019	4	2021
T-6 Controlled Flight Into Terrain - Prevention	4	2020	4	2022
<b>Crew Systems Development</b>				
T-6 Alternative On-Board Oxygen Generation System	2	2020	2	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>				<b>Project (Number/Name)</b> 676037 / <i>T-38 Operational System Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676037: <i>T-38 Operational System Development</i>	-	1.938	8.797	0.605	0.000	0.605	2.453	2.560	0.967	1.254	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 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 505 T-38's in the Air Force inventory (53 T-38A, 6 AT-38B and 446 T-38C) with 5 T-38Cs pending removal. T-38s first entered service in 1960 and average over 50 years old.

Studies & development efforts supporting future ACAT III Engineering Change Proposals to address obsolescence issues and the regular block upgrades are required to keep the system current. These 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 FY21 to ensure continued AETC pilot production. There are 2 MFDs and 2 EEDs per aircraft (1,768 displays). The current Program Office Estimate indicates MFD and EED development funding requirements of FY21 \$10.280M and FY22 \$10.160M and procurement funding requirements of: FY23 \$42.999M and FY24 \$45.839M. Market research is continuing.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F."

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> T-38 Avionics Component Integration (AvCI)	0.010	8.740	0.605	-	0.605
<b>Description:</b> 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. Additionally, the T-38C program is developing a solution for the Federal Aviation Administration Automated Dependent Surveillance-Broadcast (ADS-B) (Out) mandate. Furthermore, L3 Display Systems is unable to continue support of the T-38C Multi-Functional Display (MFD) and the Electronic Engine					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676037 / <i>T-38 Operational System Development</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Display (EED) beyond March 2026. Development of replacement displays must begin in FY20 to ensure continued AETC pilot production beyond March of 2026.					
<b>FY 2019 Plans:</b> All T-38C programs will complete developmental testing and move in to the production and deployment phase by the 3rd quarter of FY19. This is the final funding requirements for development and testing of the HUD, MDP and VHF systems.					
<b>FY 2020 Base Plans:</b> EED and MFD development will start in the 2nd quarter of FY20.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Developmental test will be completed for the Mission Display Processor, Heads-Up Display, VHF Radios and the ADS-B program by the 2nd quarter of FY19. The FY19 developmental funding completes the funding requirements for the HUD, MDP, VHF and ADS-B efforts. The significant reduction in funding from FY19 to FY20 is due to the completion of the previous efforts and the initiation of the EED and MFD effort.					
<b>Title:</b> T-38 Studies and Development Efforts					
<b>Description:</b> Studies and efforts to support future ACAT III Engineering Change Proposals to address obsolescence issues and the regular block upgrades are required to keep the system current.					
<b>FY 2019 Plans:</b> FY19 will be utilized for T-38C Boresight equipment development. The T-38C is experiencing an increase in HUD support frame cracking. Additional alignment equipment is required to ensure AETC pilot training is not impacted.					
<b>FY 2020 Base Plans:</b> There are no efforts planned for FY20.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding reduced to zero because there are no efforts planned for FY20 in this category.					
<b>Title:</b> T-38A/B ADS-B					
<b>Description:</b> Develop and integrate an Automatic Dependent Surveillance Broadcast (Out) solution the T-38A/B model fleet. The solution must maintain the military transponder modes.					
	0.010	0.042	0.000	-	0.000
	1.918	0.015	-	-	-

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676037 / <i>T-38 Operational System Development</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b><i>FY 2019 Plans:</i></b> Development and testing will be completed by the 2nd quarter of FY19. The program will move to the production and deployment phase.					
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> T-38A & AT-38B ADS-B system development and integration will be completed by the 3rd quarter of FY19.					
<b>Accomplishments/Planned Programs Subtotals</b>	1.938	8.797	0.605	-	0.605

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item T03800: T-38	51.641	70.623	35.076	-	35.076	38.026	39.624	38.489	0.000	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**  
The T-38 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 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676037 / <i>T-38 Operational System Development</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.010	Oct 2017	8.648	Oct 2018	0.555	Feb 2020	-		0.555	Continuing	Continuing	-
T-38 A/B Automatic Dependent Surveillance-Broadcast	SS/FFP	The Raytheon Company : Aberdeen, MD	-	1.632	Oct 2017	0.015	Oct 2018	-		-		-	Continuing	Continuing	-
T-38 Studies and Development Efforts	Various	TBD : NV	-	0.010	Oct 2017	0.042	Oct 2018	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	1.652		8.705		0.555		-		0.555	Continuing	Continuing	N/A

**Remarks**  
FY18 \$72K transferred to Small Business Innovative Research funding.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Avionics system Flight Test	PO	412th FTS : Edwards AFB, CA	-	0.194	Oct 2017	-		-		-		-	Continuing	Continuing	-
Not specified.	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.194		-		-		-		-	Continuing	Continuing	N/A

**Remarks**  
Funding for flight test is estimated to cover T-38A/B/C requirements.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 support	C/FFP	Not specified. : NV	-	0.033	Dec 2017	0.033	Dec 2018	-		-		-	Continuing	Continuing	-
Government Travel	Various	Not specified. : NV	-	0.059	Oct 2017	0.059	Oct 2017	0.050	Dec 2019	-		0.050	Continuing	Continuing	-
<b>Subtotal</b>			-	0.092		0.092		0.050		-		0.050	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676037 / <i>T-38 Operational System Development</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Avionics Systems Development</b>																												
Heads-Up Display Qualification Testing																												
Mission Display Processor Qualification Testing																												
Automatic Dependent Surveillance Broadcast Qualification Testing (T38-C)																												
Very High Frequency Radio Qualification Testing																												
Very High Frequency Navigation Unit Qualification Testing																												
T-38A/B Qualification Testing																												
Electronic Engine/Multi-Functional Display Development																												
T-38 Block Software Upgrades																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604233F / <i>Specialized Undergraduate Flight Training</i>	<b>Project (Number/Name)</b> 676037 / <i>T-38 Operational System Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Avionics Systems Development</i></b>				
Heads-Up Display Qualification Testing	1	2018	3	2019
Mission Display Processor Qualification Testing	1	2018	3	2019
Automatic Dependent Surveillance Broadcast Qualification Testing (T38-C)	2	2018	2	2019
Very High Frequency Radio Qualification Testing	1	2018	3	2019
Very High Frequency Navigation Unit Qualification Testing	1	2018	3	2019
T-38A/B Qualification Testing	1	2018	2	2019
Electronic Engine/Multi-Functional Display Development	2	2020	4	2022
T-38 Block Software Upgrades	3	2021	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604445F / <i>Wide Area Surveillance</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	37.750	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.001	0.000	37.755
675899: <i>Wide Area Surveillance</i>	0.000	37.750	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.001	0.000	37.755

**Program MDAP/MAIS Code:** 519

**Note**

In FY2017, Project 675895, Wide Area Surveillance was terminated.

**A. Mission Description and Budget Item Justification**

Wide Area Surveillance (WAS) consists of two advanced sensor systems, the Stateside Affordable radar System (STARS) and Scorpion, incorporated into a single WAS System. Based on existing technological capabilities, WAS will detect/track low, slow and other asymmetrical threats in the airspace and meet the user needs of sensing stressing airborne targets in complex environments with affordable sensors. The sensor outputs will be incorporated into the Battle Control Systems-Fixed (BCS-F) air picture and utilized as the North American Aerospace Defense Command/ Northern Command (NORAD/NORTHCOM) Command and Control (C2) air surveillance system of record.

Some aspects of the WAS program are classified and will be provided on a need-to-know basis.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WAS 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604445F / <i>Wide Area Surveillance</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	16.247	0.000	0.000	0.000	0.000
Current President's Budget	37.750	0.000	0.000	0.000	0.000
Total Adjustments	21.503	0.000	0.000	0.000	0.000
• Congressional General Reductions	-0.206	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	18.901	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	3.142	0.000			
• SBIR/STTR Transfer	-0.334	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY 2018 funds include \$0.009 million pending transfer to the Rapid Prototyping Fund in accordance with PL 114-92; section 828, Penalty for Cost Overruns, as amended by PL 115-91 section 825(a).

FY18 funds include BTR of \$3.142 million

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0604445F / <i>Wide Area Surveillance</i>				<b>Project (Number/Name)</b> 675899 / <i>Wide Area Surveillance</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675899: <i>Wide Area Surveillance</i>	0.000	37.750	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.001	0.000	37.755
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Wide Area Surveillance (WAS) consists of two advanced sensor systems, the Stateside Affordable Radar System (STARS) and Scorpion, incorporated into a single WAS System. Based on existing technological capabilities, WAS will detect/track low, slow and other asymmetrical threats in the airspace and meet the user needs of sensing stressing airborne targets in complex environments with affordable sensors. The sensor outputs will be incorporated into the Battle Control Systems-Fixed (BCS-F) air picture and utilized as the North American Aerospace Defense Command/ Northern Command (NORAD/NORTHCOM) Command and Control (C2) air surveillance system of record.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WAS 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 2018	FY 2019	FY 2020
<b>Title:</b> Development, Test & Fielding	37.750	0.000	-
<b>Description:</b> Development, Test & Fielding			
<b>FY 2019 Plans:</b> Complete development, integration and testing of the Stateside Affordable Radar System (STARS) and Scorpion.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>			-

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPAF 03 Line Item 834240: <i>Wide Area Surveillance</i>	73.487	87.104	80.818	-	80.818	76.031	7.893	2.239	18.183	818.915	1,164.670
• OPAF 05 861900: <i>Spares and repair parts</i>	-	-	3.007	-	3.007	3.008	3.007	3.061	3.117	0.000	15.200

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604445F / <i>Wide Area Surveillance</i>	<b>Project (Number/Name)</b> 675899 / <i>Wide Area Surveillance</i>
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**D. Acquisition Strategy**

The Wide Area Surveillance (WAS) strategy is a single step acquisition approach for full capability to develop, produce, and field highly capable and sustainable advanced sensors in the National Capital Region. Science & technology contracts were let prior to the Engineering and Manufacturing Development phase for both sub-systems. The ongoing Cost Plus Fixed-Fee (CPFF) contract for Stateside Affordable Radar System (STARS) was awarded to a single developer to design, build, integrate, and test the STARS system. A subsequent task order was awarded (Jul 17) to include pre-operational site support. The ongoing CPFF contract for Scorpion was awarded (Aug 17) to a single developer to complete the design, build, integration, and testing of the Scorpion system, and conduct pre-operational site support. This strategy includes a single delivery approach with 11 STARS and 18 Scorpion systems for a total of 29 sub-systems delivered to achieve FOC. The pre-operational contract for the Scorpion system transitioned to Interim Contract Support (ICS) in Dec 2018, STARS system will award ICS in conjunction with production contracts in FY19.

Air Force Program Executive Officer (PEO) for Battle Management (AFPEO BM) is the PEO for WAS. Air Force Life Cycle Management Center (AFLCMC) is the Contracting Authority for the WAS program and provides contracts, legal, and comptroller support. The Secretary of the Air Force for Acquisition (SAF/AQ) is the program's Milestone Decision Authority (MDA).

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604445F / <i>Wide Area Surveillance</i>	<b>Project (Number/Name)</b> 675899 / <i>Wide Area Surveillance</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Wide Area Surveillance (WAS)	Various	Various : Various	0.000	31.157	May 2018	-		-		-		-	0.000	31.157	46.000
<b>Subtotal</b>			0.000	31.157		-		-		-		-	0.000	31.157	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Mission	Various	Various : Various	0.000	1.981	Jan 2018	-		-		-		-	0.000	1.981	-
<b>Subtotal</b>			0.000	1.981		-		-		-		-	0.000	1.981	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	46 Test Squadron : Eglin AFB, FL	0.000	0.800	Feb 2019	-		-		-		-	0.000	0.800	-
<b>Subtotal</b>			0.000	0.800		-		-		-		-	0.000	0.800	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	AFLCMC/HBDB : Hanscom AFB, MA	0.000	3.812	Oct 2017	-		-		-		-	0.000	3.812	-
<b>Subtotal</b>			0.000	3.812		-		-		-		-	0.000	3.812	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			0.000	37.750	0.000	-	-	-	0.000	37.750	N/A





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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604445F / <i>Wide Area Surveillance</i>	<b>Project (Number/Name)</b> 675899 / <i>Wide Area Surveillance</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Wide Area Surveillance</i></b>				
Scorpion Pre-operational Support	4	2018	1	2019
STARS Pre-operational Support	4	2018	1	2020
Initial Operational Test and Evaluation (IOT&E)	3	2018	4	2019
Milestone C (September 2019)	4	2019	4	2019
Initial Operation Capability (IOC)	3	2019	3	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	0.903	0.000	0.903	0.500	0.000	0.000	0.000	Continuing	Continuing
674211: <i>GLOBAL ACCESS</i>	-	0.000	0.000	0.903	0.000	0.903	0.500	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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	0.903	0.000	0.903
Total Adjustments	0.000	0.000	0.903	0.000	0.903
• 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	0.903	0.000	0.903

**Change Summary Explanation**

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

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Deployment & Distribution Enterprise	0.000	0.000	0.903

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<p><b>Description:</b> Develop deployment and distribution technology</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Plans:</b> Develop deployment and distribution technology</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> New Start</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	0.903

**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

**F. 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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	694.455	0.000	694.455	786.513	550.100	451.737	522.023	Continuing	Continuing
675346: F-35	-	0.000	0.000	694.455	0.000	694.455	786.513	550.100	451.737	522.023	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Total cost, including International partner contributions, USN, USMC, and USAF funding: FY2020: \$1,782.964M.

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:

- FY13-19 PE 0207142F BPAC 675346
- FY20: USAF 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 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. 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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	
<p>Fighter Modernization Initial Capabilities Document (ICD) and through F-35 JSF Block 4 Mission Decomposition analysis completed in FY2014. 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 FY2017 and FY2018 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 FY2021.</p> <p>C2D2 efforts 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.</p> <p>The United Kingdom, Italy, Netherlands, Turkey, 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.</p> <p>This program element does 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.</p> <p>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 FY20. This is not a new start.</p> <p>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 2018 Air Force penalty total is \$14.373M. 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.</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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	694.455	0.000	694.455
Total Adjustments	0.000	0.000	694.455	0.000	694.455
• 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	694.455	0.000	694.455

**Change Summary Explanation**

FY20: USAF Common Block 4 funding moved in FY20 from PE 0207142F to PE 0604840F. This funding is a continuation of effort under 0207142F; new PE established to separate USAF unique requirements.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Product Development - Block 4 Planning and Systems Engineering	0.000	0.000	622.265	0.000	622.265
<b>Description:</b> Block 4 Planning and Systems Engineering preliminary design and delta System Requirements Review (SRR) for all variants of the F-35 Aircraft. Modernization effort is the Requirements Decomposition of capabilities for the entire Block 4 upgrade. This is a continuation of the previous Block 4 Requirements Decomposition effort which will include activities leading up to a successful System Functional Review (SFR) and 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. Expected completion of a Block 4 Preliminary Design Review (PDR) and System Requirements Review (SRR) will address additional Block 4 capabilities requirements. Post-PDR risk reduction, preplanning for subsequent Block 4 Modernization events, and investments to deliver the full Block 4 Air System capabilities are included.					
<b>FY 2019 Plans:</b>					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2			
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					
see PE 27142F					
<b>FY 2020 Base Plans:</b> Continued from PE 0207142F					
Continue Block 4 Phase II contract development. Continue Post-PDR risk reduction activities for completion of Developmental Flight Test. Continue with Agile development of capabilities through Developmental Flight Test. Continue development and maturity of key long lead capabilities and service unique weapons.					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 is a continuation of effort from PE 0207142F in FY19.					
<b>Title:</b> Technology Refresh 3 (TR-3)					
<b>Description:</b> Technology Refresh 3 (TR-3) Design Competition, Development, Integration, and Test. This is the design phase of the TR-3 program which fully supports Block 3F functionality and allows incorporation of all Block 4 capabilities documented in the System Requirements Document (SRD). TR-3 hardware redesign is required to support 4X processing growth factor based on the current processing estimates for all 3F capabilities. Redesign of TR-3 subsystems Integrated Core Processor (ICP), Aircraft Memory System (AMS), and Panoramic Cockpit Display (PCD) configurations will contain new backplane technology, commercial operating systems, and modified middleware necessary to take the design of the TR-3 System through Critical Design Review (CDR).					
<b>FY 2020 Base Plans:</b> Continued from PE 0207142F.					
The TR-3 program will complete design for Critical Design Review of the Integrated Core Processor (ICP), Panoramic Cockpit Display (PCD), and Aircraft Memory System (AMS). In addition the TR-3 program will continue with the development of middleware software 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 FY23.					
<b>FY 2020 OCO Plans:</b>					
FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
-	-	195.600	0.000	195.600	

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2			
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					
N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 is a continuation of effort from PE 0207142F in FY19.					
<b>Title:</b> Infrastructure and Support Costs					
<b>Description:</b> 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, mission systems, weapons integration, mission support, autonomic logistics development, joint reprogramming enterprise, modeling and simulation environment activities and training investment support. Other costs in support of ranges, chase planes and DT site operations.					
<b>FY 2020 Base Plans:</b> Continued from PE 0207142F.					
Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. 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. Conduct strategic basing analysis to determine permanent location for core of HPSI.					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 is a continuation of effort from PE 0207142F in FY19.					
<b>Title:</b> Test and Evaluation					
<b>Description:</b> Developmental Test activities in support of Block 4, to include Lockheed Martin and Pratt & Whitney support at both 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. Additional upgrades required to support development and evaluation of improvements driven by					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	-	-	205.811	0.000	205.811
	-	-	601.355	0.000	601.355

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
changes in the threat environment and as identified in the Electronic Warfare ICD, the Fifth Generation Fighter Modernization ICD, and the Block 4 Capability Development Document (CDD).  <b>FY 2020 Base Plans:</b> Continued from PE 0207142F.  Funding will support flight test execution to ensure Block 4 capabilities are delivered as designed. 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. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment.  <b>FY 2020 OCO Plans:</b> N/A  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 is a continuation of effort from PE 0207142F in FY19.					
<b>Title:</b> Autonomic Logistics Information System (ALIS) Development  <b>Description:</b> Autonomic Logistics Information System (ALIS) continues to deliver the core logistics infrastructure requirements for the F-35 enterprise. ALIS includes features such as aircraft scheduling, training delivery and 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: Current ALIS which includes Agile DevOps, and ALIS Next.  Current ALIS is focused on developing new software that uses the current software as a baseline. Upcoming software releases include 3.5, 3.6 and 3.7 builds. 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	-	-	157.933	0.000	157.933

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
ALIS, an Agile DevOps pilot is working to rapidly deliver capability updates to the fleet and change the way that current ALIS delivers software.					
ALIS Next is the re-architecture effort that began in FY19 and will complete fielding in FY23. ALIS Next will redesign ALIS software, data, and hardware architecture with a focus on cybersecurity, affordability, resiliency, and supportability.					
<b>FY 2020 Base Plans:</b> Continued from PE 0207142F.					
Funding will continue to support ALIS software development efforts as well as begin ALIS build 3.6. Increase the number of DevOps product teams and begin to merge with Current ALIS development efforts. Refactor ALIS software in accordance with the ALIS Next architecture developed in FY19.					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Continuing effort previously resourced in PE 0207142F.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	1,782.964	0.000	1,782.964
Other Service Funding Adjustment	-	-	1,088.509	-	1,088.509
<b>Air Force Subtotals</b>	0.000	0.000	694.455	0.000	694.455

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE 07 0207142F: <i>BPAC 675346: F-35 Squadrons</i>	291.080	426.494	11.850	-	11.850	7.693	4.948	4.196	3.745	Continuing	Continuing
• RDTE 07 0207142F (1)...: <i>BPAC 676011: Dual Capable Aircraft</i>	34.145	77.434	71.339	-	71.339	106.329	45.328	11.643	11.852	Continuing	Continuing

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 0604810N: <i>BLI 2936: F-35C Follow on Modernization (CV)</i>	138.308	-	-	-	-	-	-	-	-	0.000	138.308
• RDTE 07 0604840N: <i>BLI 2936: F-35C C2D2</i>	-	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing
• RDTE 05 0604810M: <i>BLI 2935: F-35B Follow on Modernization (STOVL)</i>	139.369	-	-	-	-	-	-	-	-	0.000	139.369
• RDTE 07 0604840M: <i>BLI 3410: F-35B C2D2</i>	-	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing
• RDTE International: <i>International</i>	157.042	209.763	281.887	-	281.887	339.139	224.501	189.728	158.811	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 Air Force. Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to FY2002. The United Kingdom, Italy, Netherlands, Turkey, 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 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. The F-35 Acquisition Strategy is currently being updated to add a section regarding C2D2.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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)	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-		-		416.615	Dec 2019	-		416.615	Continuing	Continuing	-
Prime LM 14-G-0020 (TR3)	C/CPAF	Lockheed Martin : Ft Worth, TX	-	-		-		195.600	Dec 2019	-		195.600	Continuing	Continuing	-
Prime LM BOA 0020 (Nimble Lightning + Pilot Training)	C/CPAF	Various : Various	-	-		-		4.650	Jan 2020	-		4.650	Continuing	Continuing	-
Flight Test Asset	Various	Lockheed Martin : Ft Worth, TX	-	-		-		105.000	Jan 2020	-		105.000	Continuing	Continuing	-
Prime LM DT AC Viability	C/CPAF	Lockheed Martin : Ft Worth, TX	-	-		-		79.000	Jan 2020	-		79.000	Continuing	Continuing	-
Prime PW Propulsion	SS/CPAF	Pratt Whitney : East Hartford, CT	-	-		-		82.000	Oct 2019	-		82.000	Continuing	Continuing	-
Prime LM Developmental Foundation Contract	C/CPIF	Lockheed Martin : Ft Worth, TX	-	-		-		201.000	Nov 2019	-		201.000	Continuing	Continuing	-
Prime TBD JRE Dev.	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-		-		85.200	Dec 2019	-		85.200	Continuing	Continuing	-
Prime LM ALIS Next	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-		-		68.000	Dec 2019	-		68.000	Continuing	Continuing	-
Prime LM ALIS Dev	C/CPIF	Lockheed Martin : Ft Worth, TX	-	-		-		58.000	Dec 2019	-		58.000	0.000	58.000	-
Prime LM F-35B Fatigue Test Article	C/CPFF	Lockheed Martin : Ft Worth, TX	-	-		-		21.300	Jan 2020	-		21.300	0.000	21.300	-
Training Investments	C/CPIF	Lockheed Martin : Ft Worth, TX	-	-		-		45.000	Dec 2019	-		45.000	0.000	45.000	-
Systems Engineering	Various	Various : Various	-	-		-		49.500	Jan 2020	-		49.500	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		1,410.865		-		1,410.865	Continuing	Continuing	N/A

**Remarks**  
 FY2020 Product Development continued from PE 0207142F.  
 Block 4 Modernization on R-2A includes Phase II, Nimble Lightning, JRE, & Systems Engineering.  
 Flight Test assets include weapons to support Test and assests needed for flight test instrumentation.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
JSE/IPT Development Support	WR	NAWCAD : Paxtuxent River, MD	-	-		-		48.740	Dec 2019	-		48.740	Continuing	Continuing	-
China Lake Development Support	WR	NAWCAD : China Lake, CA	-	-		-		7.850	Dec 2019	-		7.850	Continuing	Continuing	-
Eglin Development Support	Various	Eglin AFB : Eglin AFB, FL	-	-		-		4.500	Dec 2019	-		4.500	Continuing	Continuing	-
Various Development Support	Various	Various : Various	-	-		-		27.000	Dec 2019	-		27.000	Continuing	Continuing	-
WPAFB Development Support	MIPR	AFRL : WP, AFB, OH	-	-		-		7.500	Dec 2019	-		7.500	Continuing	Continuing	-
JRE Development Support	Various	Various : Various	-	-		-		25.900	Dec 2019	-		25.900	0.000	25.900	-
ALIS Development Support	Various	Various : Various	-	-		-		16.933	Dec 2019	-		16.933	0.000	16.933	-
ALIS Next Development Support	MIPR	Various : Various	-	-		-		15.000	Dec 2019	-		15.000	0.000	15.000	-
<b>Subtotal</b>			-	-		-		153.423		-		153.423	Continuing	Continuing	N/A

**Remarks**  
FY2020 Support continued from PE 0207142F.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
PAX Developmental Test & Evaluation	WR	NAWCAD : Patuxent River, MD	-	-		-		65.000	Dec 2019	-		65.000	Continuing	Continuing	-
China Lake Developmental Test & Evaluation	WR	NAWCWD : China Lake, CA	-	-		-		11.200	Dec 2019	-		11.200	Continuing	Continuing	-
Edwards AFB Developmental Test & Evaluation	Various	Edwards AFB : Edwards AFB, CA	-	-		-		22.455	Dec 2019	-		22.455	Continuing	Continuing	-
Various Developmental Test & Evaluation	Various	Various : Various	-	-		-		4.200	Dec 2019	-		4.200	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Kirtland AFB Operational Test & Evaluation	WR	Kirtland AFB : Kirtland AFB, NM	-	-		-		31.500	Dec 2019	-		31.500	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		134.355		-		134.355	Continuing	Continuing	N/A

**Remarks**  
FY2020 Test and Evaluation continued from PE 0207142F.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Civilian Pay	Allot	AFLCMC Civ Pay : Wright Patterson AFB, OH	-	-		-		44.172	Oct 2019	-		44.172	Continuing	Continuing	-
Financial Mgmt Database Support IDS	C/CPFF	Various : Various	-	-		-		1.565	Dec 2019	-		1.565	Continuing	Continuing	-
Earned Value/Finance/ Cost ACT-I	C/CPFF	Various : Various	-	-		-		4.201	Dec 2019	-		4.201	Continuing	Continuing	-
Systems System High BOS	C/CPFF	Various : Various	-	-		-		8.788	Dec 2019	-		8.788	Continuing	Continuing	-
Other CIO Services	Various	Various : Various	-	-		-		2.127	Dec 2019	-		2.127	Continuing	Continuing	-
Other Core Civ Pay	Various	NAWCAD : Various	-	-		-		11.000	Dec 2019	-		11.000	0.000	11.000	-
Other Core Contractor Sppt.	Various	Various : Various	-	-		-		8.218	Dec 2019	-		8.218	0.000	8.218	-
Travel	Various	Various : Various	-	-		-		4.250	Oct 2019	-		4.250	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		84.321		-		84.321	Continuing	Continuing	N/A

**Remarks**  
FY2020 Management Services continued from PE 0207142F.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Cost Category Subtotals</b>	-	-	0.000	1,782.964	-	1,782.964	Continuing	Continuing	N/A
Other Service Funding Adjustment	-	-	-	1,088.509	-	1,088.509			-
<b>Project Cost Totals</b>	-	-	-	694.455	-	694.455	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.  
 FY20 reflects \$694.455M USAF/\$383.741M USN/\$422.881M USMC/\$281.887M International/Total \$1782.964M

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  
 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>675346 / F-35</b>	
Systems Engineering & Development: Phase II Development	
Systems Engineering & Development: Systems Engineering & Integration Contract	
Systems Engineering & Development: Development Foundation Contract	
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 11 Full Funding / Delivery	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 12 Full Funding / Delivery	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT13 Full Funding / Delivery	
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Delivery	

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024							
	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 15 Full Funding / Delivery																																
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Delivery																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0604840F / F-35 C2D2	<b>Project (Number/Name)</b> 675346 / F-35

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>675346 / F-35</b>				
Systems Engineering & Development: Phase II Development	1	2019	1	2023
Systems Engineering & Development: Systems Engineering & Integration Contract	4	2021	4	2024
Systems Engineering & Development: Development Foundation Contract	1	2019	1	2023
Systems Engineering & Development: Development & Maturation IDIQ Contract	3	2023	4	2024
Agile Process & Capability Development: Agile Process & Capability Development	1	2019	4	2024
Verification & Validation: DT Aircraft Upgrades	1	2019	3	2021
Verification and Validation: Integrated Test	1	2019	4	2024
Verification and Validation: TR-3 Operational Test	4	2023	3	2024
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 11 Full Funding / Delivery	1	2019	4	2019
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 12 Full Funding / Delivery	1	2020	4	2020
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT13 Full Funding / Delivery	1	2021	4	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Delivery	1	2022	4	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Delivery	1	2023	4	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Delivery	1	2024	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	214.117	17.298	41.058	40.567	0.000	40.567	43.941	12.756	7.149	25.132	0.000	402.018
676003: <i>HRM Structural Development</i>	214.117	17.298	41.058	40.567	0.000	40.567	43.941	12.756	7.149	25.132	0.000	402.018
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. The Department of the Air Force (DAF) plans to accomplish this goal by modernizing existing technology, resulting in a secure and authoritative data environment that improves accuracy, strengthens decision making and reduces processing time and costs. AFIPPS supports effective military personnel management and development throughout the lifecycle of all military members, by providing an accurate and single authoritative source of personnel data. Active (RegAF), National Guard (ANG), and Reserve (AFRes) components will integrate personnel and pay functionality; streamline and improve automated support to the mobilization and deployment processes; and implement standard data that reflects the core requirements of the Combatant Commands, the Department of the Air Force, the Office of the Secretary of Defense and other federal agencies.

Congress, the Department of Defense (DoD), and other federal agencies rely on accurate AF Human Resources (HR) data to make key decisions on how the US military is organized, operated, maintained, and funded. The AFIPPS program will ensure accurate and timely delivery of pay, entitlements, allowances, and benefits information is provided for the Total Force (Active Duty, Guard, and Reserve). 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 approach utilizes Agile to develop pay capabilities and integrate into existing USAF personnel system. Additionally, The AFIPPS approach follows the DoD principle of pursuing enterprise solutions, not enterprise systems. Efforts are underway to establish DoD-level enterprise governance, ensure common standards, and create shared services while pursuing a distinctive approach appropriate for the AF.

AFIPPS's customers include approximately 510,000 AF service members across all components (RegAF, ANG, and AFRes) including thousands of military leaders of different ranks, specialties, and career fields who are responsible for the conduct of AF operations that rely on these services to ensure service members with the appropriate skill sets are deployed where needed at home and on the battlefield. Congress, the rest of the Department of Defense (DoD), and other federal agencies all rely on accurate AF Human Resources (HR) data to make key decisions that affect how the US military is organized, funded, deployed, and maintained.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver integrated personnel and pay 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,

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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0605832F, and 0605898F. 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	21.915	47.287	54.938	0.000	54.938
Current President's Budget	17.298	41.058	40.567	0.000	40.567
Total Adjustments	-4.617	-6.229	-14.371	0.000	-14.371
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-4.617	-6.229			
• 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	-14.371	0.000	-14.371

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Air Force Integrated Personnel and Pay System (AFIPPS) - Product Development	16.577	38.987	38.463
<b>Description:</b> 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).			
<b>FY 2019 Plans:</b>			
- Determine and initiate system interface modifications required to integrate pay capability into AFIPPS			
- Continue Oracle Subject Matter Expertise contract to advise program office on Commercial-off-the Shelf (COTS) product implementation			
- Continue contract to use the Agile approach for developing pay capabilities and integrate into existing USAF personnel system (first full year)			
- Purchase COTS S/W licenses to support development activities			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Maintain contract documentation to support AFIPPS strategy and Full Deployment Authority to Proceed (ATP) approval</li> <li>- Continue acquisition planning, reporting, and the execution of AFIPPS and follow-on activities</li> <li>- 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 &amp; DoD enterprise networks, databases, and information systems</li> <li>- Maintain the required AFIPPS computing environments, e.g. development, test environment</li> <li>- Continue risk reduction activities to support decision-making</li> <li>- Continue to design and implement enterprise architecture for pay</li> <li>- Continue to perform change management and other integration activities</li> <li>- Complete EBS training contract</li> <li>- Continue to use Engineering, Professional, and Administrative Support Services (EPASS) contracted personnel and Federally Funded Research and Development Center (FFRDC) resources to support implementation of the program</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue system interface modifications required to integrate pay capability into AFIPPS</li> <li>- Will continue Oracle Subject Matter Expertise contract to advise program office on COTS product implementation</li> <li>- Will continue to use the Agile approach for developing pay capabilities and integrate into existing USAF personnel system</li> <li>- Will purchase COTS S/W licenses to support development activities</li> <li>- Will maintain contract documentation to support AFIPPS strategy and Full Deployment ATP approval</li> <li>- Will continue acquisition planning, reporting, and the execution of AFIPPS and follow-on activities</li> <li>- Will continue AF information technology efforts (e.g., Common Computing Environment, FIAR/FISCAM audit support, etc) to ensure AFIPPS is fully integrated into the AF &amp; DoD enterprise networks, databases, and information systems</li> <li>- Will maintain the required AFIPPS computing environments, e.g. development, test environment</li> <li>- Will continue risk reduction activities to support decision-making</li> <li>- Will continue to design and implement enterprise architecture for pay</li> <li>- Will continue to perform change management and other integration activities</li> <li>- Will continue to use EPASS contracted personnel and FFRDC resources to support implementation of the program</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No significant change between FY2019 and FY2020.</p>				
<b>Title:</b> AFIPPS - Test and Evaluation		0.721	2.071	2.104
<b>Description:</b> Government integrated test and evaluation activities.				
<b>FY 2019 Plans:</b>				

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<ul style="list-style-type: none"> <li>- Continue refining Test and Evaluation Master Plan (TEMP) and preparing test plans</li> <li>- Begin AFIPPS integrated contractor development test activities</li> <li>- Continue Cyber Vulnerability Assessments to evaluate current/future AFIPPS system environments</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue refining TEMP and preparing test plans</li> <li>- Will continue AFIPPS integrated contractor development test activities</li> <li>- Will continue Cyber Vulnerability Assessments to evaluate current/future AFIPPS system environments</li> <li>- Will plan and conduct Developmental/Operational Testing on AFIPPS</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>                      Funding increase is due to projected inflation adjustment</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	17.298	41.058	40.567

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 834410: <i>INTEGRATED PERSONNEL AND PAY SYSTEM</i>	0.000	0.000	20.900	-	20.900	0.000	0.000	0.000	-	0.000	20.900

**Remarks**

**E. Acquisition Strategy**

AFIPPS acquisition strategy focuses on expanding the fielded AF personnel system (MilPDS) by integrating a pay capability. MilPDS is implemented using the commercial Oracle ERP E-Business Suite (EBS). The AFIPPS strategy will be to configure/develop the pay portion of EBS, ensure the system is fully integrated, and deployed. The Government awarded a contract for the pay system development, test, and deployment. The development activities will be fully coordinated and integrated with the on-going operation and sustainment of MilPDS.

AFIPPS is using agile software development to the maximum extent practical for a COTS implementation effort. The capability will be broken into epics, and each sprint will be developed and tested by the developer and government on a pre-production system. Once functionality and associated business processes from current payroll and leave systems are incorporated into the pre-production system, AFIPPS will be delivered in a single release in Q2FY21. The release is strategically planned for January to coincide with all domestic and international financial transactions that occur on the first of the year, mitigating any potential impacts to the warfighter. Incremental releases on top of the existing operational AF Military Personnel Data System (MilPDS) are not feasible due to the following:

- 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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>
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- 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

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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / AF Integrated Personnel and Pay System (AF-IPPS)	<b>Project (Number/Name)</b> 676003 / HRM Structural Development
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Common Computing Environment (CCE)	Various	Various : Various	0.701	-		-		-		-		-	0.000	0.701	0.701
Prime Development & Integration Contract	C/CPAF	ACCENTURE FEDERAL SVCS : ARLINGTON, VA	16.391	6.115	May 2018	20.229	Nov 2018	20.232	Dec 2019	-		20.232	56.896	119.863	124.894
Application Hosting Environment	MIPR	DISA EIS : Pensacola, FL	56.268	1.799	Apr 2018	1.698	Dec 2018	1.809	Dec 2019	-		1.809	1.888	63.462	63.462
COTs Licenses	Various	Various : Various	11.991	3.472	Apr 2018	1.862	Oct 2018	1.640	Apr 2020	-		1.640	15.027	33.992	33.992
System Interface Integration & Modification	TBD	TBD : TBD	0.000	0.000		3.195	Feb 2019	5.343	Dec 2019	-		5.343	2.921	11.459	11.459
Engineering Support (FFRDC)	SS/CPAF	CMU-SEI : Pittsburgh, PA	10.807	1.110	Oct 2018	2.621	Jan 2019	1.969	Aug 2020	-		1.969	4.098	20.605	20.605
Oracle EBS Subject Matter Experts	C/T&M	DLT SOLUTIONS, LLC : HERNDON, VA	0.000	0.588	May 2018	1.183	Oct 2018	1.441	Nov 2019	-		1.441	0.738	3.950	3.950
Financial Improvement and Audit Readiness(FIAR) and Acquisition Planning Subject Matter Experts	C/FP	Various : Various	0.482	0.498	Aug 2018	0.509	Aug 2019	0.567	Aug 2020	-		0.567	0.598	2.654	2.654
Oracle eBusiness Suite (EBS) Training Development	C/FP	ASPECT SOFTWARE INC : PHOENIX, AZ	2.796	0.660	Sep 2018	1.167	Nov 2018	-		-		-	0.000	4.623	4.623
Direct Mission Support (Other)	Various	Various : Various	53.862	-		-		-		-		-	0.000	53.862	53.862
<b>Subtotal</b>			153.298	14.242		32.464		33.001		-		33.001	82.166	315.171	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / AF Integrated Personnel and Pay System (AF-IPPS)	<b>Project (Number/Name)</b> 676003 / HRM Structural Development
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	1.723	0.101	Mar 2018	0.372	Dec 2018	1.038	Dec 2019	-		1.038	0.514	3.748	3.748
Development and Test Infrastructure	C/CPIF	DTSI : San Antonio, TX	0.100	0.620	Jul 2018	1.699	Dec 2018	1.066	Jul 2020	-		1.066	1.094	4.579	4.579
<b>Subtotal</b>			4.177	0.721		2.071		2.104		-		2.104	1.608	10.681	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	11.370	1.661	Apr 2018	0.400	Jan 2019	0.000		-		0.000	0.000	13.431	13.431
Engineering, Professional, and Administrative Support Services (EPASS)	C/CPAF	Oasis Systems, LLC : Lexington, MA	0.000	-		5.388	Nov 2018	4.690	Mar 2020	-		4.690	3.950	14.028	14.028
Other Program Support Cost	Various	Various : Various	25.594	0.321	Apr 2018	0.440	Nov 2018	0.449	Jan 2020	-		0.449	0.755	27.559	27.559
Professional Acquisition Support Services II (PASS II)	C/CPAF	Quantech Services, Inc. : Lexington, MA	15.849	0.353	Jul 2018	0.000		0.000		-		0.000	0.000	16.202	16.202
Specialized Cost Services (SCS): EPASS	C/CPAF	BusinessTechnologies & Solutions : Beavercreek, OH	3.829	0.000	Apr 2018	0.295	Apr 2019	0.323	Apr 2020	-		0.323	0.499	4.946	4.946
<b>Subtotal</b>			56.642	2.335		6.523		5.462		-		5.462	5.204	76.166	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	<b>Project Cost Totals</b>		214.117	17.298	41.058	40.567	-	40.567	88.978	402.018

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / AF Integrated Personnel and Pay System (AF-IPPS)	<b>Project (Number/Name)</b> 676003 / HRM Structural Development

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Integrated Personnel and Pay System</i></b>	
AFIPPS Development and Test Environments	
Enterprise Architecture Design/Implement	
Acquisition planning, RFP, Contract Award	
Prime Development, Integration, and Deployment	
AF Information Technology Efforts	
Government Integrated Test and Evaluation Activities	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605018F / <i>AF Integrated Personnel and Pay System (AF-IPPS)</i>	<b>Project (Number/Name)</b> 676003 / <i>HRM Structural Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Integrated Personnel and Pay System</i></b>				
AFIPPS Development and Test Environments	1	2018	3	2021
Enterprise Architecture Design/Implement	1	2018	4	2020
Acquisition planning, RFP, Contract Award	1	2018	3	2018
Prime Development, Integration, and Deployment	3	2018	2	2021
AF Information Technology Efforts	1	2018	4	2024
Government Integrated Test and Evaluation Activities	1	2018	1	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	37.304	32.770	47.193	0.000	47.193	50.583	52.321	49.983	53.723	Continuing	Continuing
675066: <i>Anti-Tamper Technology Executive Agent</i>	-	37.304	32.770	47.193	0.000	47.193	50.583	52.321	49.983	53.723	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 nine AT responsibilities required by DoDD 5200.47E Anti-Tamper. These responsibilities include areas unique to the DoD Executive Agent for Anti-Tamper (ATEA) and Air Force Component AT Office of Primary Responsibility (OPR). The ATEA is responsible for developing and implementing AT policy, coordinating and providing financial support for AT technology development and evaluations, hardware/software vulnerability assessments, laboratory infrastructure, establishing and maintaining a data bank/library of AT technologies, providing security mechanisms, providing outreach and education to the DoD AT community, providing intel support, and funding validation and evaluations of AT implementations across all DoD acquisition programs. This program element may include necessary civilian pay expenses required to develop new AT capabilities and evaluate AT implementations on weapon systems. 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. The AF AT OPR, that is also funded by this PE and is responsible for the oversight and security of AT on all AF acquisition programs under the Program Protection Planning process and manages AF AT technology development.

The DoD ATEA coordinates technology development among the DoD Services/Agencies, National Laboratories, and Industry.

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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>
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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 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, 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	33.150	32.770	34.193	0.000	34.193
Current President's Budget	37.304	32.770	47.193	0.000	47.193
Total Adjustments	4.154	0.000	13.000	0.000	13.000
• 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	5.100	0.000			
• SBIR/STTR Transfer	-0.946	0.000			
• Other Adjustments	0.000	0.000	13.000	0.000	13.000

**Change Summary Explanation**

FY 2018 funds include \$0.019 million pending transfer to the Rapid Prototyping Fund in accordance with PL 114-92; section 828, Penalty for Cost Overruns, as amended by PL 115-91 section 825(a).

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> DoD Anti-Tamper Technology Executive Agent (DoDATEA)	28.453	22.584	36.011

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> AT technology coordination and evaluations, hardware/software vulnerability assessments, laboratory infrastructure; provide outreach and education to the AT Community, conduct effective validation and evaluation of AT implementation as well as implementation of AT policy.</p> <p><b>FY 2019 Plans:</b> - Conduct effective validation and evaluation of AT implementation on all DoD Acquisition programs; continue AT hardware/software technical development, vulnerability assessments, and maintenance of AT laboratory infrastructure. - Continue to train acquisition workforce on AT policy and technology, and implement AT policy within the AT Community.</p> <p><b>FY 2020 Plans:</b> - Conduct effective validation and evaluation of AT implementation on all DoD Acquisition programs; continue AT hardware/software technical development, vulnerability assessments, and maintenance of AT laboratory infrastructure. - Continue to train acquisition workforce on AT policy and technology, and implement AT policy within the AT Community.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to a \$13 million POM plus up in FY 2020 and an inflation increase.</p>				
<p><b>Title:</b> DoDATEA Program Management Support</p> <p><b>Description:</b> Includes civilian pay, A&amp;AS, outreach and education, travel, supplies, and AFLCMC/WWG support.</p> <p><b>FY 2019 Plans:</b> Support program office efforts, including civilian pay, A&amp;AS, outreach and education, travel, and supplies.</p> <p><b>FY 2020 Plans:</b> Support program office efforts, including civilian pay, A&amp;AS, outreach and education, travel, and supplies.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to inflation.</p>		5.251	5.986	6.082
<p><b>Title:</b> Air Force Anti-Tamper Office Technology Development</p> <p><b>Description:</b> 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>		3.600	4.200	5.100

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<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><b>FY 2019 Plans:</b> 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><b>FY 2020 Plans:</b> 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><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to program ramp-up.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	37.304	32.770	47.193

**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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	

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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	<b>Project (Number/Name)</b> 675066 / <i>Anti-Tamper Technology Executive Agent</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Air Force Anti-Tamper Office Technology Development	Various	Not specified. : NV	-	3.600		4.200		5.100		-		5.100	Continuing	Continuing	-
<b>Subtotal</b>			-	3.600		4.200		5.100		-		5.100	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
DoD Anti-Tamper Technology Executive Agent (DoDATEA)	Various	Not specified. : NV	-	28.453		22.584		36.011		-		36.011	Continuing	Continuing	-
<b>Subtotal</b>			-	28.453		22.584		36.011		-		36.011	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.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
DoDATEA Program Management Support	Various	Not specified. : NV	-	5.251		5.986		6.082		-		6.082	Continuing	Continuing	-
<b>Subtotal</b>			-	5.251		5.986		6.082		-		6.082	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	37.304	32.770	47.193	-	47.193	Continuing	Continuing	N/A

**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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	<b>Project (Number/Name)</b> 675066 / <i>Anti-Tamper Technology Executive Agent</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>ATEA</b>	
ATEA Program Office	
AT RDT&E	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024F / <i>Anti-Tamper Technology Executive Agency</i>	<b>Project (Number/Name)</b> 675066 / <i>Anti-Tamper Technology Executive Agent</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>ATEA</b>				
ATEA Program Office	1	2018	4	2024
AT RDT&E	1	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0605117F I Foreign Materiel Acquisition and Exploitation
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	66.653	68.368	70.083	0.000	70.083	71.360	72.573	73.895	75.225	Continuing	Continuing
675897: Foreign Materiel Acquisition and Exploitation	-	66.653	68.368	70.083	0.000	70.083	71.360	72.573	73.895	75.225	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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	66.653	68.368	70.083	0.000	70.083
Current President's Budget	66.653	68.368	70.083	0.000	70.083
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**

FY 2019 to FY 2020 funding increased due to inflation.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605117F / Foreign Materiel Acquisition and Exploitation	<b>Project (Number/Name)</b> 675897 / Foreign Materiel Acquisition and Exploitation
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675897: Foreign Materiel Acquisition and Exploitation	-	66.653	68.368	70.083	0.000	70.083	71.360	72.573	73.895	75.225	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> Foreign Materiel Acquisition and Exploitation	66.653	68.368	70.083	0.000	70.083
<b>Description:</b> Classified details can be found in OSD Comptroller's classified Defense Wide Justification Book Volume 6.					
<b>FY 2019 Plans:</b> Classified					
<b>FY 2020 Base Plans:</b> Classified					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to inflation.					
<b>Accomplishments/Planned Programs Subtotals</b>	66.653	68.368	70.083	0.000	70.083

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 07 0605117F: Foreign Materiel Acquisition and Exploitation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**Remarks**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	<b>Project (Number/Name)</b> 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>

**D. Acquisition Strategy**

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

**E. 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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	<b>Project (Number/Name)</b> 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Foreign Materiel Acquisition &amp; Exploitation</i></b>				
FY19 requirements and funding requests submitted by Services/Agencies	3	2018	4	2018
Requirements and funding requests validated and prioritized	4	2018	4	2018
FY19 FMP Plan approved and published	4	2018	4	2018
FY19 Plan executed and updated as required	1	2019	1	2020
Additional acquisition opportunities reviewed quarterly; FY19 execution reprioritized	1	2019	1	2020
Additional exploitation opportunities reviewed quarterly; FY19 execution reprioritized	1	2019	1	2020
FY20 requirements and funding requests submitted by Services/Agencies	3	2019	4	2019
FY20 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
Additional acquisition opportunities reviewed quarterly; FY21 execution reprioritized	1	2021	1	2022
Additional exploitation opportunities reviewed quarterly; FY21 execution reprioritized	1	2021	1	2022
Additional FY22 acquisition/exploitation opportunities reviewed quarterly	1	2022	1	2023
Additional FY23 acquisition/exploitation opportunities reviewed quarterly	1	2023	1	2024

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605117F / <i>Foreign Materiel Acquisition and Exploitation</i>	<b>Project (Number/Name)</b> 675897 / <i>Foreign Materiel Acquisition and Exploitation</i>

**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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / <i>HC/MC-130 Recap RDT&amp;E</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	30.784	16.174	17.218	0.000	17.218	24.750	46.462	47.696	6.489	52.162	241.735
675006: <i>HC/MC-130 Recap</i>	0.000	30.784	16.174	17.197	0.000	17.197	5.750	22.601	43.601	1.300	0.000	137.407
675910: <i>Block 8.X</i>	0.000	0.000	0.000	0.021	0.000	0.021	19.000	23.861	4.095	5.189	52.162	104.328

**Program MDAP/MAIS Code:** 257

**A. Mission Description and Budget Item Justification**

HC/MC-130 Recapitalization ("Recap") produces and modifies HC/MC-130J aircraft to replace USAF's aging legacy Combat Rescue HC-130P/N and Special Operations MC-130E/P/H aircraft, which are experiencing airworthiness, maintainability and operations limitations. The Recap program incorporates production line modifications to the C-130J common/baseline configuration to convert them to the HC/MC model, and also funds post-production modifications to add special mission systems required for behind-enemy-line operations required of Combat Rescue 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/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). To meet long-lead item requirements, procurement of some Block 7.0/8.1 kit items begins in FY21.

In 2018 the USAF significantly revamped its HC/MC-130J Block 7.0/8.1. upgrade strategy. We de-scoped the MC-130J from the current Block 7.0/8.1 focus to allow the MC-130J to prioritize other (SOCOM-funded) modifications while allowing the USAF to move forward with Block 7.0/8.1 on the HC-130J. Block 8.X, which is now broken out as its own project, will then integrate SOCOM-funded AC/MC-130J capabilities with Block 7.0/8.1. Costs are based on an initial rough order of magnitude estimate and will be revised as the Block 8.X acquisition strategy matures. Both Block 7.0/8.1 and 8.X RDT&E projects include development, trial kit installs and Development and Operational Testing (DT/OT).

FY2019 Plans: The HC-130J Block 7.0/8.1 trial kit install effort occur.

FY20 Plans: Funding for HC-130J Block 7.0/8.1 trial kit install.

In addition to the MC-130J de-scope, 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / <i>HC/MC-130 Recap RDT&amp;E</i>
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The USAF also added a budget line to comply with a new Mobile User Objective System (MUOS) Satellite Communications (SATCOM) mandate; funding for that development begins in FY22, with production deliveries required by FY23.

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 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F. The program may also include any Contractor Manpower Equivalent (CME)/A&AS support deemed necessary to support the program objectives.

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

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	38.579	32.574	4.817	0.000	4.817
Current President's Budget	30.784	16.174	17.218	0.000	17.218
Total Adjustments	-7.795	-16.400	12.401	0.000	12.401
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-5.600	-16.400			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-1.000	0.000			
• SBIR/STTR Transfer	-1.195	0.000			
• Other Adjustments	0.000	0.000	12.401	0.000	12.401

**Change Summary Explanation**

FY 2018 was reduced by \$7.795M. \$5.6M was a Congressional mark for "Block 8 development ahead of need". \$1.0M was reprogrammed for other priorities. \$1.195M was a SBIR transfer.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / <i>HC/MC-130 Recap RDT&amp;E</i>	
<p>FY 2019 was reduced by \$16.4M by a Congressional mark for "Block 8.1 program delays".</p> <p>FY 2020 was increased by \$12.401M due to previous delays for Block 8.1 phasing. This increase is required to stay on schedule.</p>		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E				<b>Project (Number/Name)</b> 675006 / HC/MC-130 Recap			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675006: HC/MC-130 Recap	0.000	30.784	16.174	17.197	0.000	17.197	5.750	22.601	43.601	1.300	0.000	137.407
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 HC/MC RDT&E effort integrates Block 7.0/8.1 into a HC-130J, provides program capability updates, studies, and integration with other HC, MC and AC unique modifications. The HC/MC 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 and ADS-B Out portions of Block 7.0/8.1 ahead of the remaining 36 capabilities in order to comply with the 2020 mandates.

The Block 7.0/8.1 fleet modification program begins in FY 2019.

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 0605278F.

HC/MC 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> HC-130 Recap Continuous Improvement Program (CIP)	3.662	2.560	1.972
<b>Description:</b> 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. FY18 funding amount has increased due to cost sharing with SOCOM for an Expanded Intercommunication System (ICS) effort.			
<b>FY 2019 Plans:</b> Support continuous improvement cycle of both hardware and software of multiple onboard systems, some of which may impact the aircraft OFP with programs already in work.			
<b>FY 2020 Plans:</b> Funding continued to support continuous improvement cycle of both hardware and software of multiple onboard systems.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>			

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E	<b>Project (Number/Name)</b> 675006 / HC/MC-130 Recap
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
FY20 decrease attributed to ramping down the Continuous Improvement Program.			
<b>Title:</b> HC-130 Block 7.0/8.1	26.634	12.988	14.909
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> The HC-130J Block 7.0/8.1 trial kit install efforts occur.			
<b>FY 2020 Plans:</b> Funding for combined software/hardware upgrade for Block 8.1 on HC-130J TKI.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 increase attributed to additional software/hardware integration on the HC-130J TKI kit.			
<b>Title:</b> HC-130J Government Test Support	0.488	0.626	0.316
<b>Description:</b> Test and evaluation planning, conduct, and support for developmental and operational testing			
<b>FY 2019 Plans:</b> Funding will support developmental and operational testing including Block 7.0/8.1 DT&E			
<b>FY 2020 Plans:</b> Funding will support developmental and operational testing including Block 7.0/8.1 DT&E			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 20 decrease attributed to phasing down of the test program.			
<b>Accomplishments/Planned Programs Subtotals</b>	30.784	16.174	17.197

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item HCMC00: HC/MC-130 Modifications	112.054	125.654	51.482	-	51.482	38.515	20.099	4.375	4.537	385.000	741.716
• APAF 02 Line Item C130JH: HC-130J	281.502	188.837	0.000	-	0.000	0.000	0.000	0.000	5.000	0.000	475.339

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 02 Line Item C-130JM: MC-130J	1,009.378	945.879	911.207	-	911.207	438.435	390.566	120.466	27.612	20.000	3,863.543

**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 as well as other SOF peculiar 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.

**E. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E	<b>Project (Number/Name)</b> 675006 / HC/MC-130 Recap
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>HC/MC-130 Recap Development</b>	
HC-130J Government Testing	[REDACTED]
HC-130 RECAP Block 7.0/8.1 Development	[REDACTED]
Continuous Improvement Program (CIP)	[REDACTED]

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**Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force** **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>HC/MC-130 Recap Development</i></b>				
HC-130J Government Testing	1	2018	4	2023
HC-130 RECAP Block 7.0/8.1 Development	3	2018	2	2021
Continuous Improvement Program (CIP)	2	2020	2	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E	<b>Project (Number/Name)</b> 675910 / Block 8.X
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675910: Block 8.X	0.000	0.000	0.000	0.021	0.000	0.021	19.000	23.861	4.095	5.189	52.162	104.328
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Integrates Block 7.0/8.1 into MC-130J and AC-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 0605278F.

MC/AC 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 2018	FY 2019	FY 2020
<b>Title:</b> MC/AC Block 8.X	-	0.000	0.021
<b>Description:</b> Combined software/hardware upgrade for Block 8.1 to add capabilities to integrate onto MC and AC beginning in FY21 and follow-on upgrades.			
<b>FY 2019 Plans:</b> N/A			
<b>FY 2020 Plans:</b> Funding to begin 4th QTR for integration of Block 7.0/8.1 onto AC-130J aircraft.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding for Block 8.X begins in FY 20.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	0.000	0.021

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

N/A

**Remarks**

**D. Acquisition Strategy**

Lockheed Martin is the primary contractor for Research and Development work in support of the Block 8.X program. 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 beginning in FY21.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E	<b>Project (Number/Name)</b> 675910 / Block 8.X
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**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E	<b>Project (Number/Name)</b> 675910 / Block 8.X
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
MC/AC Block 7.0/8.1	C/CPAF	Not specified. : TBD	0.000	0.000		0.000		0.021	Jul 2020	-		0.021	0.000	0.021	-
<b>Subtotal</b>			0.000	0.000		0.000		0.021		-		0.021	0.000	0.021	N/A
<b>Project Cost Totals</b>			0.000	0.000		0.000		0.021		-		0.021	0.000	0.021	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605278F / HC/MC-130 Recap RDT&E	<b>Project (Number/Name)</b> 675910 / Block 8.X
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Block 8.X</b>	
Block 8.X development for AC/MC-130	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Block 8.X</b>				
Block 8.X development for AC/MC-130	4	2020	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / <i>NC3 Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	12.382	19.312	25.917	0.000	25.917	26.404	26.973	27.464	0.000	Continuing	Continuing
674877: <i>NC3 Integration, Assessment, and Improvement</i>	-	12.382	19.312	25.917	0.000	25.917	26.404	26.973	27.464	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

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 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, 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 element may include necessary civilian pay expenses required to manage, execute, and deliver nuclear weapon support 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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / NC3 Integration
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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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	12.636	26.112	25.917	0.000	25.917
Current President's Budget	12.382	19.312	25.917	0.000	25.917
Total Adjustments	-0.254	-6.800	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-6.800			
• 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	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY18 \$0.254M SBIR reduction

FY19 \$6.8M Congressional Mark due to unjustified growth in direct mission support.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> NC3 Integration, Assessment, and Improvement	12.382	19.312	25.917	0.000	25.917
<b>Description:</b> To include but not limited to: Modeling and simulation of the AF NC3 WS current and future capabilities, conducting capability gap analysis, and 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					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / <i>NC3 Integration</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>solutions, issue tracking and resolution, assessments and analysis, and governance. Providing data-driven system of system solutions, and shaping NC3 component program acquisition strategies for AF NC3 WS sustainment and performance capability improvements. 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><b>FY 2019 Plans:</b> AF NC3 weapon system integration efforts including, but not limited to:</p> <ul style="list-style-type: none"> <li>- Continue to implement test and evaluation certification program for AF NC3 WS</li> <li>- Expand existing communication spectrum and cyber assessment test bed utilizing a phased approach</li> <li>- Continue to perform NC3 physics, communication and networking analysis</li> <li>- Continue to develop and evolve technical framework of the AF NC3 WS to meet mission threats of 2030 and beyond</li> <li>- Continue to conduct WS analysis, develop WS capability model, plan WS updates, and implement WS updates</li> <li>- Continue to evaluate options for system-of-system performance improvements within constraints of AF NC3 WS strategic vision and roadmap</li> <li>- Continue to analyze, model, and prototype emerging NC3 technologies</li> <li>- 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 AF NC3 WS health assessment application, integrated scheduling, budgeting and cost controls, etc.</li> <li>- Continue to conduct AF NC3 WS health assessments, reporting, and issue resolution</li> <li>- Continue to map out the AF NC3 WS supply chain and develop supply chain monitoring capability, supply chain supportability and supply chain risk management</li> <li>- Continue to develop layered architecture to measure and report capability impacts</li> <li>- Continue to develop and coordinate OPCD to support weapon system configuration element specs, test and evaluation, and assessment of weapon capabilities and limitations</li> <li>- Establish authoritative intelligence community analysis for high-altitude electromagnetic pulse (HEMP)</li> <li>- Improve integration and interoperability of the AF NC3 WS</li> <li>- Continue to conduct WS risk, issue, and opportunity analysis, and mitigation/corrective action/pursuit plan development</li> </ul> <p><b>FY 2020 Base Plans:</b></p>					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / <i>NC3 Integration</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>NC3 weapon system integration efforts including, but not limited to:</p> <ul style="list-style-type: none"> <li>- Continue to implement test and evaluation certification program for NC3 WS</li> <li>- Expand existing communication spectrum and cyber assessment test bed utilizing a phased approach</li> <li>- Continue to perform NC3 physics, communication and networking analysis</li> <li>- Continue to develop and evolve technical framework of the NC3 WS to meet mission threats of 2030 and beyond</li> <li>- Continue to conduct WS analysis, develop WS capability model, plan WS updates, and implement WS updates</li> <li>- Continue to evaluate options for system-of-system performance improvements within constraints of NC3 WS strategic vision and roadmap</li> <li>- Continue to analyze, model, and prototype emerging NC3 technologies</li> <li>- 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.</li> <li>- Continue to conduct NC3 WS health assessments, reporting, and issue resolution</li> <li>- Continue to map out the NC3 WS supply chain and develop supply chain monitoring capability, supply chain supportability and supply chain risk management</li> <li>- Continue to develop layered architecture to measure and report capability impacts</li> <li>- 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</li> <li>- Establish authoritative intelligence community analysis for high-altitude electromagnetic pulse (HEMP)</li> <li>- Improve integration and interoperability of the NC3 WS</li> <li>- Continue to conduct WS risk, issue, and opportunity analysis, and mitigation/corrective action/pursuit plan development</li> </ul> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 to FY20 funding increased due continued ramp-up for full requirements.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	12.382	19.312	25.917	0.000	25.917

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

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / <i>NC3 Integration</i>	
<b>D. Other Program Funding Summary (\$ in Millions)</b>		
<b>Remarks</b>		
<b>E. Acquisition Strategy</b> 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 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.		
<b>F. Performance Metrics</b> 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / NC3 Integration	<b>Project (Number/Name)</b> 674877 / NC3 Integration, Assessment, and Improvement
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
DMS FFRDC/UARC/A&AS	Various	Various : Various	-	11.083	Oct 2017	13.952	Nov 2018	19.959	Oct 2019	-		19.959	Continuing	Continuing	-
DMS Supply Chain Risk Management	MIPR	NSWC : Crane, IN	-	-		1.200	Jan 2019	1.400	Jan 2020	-		1.400	Continuing	Continuing	-
<b>Subtotal</b>			-	11.083		15.152		21.359		-		21.359	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Integration Studies /Test Support	Various	Various : Various	-	0.025	Jul 2018	-		0.222	Oct 2019	-		0.222	Continuing	Continuing	-
<b>Subtotal</b>			-	0.025		-		0.222		-		0.222	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 (Eng/Acq Spt/Travel/Supplies)	Various	Various : Various	-	1.274	Oct 2017	4.160	Oct 2018	4.336	Oct 2019	-		4.336	Continuing	Continuing	-
<b>Subtotal</b>			-	1.274		4.160		4.336		-		4.336	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	12.382	19.312	25.917	-	25.917	Continuing	Continuing	N/A

**Remarks**  
Increase in FY19 Management Services due to Direct Cite Authority for civilian positions. \$1.8M in FY19, \$1.9M in FY20, and escalated in future years.



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0606018F / <i>NC3 Integration</i>	<b>Project (Number/Name)</b> 674877 / <i>NC3 Integration, Assessment, and Improvement</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>NC3 WS Integration</i></b>				
AF NC3 WS Test and Certification Program	1	2018	4	2024
NC3 Health Assessment and Analysis	1	2018	4	2024
Enhance Target Architecture through Development of NC3 Technologies	1	2018	4	2024
Implement AF NC3 WS Program and Materiel Management Control Process	1	2018	4	2024
AF NC3 WS Risk Management Program, Monthly Working Group, and Quarterly Board	1	2018	4	2024
AF NC3 Maintenance Data Reporting	1	2018	4	2024
NC3 Supply Chain Risk Analysis	1	2018	4	2024
NC3 Supply Chain Normalization and Supply Health Reporting	1	2018	4	2024
AF NC3 WS NC3 Configuration Boards Biannually	1	2018	4	2024
AF Nuclear Weapon System Enterprise Review Biannually	1	2018	4	2024
AF NC3 WS Review Biannually	1	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	87.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	87.800
677821: <i>Cyberspace Vulnerability Assessment</i>	-	0.000	87.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	87.800
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 CY 2019 Assessments and Evaluations Cyber Vulnerabilities was a new start.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	99.100	0.000	0.000	0.000
Current President's Budget	0.000	87.800	0.000	0.000	0.000
Total Adjustments	0.000	-11.300	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-11.300			
• 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**

Decrease in FY 2019 due to a Congressional directed reduction in the Department of Defense Appropriation Act 2019 for unjustified growth in infrastructure assessments.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Address Weapon System Cyber Vulnerabilities	0.000	39.466	0.000
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> Conduct weapon systems cyber vulnerability assessments and prototype mitigations.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 decreased compared to FY 2019 by \$39.466 million. Funding decreased due to higher Department of Defense priorities.			
<b>Title:</b> Address Infrastructure Cyber Vulnerabilities	0.000	44.334	0.000
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>Conduct infrastructure cyber vulnerability assessments. Develop prototype mitigations. Initiate the infrastructure cyber pilot program.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 decreased compared to FY 2019 by \$44.334 million. Funding decreased due to higher Department of Defense priorities.</p>			
<p><b>Title:</b> Exercise Participation</p> <p><b>Description:</b> This effort supports exercise participation, Combatant Command support, and assessment team activities to validate candidate weapon system and infrastructure cyber vulnerabilities.</p> <p><b>FY 2019 Plans:</b> Participate in USSTRATCOM and other Combatant Command exercises. Validate Air Force weapon system and infrastructure cyber vulnerabilities.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 decreased compared to FY 2019 by \$4.000 million. Funding decreased due to higher Department of Defense priorities.</p>	0.000	4.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	87.800	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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0606942F / Assessments and Evaluations Cyber Vulnerabilities	<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Weapon Systems Prototype Mitigations	TBD	Various : TBD	-	0.000		19.300	Jan 2019	-		-		-	0.000	19.300	-
More Situational Awareness for Industrial Control Systems (MOSAICS) Joint Capability Technology Demonstration	MIPR	Various : TBD	-	0.000		3.000	Jan 2019	-		-		-	0.000	3.000	-
<b>Subtotal</b>			-	0.000		22.300		-		-		-	0.000	22.300	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.

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	TBD	Various : TBD	-	0.000		4.000	Jan 2019	-		-		-	0.000	4.000	-
<b>Subtotal</b>			-	0.000		4.000		-		-		-	0.000	4.000	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Weapon Systems Cyber Vulnerability Assessments	MIPR	Various : TBD	-	0.000		20.166	Jan 2019	-		-		-	0.000	20.166	-
Critical Infrastructure Assessments	MIPR	Various : TBD	-	0.000		41.334	Jan 2019	-		-		-	0.000	41.334	-
<b>Subtotal</b>			-	0.000		61.500		-		-		-	0.000	61.500	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0606942F / <i>Assessments and Evaluations Cyber Vulnerabilities</i>	<b>Project (Number/Name)</b> 677821 / <i>Cyberspace Vulnerability Assessment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Cyberspace Vulnerability Assessment</i></b>				
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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	107.936	325.264	325.974	0.000	325.974	515.207	534.212	528.840	401.870	Continuing	Continuing
671803: <i>B-52 AFMC Test Assets</i>	-	0.000	0.000	4.069	0.000	4.069	15.682	4.269	4.270	0.000	0.000	28.290
671805: <i>B-52 VLF/LF Modernization</i>	-	0.000	0.000	10.000	0.000	10.000	13.000	8.980	20.604	0.000	0.000	52.584
671807: <i>Advanced Targeting POD Display Upgrade</i>	-	0.000	0.000	9.747	0.000	9.747	12.307	0.000	0.000	0.000	0.000	22.054
671810: <i>B-52 AEHF Integration*</i>	-	0.000	0.000	0.000	0.000	0.000	2.500	2.500	2.500	20.766	Continuing	Continuing
675039: <i>B-52 System Improvements</i>	-	12.047	75.230	10.050	0.000	10.050	0.050	0.050	0.050	0.000	Continuing	Continuing
675041: <i>Bomber Tactical Data Link</i>	-	5.529	32.427	2.878	0.000	2.878	0.000	0.000	0.000	0.000	0.000	40.834
675048: <i>1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)</i>	-	14.417	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.417
675050: <i>CONNECT</i>	-	4.989	11.138	0.001	0.000	0.001	0.000	0.003	0.002	0.000	0.000	16.133
675055: <i>GPS-IU</i>	-	15.223	37.030	1.985	0.000	1.985	0.000	0.000	0.000	0.000	0.000	54.238
675056: <i>B-52 Radar Modernization Program (RMP)</i>	-	13.954	56.864	109.278	0.000	109.278	169.000	187.734	177.356	111.204	Continuing	Continuing
675057: <i>B-52 Low Cost Improvement (LCI)</i>	-	0.105	2.605	2.607	0.000	2.607	2.605	2.660	2.710	0.000	Continuing	Continuing
675058: <i>B-52 Weapon Sys Trainer Air Ref Training Upgrade</i>	-	17.472	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.472
675129: <i>B-52 CERP</i>	-	9.495	61.915	175.359	0.000	175.359	300.063	328.016	321.348	269.900	Continuing	Continuing
675160: <i>B-52 Crypto Modernization</i>	-	13.756	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
676039: <i>B-52 Airspace Compliance</i>	-	0.949	36.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	37.004

\*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2020

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	
<b>Note</b> Created four (4) new BPACs for traceability purposes. Note that these are not new start programs for FY2020.  Prior to FY2020, project 671803, B-52 AFMC Test Assets funding is documented in Project 675039, B-52 System Improvement  Prior to FY2020, Project 671805, B-52 VLF/LF Modernization funding is documented in Project 675039, B-52 System Improvement  Prior to FY2020, Project 671807, B-52 Advanced Target POD MFCD funding is documented in Project 675039, B-52 System Improvement  Prior to FY2020, Project 671810, B-52 AEHF Integration funding is documented in 675041 B-52 Bomber Tactical Data Link  <b>A. Mission Description and Budget Item Justification</b> 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.  This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-52 weapon system 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.  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 2018 Air Force penalty total is \$14.373M. 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.		

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	111.910	280.414	529.772	0.000	529.772
Current President's Budget	107.936	325.264	325.974	0.000	325.974
Total Adjustments	-3.974	44.850	-203.798	0.000	-203.798
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-2.600			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	47.450			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.974	0.000			
• Other Adjustments	0.000	0.000	-203.798	0.000	-203.798

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

**Project: 675039: *B-52 System Improvements***

Congressional Add: *IR Missile Warning System*

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*

Congressional Add Subtotals for Project: 675160

Congressional Add Totals for all Projects

	<b>FY 2018</b>	<b>FY 2019</b>
	-	24.000
	-	10.000
Congressional Add Subtotals for Project: 675039	-	34.000
	-	1.450
Congressional Add Subtotals for Project: 675041	-	1.450
	-	12.000
Congressional Add Subtotals for Project: 675160	-	12.000
Congressional Add Totals for all Projects	-	47.450

**Change Summary Explanation**

FY18: Decrease of \$3.974 due to SBIR transfer

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	
FY19: Increase of \$44.850 consists of congressional changes of: -\$2.6M for CERP; +\$1.450M for Bomber Tactical Data Link; +\$12.0M for Crypto Mod; +10.0M for Mission Data Recorder and +\$24.0M for Infrared Threat Urgent Operational Need		
FY20: Decrease of \$203.8M consists of: -\$137.291M for CERP; -\$9.727M for RMP; -\$7.858M for WST AR Trainer; -\$25.731M for VLF/LF; -\$33.191M for AEHF and +10.000M for Mission Data Recorder		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 671803 / B-52 AFMC Test Assets			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
671803: B-52 AFMC Test Assets	-	0.000	0.000	4.069	0.000	4.069	15.682	4.269	4.270	0.000	0.000	28.290
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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> B-52 AFMC Test Aircraft Asset Support	0.000	0.000	4.069
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> Provide funding for the test aircraft, manpower and facilities at the Air Force Test Center, Edwards AFB and funds Programmed Depot Maintenance (PDM) for one test aircraft. This will support the developmental testing and sustainment needs of the B-52 from FY19-23. FY19 is documented in BPAC 675039.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 671803 / <i>B-52 AFMC Test Assets</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
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.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decrease is due to the PDM cycle five year phase. The next PDM for aircraft #036 is FY24 (Approximately \$15M)			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	4.069

**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.

**E. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 671803 / <i>B-52 AFMC Test Assets</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>AFMC Test Aircraft support</i></b>	
Test Support	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 671803 / <i>B-52 AFMC Test Assets</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AFMC Test Aircraft support</i>				
Test Support	1	2020	4	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 671805 / B-52 VLF/LF Modernization
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
671805: B-52 VLF/LF Modernization	-	0.000	0.000	10.000	0.000	10.000	13.000	8.980	20.604	0.000	0.000	52.584
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. 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.

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

	FY 2018	FY 2019	FY 2020
<b>Title:</b> B-52 Very Low Frequency/Low Frequency (VLF/LF)	0.000	0.000	10.000
<b>Description:</b> Provides secure, survivable, receive-only strategic nuclear communication for the B-52			
<b>FY 2019 Plans:</b> Approve Acquisition and Contracting Strategy for the B-52 VLF/LF and award a contract to the OEM for Engineering and Manufacturing Development (EMD) effort. FY19 funding for this effort is documented in BPAC 675039.			
<b>FY 2020 Plans:</b>			

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 671805 / <i>B-52 VLF/LF Modernization</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
Continue EMD phase to support fielding decision. Accomplish System Requirements Review (SRR), Preliminary Design Review (PDR), Critical Design Review (CDR), and Test and Evaluation Master Plan (TEMP). Initiate Development and Operational Testing. Release Request for Proposal to support long-lead procurement of terminals for installs in FY21/22.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decreased due to ramp down in EMD efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	10.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 B05200: <i>BP11 Production</i>	-	0.000	0.000	-	0.000	8.410	33.557	19.523	8.076	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**  
Approve Acquisition and Contracting Strategy for the B-52 VLF/LF and accomplish MS B. Submit RFP for Engineering and Manufacturing Development (EMD) effort. Negotiate and award EMD proposal.

**E. 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 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0101113F / B-52 Squadrons				671805 / B-52 VLF/LF Modernization							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
VLF/LF EMD	SS/CPFF	Various : Oklahoma, OK	-	-		-		6.430	Jul 2020	-		6.430	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		6.430		-		6.430	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
VLF/LF Program Office Support	Various	Various : TBD	-	-		-		1.515	Jul 2020	-		1.515	Continuing	Continuing	-
VLF/LF Trainers	Allot	Not specified. : TBD	-	-		-		0.046	Jul 2020	-		0.046	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		1.561		-		1.561	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
VLF/LF Test	PO	Not specified. : TBD	-	-		-		0.046	Jul 2020	-		0.046	Continuing	Continuing	-
VLF/LF Cyber Security	TBD	Not specified. : TBD	-	-		-		0.046	Jul 2020	-		0.046	Continuing	Continuing	-
VLF/LF Certifications	TBD	Not specified. : TBD	-	-		-		0.046	Jul 2020	-		0.046	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.138		-		0.138	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
A&AS, Travel, Centralized Support	Various	Various : TBD	-	-		-		1.871	Dec 2019	-		1.871	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		1.871		-		1.871	Continuing	Continuing	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 671805 / <i>B-52 VLF/LF Modernization</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B-52 VLF/LF Modernization</i></b>				
ASP	1	2019	1	2019
EMD	3	2019	3	2021
MS C	3	2021	3	2021
Production	3	2021	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 671807 / Advanced Targeting POD Display Upgrade			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
671807: <i>Advanced Targeting POD Display Upgrade</i>	-	0.000	0.000	9.747	0.000	9.747	12.307	0.000	0.000	0.000	0.000	22.054
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Prior to FY2020, Project 671807 B-52 Advanced Target POD MFCD funding is documented in Project 675039 B-52 System Improvements

**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 SA and combat lethality.

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.

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

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> B-52 Advanced Target Pod Multi-Functional Color Display	0.000	0.000	9.747
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> Initiate development activities for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. Begin TMRR efforts. FY19 funding is documented in BPAC 675039.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 671807 / Advanced Targeting POD Display Upgrade

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Development activities for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. EMD efforts.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding increased due to ramp up in EMD and flight test efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	9.747

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 B05200: <i>Advanced Target Pod MFCD Production</i>	-	-	-	-	-	-	22.907	16.216	16.508	0.000	55.631
• APAF 06 000999: <i>Initial Spares</i>	-	-	-	-	-	-	-	2.232	2.272	0.000	4.504

**Remarks**

**D. Acquisition Strategy**

Acquisition Strategy Pending decision in 4QFY19.

**E. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 671807 / Advanced Targeting POD Display Upgrade

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>ATP-MFCD</b>																												
MDD																												
EMD																												
Milestone C																												
Production																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 671807 / <i>Advanced Targeting POD Display Upgrade</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>ATP-MFCD</i></b>				
MDD	1	2019	1	2019
EMD	1	2019	1	2022
Milestone C	1	2022	1	2022
Production	1	2022	2	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675039 / B-52 System Improvements
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675039: B-52 System Improvements	-	12.047	75.230	10.050	0.000	10.050	0.050	0.050	0.050	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.

**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.

**B-52 AMFC Test Support (FY19 funding only)**

The B-52 Test Support 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.

**B-52 VLF/LF Modernization (FY19 funding only)**

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. 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) (FY19 funding only)**

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

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

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

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.

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 2018	FY 2019	FY 2020
<p><b>Title:</b> B-52 Systems Improvements</p> <p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b> 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.</p> <p><b>FY 2020 Plans:</b> 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</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$10M for Mission Data Recorder documented in congressional adds.</p>	12.047	0.050	10.050
<p><b>Title:</b> AFMC Test Assets</p>	0.000	17.766	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675039 / B-52 System Improvements		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b> 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.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A - funding transferred to BPAC 671803 in FY20</p>				
<p><b>Title:</b> B-52 VLF/LF Modernization</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> Approve Acquisition and Contracting Strategy for the B-52 VLF/LF and accomplish MS B. Submit RFP for Engineering and Manufacturing Development (EMD) effort. Negotiate and award EMD proposal.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding moved to BPAC 671805 in FY20</p>		0.000	21.835	0.000
<p><b>Title:</b> Advanced Target POD MFCD</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p>		0.000	1.579	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675039 / B-52 System Improvements

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Initiate development activities for the B-52 Advanced Targeting Pod Monitor Upgrade with 10 Gig Ethernet connection. Begin TMRR efforts.  <b>FY 2020 Plans:</b> N/A  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A funding transferred to BPAC 671807 in FY20			
<b>Accomplishments/Planned Programs Subtotals</b>	12.047	41.230	10.050

	<b>FY 2018</b>	<b>FY 2019</b>
<b>Congressional Add:</b> IR Missile Warning System <b>FY 2019 Plans:</b> Complete design, integration, and testing for overseas operations for installation on B-52.	-	24.000
<b>Congressional Add:</b> Mission Data Recorder <b>FY 2019 Plans:</b> Data recorder design and flight testing.	-	10.000
<b>Congressional Adds Subtotals</b>	-	34.000

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 B052000: BP11 Aircraft Procurement Low Cost Mods	0.425	0.452	5.460	-	5.460	0.470	0.480	0.489	0.498	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

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

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675039 / B-52 System Improvements
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	11.997	Jun 2018	-		-		-		-	Continuing	Continuing	-
VLF/LF EMD - BPAC 671805	SS/CPFF	Various : Oklahoma City, OK	-	-		18.947	Jul 2019	-		-		-	Continuing	Continuing	-
Advanced Target POD MFCD - BPAC 671807	TBD	TBD : TBD	-	-		1.579	Jun 2019	-		-		-	Continuing	Continuing	-
Mission Data Recorder	TBD	TBD : Oklahoma City, OK	-	-		10.000	Mar 2019	10.000	Dec 2019	-		10.000	Continuing	Continuing	-
IR Missile Warning System	C/CPAF	Not specified. : TBD	-	-		24.000	Mar 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	11.997		54.526		10.000		-		10.000	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-
<b>Subtotal</b>			-	-		1.073		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-



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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675039 / <i>B-52 System Improvements</i>
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Systems Improvements</b>	
System Improvements Studies and Analysis, etc. (Began 2Q16)	
<b>AFMC Test Aircraft support - BPAC 671803</b>	
Test Support	
<b>B-52 VLF/LF Modernization - BPAC 671805</b>	
EMD	
<b>ATP - MFCD BPAC 671807</b>	
EMD	
<b>IR Missile Warning System UON</b>	
Integration and Test	
Production and Installation	
<b>Mission Data Recorder</b>	
Boeing Contract for Permanent Modification of Mission Data recorder	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Systems Improvements</i></b>				
System Improvements Studies and Analysis, etc. (Began 2Q16)	1	2018	4	2024
<b><i>AFMC Test Aircraft support - BPAC 671803</i></b>				
Test Support	1	2019	4	2019
<b><i>B-52 VLF/LF Modernization - BPAC 671805</i></b>				
EMD	3	2019	4	2019
<b><i>ATP - MFCD BPAC 671807</i></b>				
EMD	3	2019	4	2019
<b><i>IR Missile Warning System UON</i></b>				
Integration and Test	4	2018	2	2019
Production and Installation	3	2019	3	2020
<b><i>Mission Data Recorder</i></b>				
Boeing Contract for Permanent Modification of Mission Data recorder	2	2018	4	2019

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675041 / Bomber Tactical Data Link
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675041: <i>Bomber Tactical Data Link</i>	-	5.529	32.427	2.878	0.000	2.878	0.000	0.000	0.000	0.000	0.000	40.834
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 IWBU, 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.

B-52 Advanced Extremely High Frequency (AEHF) Integration (In FY19 only)

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, Re-Engine, 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,

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

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

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 2018	FY 2019	FY 2020
<p><b>Title:</b> Bomber Tactical Data Link</p> <p><b>Description:</b> 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 LRU. 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><b>FY 2019 Plans:</b> Continue EMD phase to include unique software programming, and continued developmental and operational testing.</p> <p><b>FY 2020 Plans:</b> Continue EMD, complete DT and OT, begin Weapons System Trainer Upgrade</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease due to EMD phase ending</p>	5.529	17.528	2.878
<p><b>Title:</b> B-52 AEHF Integration</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p>	0.000	13.449	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675041 / Bomber Tactical Data Link

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Establish risk reduction activity to support Engineering Manufacturing and Development effort. Risk reduction efforts to include opportunity for high classification of messages with focus on non-federated integration approaches versus federated approach and evaluation of environmental factors for terminal installation.			
<b>FY 2020 Plans:</b> Funds moved to BPAC 671810			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funds moved to BPAC 671810			
<b>Accomplishments/Planned Programs Subtotals</b>	5.529	30.977	2.878

	<b>FY 2018</b>	<b>FY 2019</b>
<b>Congressional Add:</b> Bomber Tactical Data Link - Congressional Add	-	1.450
<b>FY 2019 Plans:</b> Continue EMD phase to include unique software programming, and continued developmental and operational testing.		
<b>Congressional Adds Subtotals</b>	-	1.450

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line Item B05200: BP11 Production	-	-	15.925	-	15.925	30.214	24.917	25.372	-	0.000	96.428
• APAF 06 000999: Initial Spares	-	-	2.381	-	2.381	2.499	-	-	-	0.000	4.880
• RDTE 07 BPAC 671810: B-52 AEHF (not including Bomber Tactical Datalink)	-	13.449	0.000	-	0.000	2.500	2.500	2.500	20.766	Continuing	Continuing

**Remarks**  
FY19 is only year containing both Bomber Tactical Data Link and AEHF 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). The program is required to return to the MDA for the production/deployment ASP following a successful Preliminary Design Review (PDR).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675041 / <i>Bomber Tactical Data Link</i>

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675041 / Bomber Tactical Data Link
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	4.213	Feb 2018	9.409	Feb 2019	2.878	Nov 2019	-		2.878	Continuing	Continuing	-
<b>Subtotal</b>			-	4.213		9.409		2.878		-		2.878	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	-		4.039	Feb 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	-		4.039		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	1.266	Feb 2018	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	-
<b>Subtotal</b>			-	1.266		16.058		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.050	Mar 2018	2.898	Mar 2019	-		-		-	Continuing	Continuing	-





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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Bomber Tactical Data Link</i></b>				
EMD	4	2018	3	2020
Milestone C	4	2020	4	2020
Production and Install	4	2020	2	2024
IOC	4	2021	4	2021
FOC	2	2024	2	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675048 / 1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675048: 1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)	-	14.417	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.417
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The MIL-STD-1760 Internal Weapons Bay Upgrade (IWBU) enables the integration of the 1760 weapons capability into the bomb bay on 78 B-52H aircraft (76 operational plus two (2) Ground Instructional Training Aircraft (GITA)), utilizing 44 Common Strategic Rotary Launchers (CSRLs) converted into Conventional Rotary Launchers (CRLs). Three of the CRLs were modified under EMD for test purposes.

The 1760 IWBU project is segmented into increments. Increment 1.0 provides internal and external carriage of JDAM, Laser-JDAM, JASSM, JASSM/ER, MALD, and MALD/J. It consists of two sub-increments 1.1 and 1.2. This requirement's CDD was validated by the Air Force Requirements Oversight Council (AFROC) in June 2013.

The 1760 IWBU Inc. 1.1 CDD was revalidated as a Capability Production Document (CPD) by the AFROC in February 2015; the 1760 IWBU Inc. 1.2 CPD was approved October 2018. Development efforts for Increment 1.1 were completed in November 2015 and Air Force Global Strike Command (AFGSC) declared Initial Operational Capability (IOC) in May 2016. AFGSC declared Full Operational Capability (FOC) in June 2018.

Increment 1.1 utilizes 44 CSRLs converted into CRLs, where three of the CRLs will be modified under EMD for test purposes.

Increment 1.2 converts 44 CRLs three of which will be modified under EMD and 76 operational B-52H aircraft plus two GITA.

Increment 1.2 develops the capability for internal carriage of eight Joint Air-to-Surface Standoff Missiles (JASSM) and its variants, to include JASSM Extended Range (JASSM-ER), and eight Miniature Air Launched Decoys (MALD) and its variants, to include MALD Jammer (MALD-J). This increment also develops the capability for external carriage for 12 JASSM-ER.

Increment 1.2 completed Preliminary Design Review (PDR) in October 2015. Critical Design Review (CDR) was conducted in March 2016. Milestone B approval was granted in April 2016. An Integrated Baseline Review (IBR) was conducted in May 2016, validating cost and schedule baselines. Long Lead parts approval was granted in October 2016, estimated award August 2018. In addition, a change from Low Rate Initial Production (LRIP)/Full Rate Production (FRP) to an FRP-only strategy with 2 lot buys was approved in October 2016. Lot I/II Approval was granted after the Milestone C Decision, November 2018.

Upon completion of JASSM/ER software development, an interim capability provided for carriage and deployment of no less than 20 JASSM/ER [8 bay (power 4), 12 external] is planned. A combined DT/OT validated this capability in advance of 1.2 Full System validation, and Required Assets Available (RAA) was declared September 2017. AFGSC declared 1.2 Interim Fielding Authorization October 2017.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675048 / 1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)

Aircraft Hardware Development: Development of Group A wiring and circuit breakers to supply additional power to the CRL per JASSM-ER requirements (for all 76 operational B-52H aircraft) and two GITA.

Software Development consists of a modification to existing aircraft SMO and weapon (JASSM and MALD) OFP software to allow for internal and external carriage and modification to ground-based Joint Mission Planning System (JMPS).

CRL Hardware Development consists of developing Group A-associated interface hardware and two Group B LRUs (power supply and power distribution box). Two CRLs were modified for Interim and three CRLs were modified for 1.2 Full system using RDT&E funds.

Support Equipment consists of developing software updates to the existing MUSTANG to interface with the CRL and the development of additional ground handling support equipment, maintenance stands.

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 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>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> 1760 IWBU Inc 1.2	14.417	-	-
<b>Description:</b> Provides internal J-series weapons capability through modification of CRLs with aircraft hardware modifications and upgraded weapon management software. Upon completion of JASSM software coding and 1.2 Interim hardware design completion, but prior to Inc. 1.2 Full 1760 hardware design completion, an interim JASSM/ER capability will be validated thru DT/OT in FY17.			
<b>Accomplishments/Planned Programs Subtotals</b>	14.417	-	-

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line Item	30.303	24.176	-	-	-	-	-	0.001	0.002	0.000	54.482
B05200: BP11 Production											
• APAF 06 000999: Initial Spares	0.814	0.174	-	-	-	-	-	-	-	0.000	0.988

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675048 / 1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• APAF 07 Line Item B05200: Depot Activation	-	0.981	-	-	-	-	-	-	-	0.000	0.981

**Remarks**

**D. Acquisition Strategy**

The 1760 IWBU Increment 1.1 project will acquire software development and hardware design via a sole source contract to Boeing Defense, Space & Security (DSS) in Oklahoma City, OK. Deliverables include updated J-series weapon SMOs (software), three prototype modified CSRLs, six LRIP assets, logistics support, ground and flight test support, and engineering drawings. The Increment 1.1 program procured the CRL modification kits via sole source to Boeing DSS, OKC for LRIP and Full Rate Production (FRP), LRIP Installations, and FRP. Installs of the kits were completed via Contract Field Team (CFT).

Increment 1.2 Program has a sole source EMD contract to Boeing Defense, Space & Security (DSS) in Oklahoma City, OK. Deliverables include updated JASSM and MALD weapon SMOs (software), three prototype modified CRLs, logistics support, ground and flight test support, and engineering drawings. Upon completion of JASSM/ER OFP and SMO software coding, an interim capability of no less than 20 JASSM/ER [8 bay (power 4), 12 external] was validated thru DT/OT in FY17. The 1760 IWBU Inc. 1.2 Full capability lifted the Inc. 1.2 Interim power restriction to allow for power of 8 JASSMs in the bay and integrate 8 MALD into the bay. The Increment 1.2 program will procure the CRL modification and aircraft kits for full rate production via sole source to Boeing DSS, OKC. The installs of the kits are planned to be completed via CFTs and PDM.

**E. 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 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0101113F / B-52 Squadrons				675048 / 1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
1.2 1760 IWBU Production Development	SS/CPAF	Boeing : OKC, OK	-	3.000	Mar 2019	-		-		-		-	0.000	3.000	-
1.2 1760 IWBU JASSM OFP	SS/FFP	Lockheed : Orlando, FL	-	1.853	Jan 2019	-		-		-		-	0.000	1.853	-
<b>Subtotal</b>			-	4.853		-		-		-		-	0.000	4.853	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
1.2 1760 IWBU Government Test	PO	419 FLTS : Edwards AFB, CA	-	3.142	Jan 2019	-		-		-		-	0.000	3.142	-
1.2 1760 IWBU Trainer Software	Allot	AFLCMC : Wright Patterson AFB, OH	-	2.094	Sep 2018	-		-		-		-	0.000	2.094	-
1.2 1760 IWBU JASSM Test Assets	SS/FFP	Lockheed : Orlando, FL	-	3.272	Jan 2019	-		-		-		-	0.000	3.272	-
<b>Subtotal</b>			-	8.508		-		-		-		-	0.000	8.508	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
1.2 1760 IWBU Program Management Administration, A&AS, Travel	C/CPAF	AFLCMC : Tinker AFB, OK	-	1.056	Sep 2018	-		-		-		-	0.000	1.056	-
<b>Subtotal</b>			-	1.056		-		-		-		-	0.000	1.056	N/A
<b>Project Cost Totals</b>			-	14.417		0.000		-		-		-	0.000	14.417	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2020 Air Force							<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>			<b>Project (Number/Name)</b> 675048 / 1760 <i>INTERNAL WEAPONS BAY UPGRADE (IWBU)</i>				
	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

Remarks



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675048 / 1760 INTERNAL WEAPONS BAY UPGRADE (IWBU)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>1760 Internal Weapons Bay Upgrade</b>				
1760 IWBU Inc. 1.2 EMD (Began 2Q16)	1	2018	1	2019
1760 IWBU Inc. 1.2 Milestone C (Nov 18)	1	2019	1	2019
1760 IWBU Inc. 1.2 Production and Installations	1	2019	2	2021
1760 IWBU Inc. 1.2 RAA (Dec 19)	1	2020	1	2020
1760 IWBU Inc. 1.2 FOC (Mar 21)	2	2021	2	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675050 / CONECT			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675050: CONECT	-	4.989	11.138	0.001	0.000	0.001	0.000	0.003	0.002	0.000	0.000	16.133
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The B-52 Combat Network Communications Technology (CONECT) acquisition project supports nuclear and conventional operations by upgrading the B-52 fleet with data and voice communications capabilities, along with improved threat and situational awareness to support participation in net-centric operations. The CONECT upgrade includes the following: new MFCDs, a digital interphone system, on-board client/server architecture supporting distributed processing with independent control functions, an Ultra High Frequency (UHF) Beyond Line-Of-Sight (BLOS) Joint Range Extension (JRE) capability Intelligence Broadcast Receiver (IBR), limited Internet Protocol (IP)-based UHF BLOS link supporting voice, e-mail and file transfers, and an Improved Data Modem (IDM)-based digital Variable Message Format (VMF) datalink.

As the CONECT 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 CONECT. In order to maintain currency with the latest aircraft configuration, the CONECT project will update existing trainers (using stimulate/simulate/computer-based training or a mix) to add CONECT 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 CONECT 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 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.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> B-52 CONECT	4.989	11.138	0.001
<b>Description:</b> 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/			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675050 / <i>CONNECT</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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.			
<b><i>FY 2019 Plans:</i></b> Continue Diminishing Manufacturing Source (DMS) redesign development and test effort. Continue the engineering to assist PDM during after-install checkout, and provide Barksdale/Minot units with maintenance checkout and operational training capability. CONECT will continue the development/update of the existing trainers, by simulation/computer-based training or a mix, to add CONECT functionality to meet user-training requirements, ground stations and update/maintain the SIL for the Weapon System Trainer (WST).			
<b><i>FY 2020 Plans:</i></b> FY19 last year of funding			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decreased due to program development ending in FY19.			
<b>Accomplishments/Planned Programs Subtotals</b>	4.989	11.138	0.001

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line Item B05200: <i>BP11 Production</i>	63.411	55.444	13.567	-	13.567	22.261	10.569	5.678	-	0.000	170.930
• APAF 06 000999: <i>Initial Spares</i>	4.009	-	-	-	-	-	-	-	-	0.000	4.009
• APAF 07 Line Item B05200: <i>Post Production Support</i>	0.199	12.819	4.641	-	4.641	5.550	5.662	5.765	-	0.000	34.636

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675050 / CONECT
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.005	Oct 2017	1.000	Dec 2018	0.001	Dec 2019	-		0.001	0.000	1.006	-
CONECT Weapon Sys Trainer Update	C/Various	Aviation Training Consultants LLC : Edmond, OK	-	4.984	May 2018	6.500	Feb 2019	-		-		-	0.000	11.484	-
<b>Subtotal</b>			-	4.989		7.500		0.001		-		0.001	0.000	12.490	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-
<b>Subtotal</b>			-	-		1.138		-		-		-	0.000	1.138	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	-		2.500	Dec 2018	-		-		-	0.000	2.500	-
<b>Subtotal</b>			-	-		2.500		-		-		-	0.000	2.500	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
	<b>Project Cost Totals</b>			-	4.989	11.138	0.001	-	0.001	0.000	16.128

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675050 / CONECT
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>CONECT</b>	
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 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>CONNECT</b>				
Weapon System Trainer (WST) Upgrade	1	2018	4	2019
WST System Integration Lab (SIL) Development	1	2018	1	2019
System Integration Lab Relocation	1	2018	4	2019
Offensive Station Mission Trainer (OSMT) Development	2	2018	4	2019
Production and Installation	1	2018	3	2021
FOC	3	2021	3	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675055 / GPS-IU			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675055: GPS-IU	-	15.223	37.030	1.985	0.000	1.985	0.000	0.000	0.000	0.000	0.000	54.238
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, it is projected to exceed the designated safety threshold of 95% memory load by 2018. The GPS IU is also facing parts obsolescence issues. Studies show that the current spares will be exhausted by 2018. 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) 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.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675055 / <i>GPS-IU</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Global Positioning System (GPS) Interface Unit (IU) <b>Description:</b> Global Positioning System (GPS) Interface Unit (IU) Upgrade will replace six circuit card assemblies in the GPS IU, the backplane, and the chassis.  <b>FY 2019 Plans:</b> Continue EMD and complete CDR.  <b>FY 2020 Plans:</b> Development/Operational Flight test, Configuration Control Board, and Technology Readiness Review  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decrease due to ramp down and completion of EMD	15.223	37.030	1.985
<b>Accomplishments/Planned Programs Subtotals</b>	15.223	37.030	1.985

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 06 Line Item B05200: <i>BP11 Production</i>	-	-	11.097	-	11.097	23.904	22.359	0.000	-	0.000	57.360
• APAF 06 000999: <i>Initial Spares</i>	-	-	-	-	-	-	8.060	1.546	-	0.000	9.606

**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 will continue in the EMD phase via a sole source contract to Boeing DSS, OKC, awarded Aug 2018. Deliverables include software, eight modernized prototypes, logistics support, ground and flight test support, and engineering drawings. MS B approved June 2018.

**E. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675055 / <i>GPS-IU</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>GPS-IU</b>																												
TMRR Phase II																												
MS B (June 2018)																												
EMD																												
DT/OT																												
MS C																												
Production & Installs																												
FOC																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>GPS-IU</i></b>				
TMRR Phase II	1	2018	3	2018
MS B (June 2018)	3	2018	3	2018
EMD	4	2018	1	2021
DT/OT	2	2020	3	2020
MS C	1	2021	1	2021
Production & Installs	1	2021	3	2022
FOC	3	2022	3	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675056 / B-52 Radar Modernization Program (RMP)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675056: B-52 Radar Modernization Program (RMP)	-	13.954	56.864	109.278	0.000	109.278	169.000	187.734	177.356	111.204	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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Radar Modernization Program	13.954	56.864	109.278
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675056 / B-52 Radar Modernization Program (RMP)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Continue requirements development/decomposition, acquisition planning, risk reduction efforts, and complete an OEM radar supplier selection/award plus other OEM Group B subcontractor selections.			
<b>FY 2020 Plans:</b> 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 4QFY20.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to ramp up in OEM and subcontractors Pre-EMD activities through Preliminary Design Review with continued risk reduction efforts. Additionally, completion of MS B and initial SIL kits buy.			
<b>Accomplishments/Planned Programs Subtotals</b>	13.954	56.864	109.278

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Lineltem B05200: BP11 Production	-	-	0.009	-	0.009	0.000	12.861	69.114	193.655	Continuing	Continuing
• APAF 07 Line Item B05200: Post Production Support	-	-	-	-	-	0.098	0.100	0.102	0.104	Continuing	Continuing
• APAF 06 000999: Initial Spares	-	-	0.118	-	0.118	0.197	0.200	0.204	0.208	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The Milestone Decision Authority was presented the B-52 RMP Acquisition Strategy (AS) on 19 Jan 2018 and signed/approved the AS on 13 Mar 2018. The MDA approved release of an RFP to the OEM to conduct radar selection, continue ongoing contract work with OEM as aircraft integrator, and continue ongoing acquisition planning and risk reduction activities.

**E. 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 2020 Air Force												Date: February 2019				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 7				PE 0101113F / B-52 Squadrons				675056 / B-52 Radar Modernization Program (RMP)								
<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	
Risk Reduction	TBD	Not specified. : NV	-	12.226	Dec 2017	52.736	Jul 2019	98.723	Jan 2020	-		98.723	Continuing	Continuing	-	
<b>Subtotal</b>			-	12.226		52.736		98.723		-		98.723	Continuing	Continuing	N/A	
<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	
Cyber Security Support	C/CPAF	Not specified. : TBD	-	-		0.732	Dec 2018	-		-		-	Continuing	Continuing	-	
<b>Subtotal</b>			-	-		0.732		-		-		-	Continuing	Continuing	N/A	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 RMP BPAC 675056	C/CPAF	Not specified. : TBD	-	-		0.276	Dec 2018	0.300	Jan 2020	-		0.300	Continuing	Continuing	-	
Studies RMP Development	C/CPAF	Not specified. : TBD	-	-		1.966	Dec 2018	2.050	Jan 2020	-		2.050	Continuing	Continuing	-	
<b>Subtotal</b>			-	-		2.242		2.350		-		2.350	Continuing	Continuing	N/A	
<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Support, A&AS, PMA	Various	Not specified. : NV	-	1.728	Jan 2018	1.154	Aug 2019	8.205	Dec 2019	-		8.205	Continuing	Continuing	-	
<b>Subtotal</b>			-	1.728		1.154		8.205		-		8.205	Continuing	Continuing	N/A	
<b>Project Cost Totals</b>			-	13.954		56.864		109.278		-		109.278	Continuing	Continuing	N/A	



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675056 / <i>B-52 Radar Modernization Program (RMP)</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Radar Modernization Program</i></b>																												
Acquisition Planning	■																											
Risk Reduction	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Development Request for Proposal Release							■																					
MS B													■															
EMD																												
MS C																										■		
Production																											■	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675056 / <i>B-52 Radar Modernization Program (RMP)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Radar Modernization Program</i></b>				
Acquisition Planning	1	2018	1	2018
Risk Reduction	1	2018	4	2020
Development Request for Proposal Release	3	2019	3	2019
MS B	4	2020	4	2020
EMD	4	2020	4	2024
MS C	2	2024	2	2024
Production	2	2024	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675057 / B-52 Low Cost Improvement (LCI)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675057: B-52 Low Cost Improvement (LCI)	-	0.105	2.605	2.607	0.000	2.607	2.605	2.660	2.710	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. Continuing work related to the Mission Data Recorder to make the T-1 modification a Permanent Modification to the platform. 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> B-52 Low Cost Improvements	0.105	2.605	2.607
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> 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.			
<b>FY 2020 Plans:</b> 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			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675057 / B-52 Low Cost Improvement (LCI)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
projects of the technology in a relevant environment. Perform work necessary to make the Mission Data Recorder a permanent modification on the platform.  <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	0.105	2.605	2.607

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b> <b>Base</b>	<b>FY 2020</b> <b>OCO</b>	<b>FY 2020</b> <b>Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line item B05200: BP11 Production	2.378	2.362	2.412	-	2.412	2.461	2.511	2.557	2.603	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

Studies and Analyses will be conducted by various AFLCMC organizations and AFGSC. Additionally, the OEM will perform work necessary to make the Mission Data Recorder a permanent modification.

**E. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675057 / B-52 Low Cost Improvement (LCI)

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Low Cost Improvements</b>	
Low Cost Improvements Studies and Analyses	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675057 / <i>B-52 Low Cost Improvement (LCI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Low Cost Improvements</i></b>				
Low Cost Improvements Studies and Analyses	2	2018	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675058 / B-52 Weapon Sys Trainer Air Ref Training Upgrade			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675058: B-52 Weapon Sys Trainer Air Ref Training Upgrade	-	17.472	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.472
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
In FY 2020, Project 675058, B-52 Weapon Sys Trainer Air Ref Training Upgrade was terminated.

**A. Mission Description and Budget Item Justification**

The principal mission of the B-52 Training Systems program is to ensure high fidelity simulators and training systems are available for aircrew members to support credible training, maintain proficiencies, and increase skill levels. B-52 Aircrew Training Devices simulates the necessary visual, motion, and audible cues to provide ground training of Air Force Global Strike Command aircrew members. The B-52 Weapon System Trainer (WST) Air Refueling Upgrade is a comprehensive project that will allow B-52 Aircrew to accomplish credible air refueling training in the simulator, which minimizes the requirement for on-aircraft air refueling training. To facilitate this capability, scope of work may involve development of Analysis of Alternatives (AoA), Studies and Analysis, Capability Development Documents (CDD) or any other Analysis or paperwork necessary to establish a program of record. Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues. DMSMS 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> B-52 Weapons Systems Trainer Air Refueling Training Upgrade	17.472	0.000	0.000
<b>Description:</b> Upgrade allows pilots to conduct effective air refueling training in a simulator; mitigates tanker availability shortfalls for training.			
<b>FY 2019 Plans:</b> Program terminated.			
<b>FY 2020 Plans:</b> Funding removed in FY19 and beyond. Will revisit trainer upgrade following RMP and CERP installations.			
<b>Accomplishments/Planned Programs Subtotals</b>	17.472	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675058 / B-52 Weapon Sys Trainer Air Ref Training Upgrade

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line item B05200: BP11 Production	1.608	-	-	-	-	-	-	-	-	0.000	1.608

**Remarks**

**D. Acquisition Strategy**

The B-52 Training Systems Contract will be utilized for Weapon System Trainer Air Refueling contracting actions.

**E. 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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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>												<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons					<b>Project (Number/Name)</b> 675058 / B-52 Weapon Sys Trainer Air Ref Training Upgrade					
<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Weapon System Trainer Air Refueling Training Upgrade	TBD	TBD : NV	-	17.472	Feb 2018	-		-		-		-	0.000	17.472	-
<b>Subtotal</b>			-	17.472		-		-		-		-	0.000	17.472	N/A
			<b>Prior Years</b>	<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			-	17.472		0.000		-		-		-	0.000	17.472	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675058 / B-52 Weapon Sys Trainer Air Ref Training Upgrade

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Weapon System Trainer</i></b>																												
Master Flight Test Plan																												
Data Collection/Compilation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675058 / <i>B-52 Weapon Sys Trainer Air Ref Training Upgrade</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Weapon System Trainer</i></b>				
Master Flight Test Plan	3	2018	2	2019
Data Collection/Compilation	3	2019	4	2019

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons				<b>Project (Number/Name)</b> 675129 / B-52 CERP			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675129: B-52 CERP	-	9.495	61.915	175.359	0.000	175.359	300.063	328.016	321.348	269.900	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 studies be performed during the program 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> B-52 CERP	9.495	61.915	175.359

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675129 / <i>B-52 CERP</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<p><b>Description:</b> 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><b>FY 2019 Plans:</b> Complete System Requirements and Acquisition Planning phase, Engine Source Selection, preliminary design with the integrator, and begin Rapid Prototyping Phase.</p> <p><b>FY 2020 Plans:</b> Continue Rapid Prototyping phase with selected engine vendor and Boeing as the integrator.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to entry into Rapid Prototyping phase with selection of engine vendor and sole source integration contract with Boeing.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	9.495	61.915	175.359

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

N/A

**Remarks**

**D. Acquisition Strategy**

Ongoing risk reduction activities with Original Equipment Manufacturer. Materiel Development Decision approved in May 2018. Acquisition strategy and FY16 NDAA Section 804 authority approved Sept 2018.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675129 / B-52 CERP
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	9.495	Jun 2018	-		-		-		-	Continuing	Continuing	-
Risk Reduction, Acquisition Planning, preliminary integration design and Engine Source Selection System Performance Requirements decomposition, Begin Rapid prototyping	SS/CPFF	The Boeing Co : Oklahoma City, OK	-	-		36.915	Apr 2019	169.359	Feb 2020	-		169.359	Continuing	Continuing	-
Integration Risk Analysis via Other Transaction	C/FFP	SOSSEC Consortium : Atkinson, NH	-	-		20.000	Jan 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	9.495		56.915		169.359		-		169.359	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	EPASS Contract for A&AS : WPAFB, OH	-	-		5.000	Nov 2018	6.000	Oct 2019	-		6.000	Continuing	Continuing	-
<b>Subtotal</b>			-	-		5.000		6.000		-		6.000	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	9.495	61.915	175.359	-	175.359	Continuing	Continuing	N/A

**Remarks**



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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B-52 CERP</i></b>				
MDD	3	2018	3	2018
System Requirement Phase	4	2018	4	2019
Acquisition Strategy Panel	4	2018	4	2018
Prototype Development Phase 1	1	2020	4	2020
Prototype Development Phase 2	1	2021	4	2024
Virtual Power Pod Prototype	3	2019	3	2019
Virtual System Prototype	4	2020	4	2020
Physical System Prototype 1	3	2023	3	2023
Physical System Prototype 2	1	2024	1	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675160 / B-52 Crypto Modernization
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
	675160: B-52 Crypto Modernization	-	13.756	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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 2018	FY 2019	FY 2020
<b>Title:</b> B-52 Crypto Modernization	13.756	0.000	0.000
<b>Description:</b> Upgrades aircraft with MUOS capable ARC-210 radio systems to prevent loss of BLOS voice and data communications capability.			
<b>FY 2019 Plans:</b> Funded through congressional add.			
<b>FY 2020 Plans:</b> No funding.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No increase			
<b>Accomplishments/Planned Programs Subtotals</b>	13.756	0.000	0.000

	<b>FY 2018</b>	<b>FY 2019</b>
<b>Congressional Add:</b> B-52 Crypto Modernization Congressional Add	-	12.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 675160 / <i>B-52 Crypto Modernization</i>
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	<b>FY 2018</b>	<b>FY 2019</b>
<b>FY 2019 Plans:</b> Continue EMD efforts. Complete preliminary design reviews, s/w lab test, and prepare for FY20 flight testing.		
<b>Congressional Adds Subtotals</b>	-	12.000

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line item B05200: <i>BP11 Production</i>	-	-	17.722	-	17.722	21.059	12.188	2.500	-	0.000	53.469

**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**

EMD - Expecting via a contract with the OEM (Boeing, Oklahoma City).  
 Group A Kit (wiring / kitting / receiver) - Execute using Small Business non-competitive 8a  
 Group B Kit (ARC-210 Radios and ancillaries) - MIPR to Navy PMA 209  
 Installation - Executed via Contract Field Team (CFT) competitive contract

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675160 / B-52 Crypto Modernization
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Crypto Modernization development and integration activities	SS/CPIF	OEM : OKC, OK	-	12.937	Sep 2018	11.530	Aug 2019	-		-		-	0.000	24.467	-
<b>Subtotal</b>			-	12.937		11.530		-		-		-	0.000	24.467	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Initiate Test Requirements and DT/OT planning	Various	Various : OK	-	0.349	Jan 2018	-		-		-		-	0.000	0.349	-
<b>Subtotal</b>			-	0.349		-		-		-		-	0.000	0.349	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Costs for Program Management Administration and Travel	Various	Various : OK	-	0.470	Jan 2018	0.470	Jan 2019	-		-		-	0.000	0.940	-
<b>Subtotal</b>			-	0.470		0.470		-		-		-	0.000	0.940	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	<b>Project Cost Totals</b>		-	13.756	12.000	-	-	-	0.000	25.756

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 675160 / B-52 Crypto Modernization
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Crypto Modernization</i></b>	
MDD / AS Approved (Jan 2018)	█
Risk Reduction Activities	████████████████████
EMD	██
MS C	████
Production and Installation	██

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Crypto Modernization</i></b>				
MDD / AS Approved (Jan 2018)	2	2018	2	2018
Risk Reduction Activities	2	2018	2	2019
EMD	2	2019	4	2021
MS C	4	2021	4	2021
Production and Installation	4	2021	3	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 676039 / B-52 Airspace Compliance
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
676039: B-52 Airspace Compliance	-	0.949	36.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	37.004
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2020, Project 676039, B-52 Airspace Compliance was terminated.

**A. Mission Description and Budget Item Justification**

B-52 Airspace Compliance - Communication, Navigation and Surveillance and Air Traffic Management (CNS/ATM) upgrades are required to comply with increasing FAA requirements. Automatic Dependent Surveillance-Broadcast (ADS-B)Out upgrades to meet FAA mandate. ADS-B Out will also comply with Public Law 111-383-Jan 7, 2011, which mandates procurement of any Global Positioning System (GPS) after FY2017 must be capable of receiving Military Code (M-Code).

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 2018	FY 2019	FY 2020
<b>Title:</b> B-52 Airspace Compliance	0.949	36.055	0.000
<b>Description:</b> Communication, Navigation and Surveillance and Air Traffic Management (CNS/ATM) upgrades are required to comply with increasing FAA requirements. Automatic Dependent Surveillance-Broadcast (ADS-B) upgrade to meet FAA mandate.			
<b>FY 2019 Plans:</b> Continue develop and refine requirements, initiate development activities supporting integration of Communication, Navigation and Surveillance and Air Traffic Management (CNS/ATM) upgrades and Automatic Dependent Surveillance-Broadcast (ADS-B) upgrades			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Effort terminated			
<b>Accomplishments/Planned Programs Subtotals</b>	0.949	36.055	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 676039 / <i>B-52 Airspace Compliance</i>
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**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

FY19 funding realigned to Radar Modernization Program and Infrared Missile Warning System.

Combined Acquisition Strategy (AS) and AS Panel conducted in Dec 2017 and Approved Apr 2018.

**D. Acquisition Strategy**

- EMD - Expected to execute via a contract with the OEM (Boeing, Oklahoma City).
- Group A Kit (wiring / kitting / receiver) - Execute using Small Business non-competitive 8a
- Group B Kit (APX-119 transponder) - MIPR through iGATM catalog
- Installation - Executed via Contract Field Team (CFT) competitive contract

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 676039 / B-52 Airspace Compliance
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Airspace Compliance	TBD	Not specified. : TBD	-	-		31.155		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	-		31.155		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	TBD	Not specified. : NV	-	0.949	Jun 2018	4.900	Apr 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.949		4.900		-		-		-	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	0.949	36.055	-	-	-	Continuing	Continuing	N/A

**Remarks**  
Effort terminated in FY19. FY19 funding realigned to Radar Modernization Program.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / B-52 Squadrons	<b>Project (Number/Name)</b> 676039 / B-52 Airspace Compliance
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Airspace compliance</i></b>	
EMD/RFP Release	██████████
EMD	██████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101113F / <i>B-52 Squadrons</i>	<b>Project (Number/Name)</b> 676039 / <i>B-52 Airspace Compliance</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Airspace compliance</i></b>				
EMD/RFP Release	1	2019	2	2019
EMD	2	2019	4	2019

**Note**  
Effort Terminated in FY19. Funding realigned to Radar Modernization Program and Infrared Missile Warning System.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.446	5.955	10.217	0.000	10.217	8.436	5.460	1.206	0.518	Continuing	Continuing
674797: <i>ALCM Upgrades</i>	-	0.446	5.955	10.217	0.000	10.217	8.436	5.460	1.206	0.518	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 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0101122F I Air-Launched Cruise Missile (ALCM)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.463	5.955	10.421	0.000	10.421
Current President's Budget	0.446	5.955	10.217	0.000	10.217
Total Adjustments	-0.017	0.000	-0.204	0.000	-0.204
• 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	-0.017	0.000			
• Other Adjustments	0.000	0.000	-0.204	0.000	-0.204

**Change Summary Explanation**

FY18: -\$0.017M for SBIR

FY20: -\$0.204M re-phased to future budget years

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Inertial Navigation Element (INE)	0.000	4.955	6.776
<b>Description:</b> Conducting analysis and engineering efforts to ensure short and long term supportability of the ALCM Inertial Navigation Element (INE).			
<b>FY 2019 Plans:</b> Assessing the engineering feasibility of recreating the INE memory modules technology of the circuit cards for technology insertion into the ALCM to offset memory module serviceability end of life. Development of working engineering samples to assess ability to create 'like new' devices.			
<b>FY 2020 Plans:</b> Complete development and certification that INE unit is ready for production.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase in development efforts in FY20.			
<b>Title:</b> ALCM Test Plan Development and Evaluation	0.446	1.000	3.441
<b>Description:</b> Develop test procedures to implement CJCS-directed requirement for Electromagnetic (EM) testing for nuclear systems.			

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>FY 2019 Plans:</b> Develop a test plan for an active system test of the ALCM to be exposed to a neutron/gamma environment. Intent of the test is to assess survivability of a legacy mission critical system in a CBRN environment per DoDI 3150.09 and AFI 10-2607.			
<b>FY 2020 Plans:</b> Continue testing in a CBRN environment.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Reflects increase in testing activities in FY20.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.446	5.955	10.217

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• MPAF 03 Line Item MALCBG: <i>ALCM, Missile Modifications</i>	31.675	47.632	77.387	-	77.387	80.837	83.498	69.296	-	Continuing	Continuing
• MPAF 04 Line Item MALCBG: <i>ALCM, Replenishment Spares</i>	2.942	2.280	2.321	-	2.321	2.359	2.407	2.451	-	Continuing	Continuing
• OPAF 03 Line Item <i>MALCBG: ALCM, Electronics &amp; Telecommunications Equipment (BP83)</i>	1.757	1.775	1.806	-	1.806	1.840	1.873	1.906	-	Continuing	Continuing
• MPAF 04 Line Item 999/Replen <i>Spa...: ALCM, Initial Spares</i>	0.304	0.308	0.119	-	0.119	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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>	
Phase 1 - Short-term parts shortage mitigation analyses with Tomahawk Reference Measuring Unit and Computer 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		
<b>F. Performance Metrics</b> 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101122F / Air-Launched Cruise Missile (ALCM)	<b>Project (Number/Name)</b> 674797 / ALCM Upgrades
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
INE LRU Sustainment Assessment	TBD	NG : UT	-	0.000		4.935	Oct 2018	6.776	Oct 2019	-		6.776	Continuing	Continuing	-
CBRN Test Plan Development & Evaluation	Various	WSMR, Boeing : NV	-	0.426	May 2018	1.000	Jun 2019	3.421	Dec 2019	-		3.421	Continuing	Continuing	-
<b>Subtotal</b>			-	0.426		5.935		10.197		-		10.197	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 - Government Costs	Various	Various : Various	-	0.020		0.020		0.020		-		0.020	Continuing	Continuing	-
<b>Subtotal</b>			-	0.020		0.020		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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	0.446	5.955	10.217	-	10.217	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101122F / Air-Launched Cruise Missile (ALCM)	<b>Project (Number/Name)</b> 674797 / ALCM Upgrades

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>INE Sustainment</b>	
INE Line Replaceable Unit Assessment	
<b>CBRN Test</b>	
CBRN Test Plan Development	
CBRN Test Execution	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101122F / <i>Air-Launched Cruise Missile (ALCM)</i>	<b>Project (Number/Name)</b> 674797 / <i>ALCM Upgrades</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>INE Sustainment</i></b>				
INE Line Replaceable Unit Assessment	2	2019	4	2022
<b><i>CBRN Test</i></b>				
CBRN Test Plan Development	1	2018	4	2024
CBRN Test Execution	1	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101126F / <i>B-1B Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	60.367	60.295	1.000	0.000	1.000	27.315	14.157	8.107	0.000	0.000	171.241
675344: <i>B-1B Modernization</i>	-	60.367	60.295	1.000	0.000	1.000	27.315	14.157	8.107	0.000	0.000	171.241
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 current structural service life extends beyond 2040.

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.

**FULLY INTEGRATED TARGETING POD (FITP)**

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 AUTOMATIC SURVEILLANCE BROADCAST (ADS-B) OUT**

B-1B Identification Friend or Foe (IFF) Mode 5/S is the replacement for the B-1B Mark XII IFF Mode 4. Mode 5 will provide secure target identification and will be a response system for combat identification. Mode Select (Mode S) and ADS-B Out 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) mandate. Funds are included to accommodate the DoD mandate as outlined in previous AF and DoD budget exhibits.

**RADIO CRYPTO COMPLIANCE**

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101126F / <i>B-1B Squadrons</i>	
<p>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.</p> <p>Multifunctional Information Distribution System (MIDS) - Joint Tactical Radio System (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 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 retargeting 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><b>GAP AND INTEGRATION ANALYSIS</b> 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&amp;E efforts.</p> <p>This PE 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 PEs 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.</p> <p>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 2018 Air Force penalty total is \$14.373M. 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.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101126F / B-1B Squadrons
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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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	62.471	76.030	6.586	0.000	6.586
Current President's Budget	60.367	60.295	1.000	0.000	1.000
Total Adjustments	-2.104	-15.735	-5.586	0.000	-5.586
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.735			
• 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	-2.104	0.000			
• Other Adjustments	0.000	0.000	-5.586	0.000	-5.586

**Change Summary Explanation**

FY18: Decrease of \$2.104M for SBIR

FY19: Decrease of \$15.735M consists of congressional marks of: -\$2.435M for MIDS-JTRS and -\$13.300M for FITP

FY20: Decrease of \$5.586M for BRU-56

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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<b>Title:</b> Fully Integrated Targeting Pod	24.142	7.088	0.000
<b>Description:</b> 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			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0101126F / B-1B Squadrons		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
targeting pod use. Furthermore, the FITP removes the need for an ICS sustainment support structure, which will resolve the DMS issue.  <b>FY 2019 Plans:</b> Complete Gap & Integration Analysis, continue Pre-Milestone B activities to include Preliminary Design Review (PDR). <b>FY 2020 Plans:</b> N/A <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No approved funding for FY20.				
<b>Title:</b> Mode 5/S Automatic Dependent Surveillance Broadcast (ADS-B) Out <b>Description:</b> B-1B Identification Friend or Foe (IFF) Mode 5/S is the replacement for the B-1B Mark XII IFF Mode 4. Mode 5 will provide secure target identification and will be a response system for combat identification. Mode Select (Mode S) and ADS-B Out 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. Upgrades to ADS-B Out and Mode S are required FAA mandates and the upgrade to Mode 5 is a JROC mandate. Failure to meet these mandates will result in delayed/denied service of controlled airspace within the US and Europe.  <b>FY 2019 Plans:</b> Continue Engineering and Manufacturing Development (EMD) efforts. Develop software integration labs requirements, complete Systems Requirement Review, Systems Functional review, and Software Specification Review. <b>FY 2020 Plans:</b> N/A <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No approved funding for FY20		14.137	17.065	0.000
<b>Title:</b> Radio Crypto Compliance <b>Description:</b> 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		5.298	8.491	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0101126F / B-1B Squadrons		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
compliant radios providing BLOS communications. Funds are included to accommodate the DoD mandate as outlined in previous AF and DoD budget exhibits.				
<b>FY 2019 Plans:</b> Continue Engineering and Manufacturing Development (EMD) efforts. Develop software integration labs requirements, complete Systems Requirement Review, Systems Functional review, and Software Specification Review.				
<b>FY 2020 Plans:</b> N/A				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No approved funding for FY20				
<b>Title:</b> Multifunctional Information Distribution System-Joint Tactical Radio System		8.644	7.280	0.000
<b>Description:</b> 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 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.				
<b>FY 2019 Plans:</b> Continue Engineering and Manufacturing Development (EMD) efforts. Develop software integration labs requirements, complete Systems Requirement Review, Systems Functional review, and Software Specification Review.				
<b>FY 2020 Plans:</b> N/A				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No approved funding for FY20				
<b>Title:</b> Bomb Rack Unit - 56		6.107	20.114	1.000
<b>Description:</b> 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				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101126F / B-1B Squadrons
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>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.</p> <p><b>FY 2019 Plans:</b> Award the competitive EMD contract for hardware and continue software development. Begin Preliminary Design Review activities.</p> <p><b>FY 2020 Plans:</b> Complete a Critical Design Review (CDR) and accomplish Developmental Testing / Operational Testing (DT/OT)</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding reduced from FY19 to FY20 due to rephasing of program.</p>			
<p><b>Title:</b> Gap and Integration Analysis</p> <p><b>Description:</b> 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&amp;E efforts.</p> <p><b>FY 2019 Plans:</b> Funds used to ensure test asset availability for testing of aircraft RDT&amp;E efforts.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No approved funding for Gap &amp; Integration Analysis in FY2020</p>	2.039	0.257	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	60.367	60.295	1.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APAF 05 Line Item B01B00: <i>Training Support to Units, Mods PE 0809731F</i>	0.448	0.450	0.458	-	0.458	0.467	0.476	0.485	0.494	0.000	3.278
• APAF 05 0101126F: B-1B SQUADRONS	93.286	39.240	21.653	-	21.653	81.819	73.660	106.266	64.262	0.000	480.186
• APAF 05 Line Item B01B00 Spares: <i>B-1B Squadrons, Spares</i>	6.906	0.000	0.000	-	0.000	0.718	0.856	0.872	0.563	0.000	9.915

**Remarks**

**E. Acquisition Strategy**

FITP acquisition strategy will be a one year Cost Plus Fixed Fee (CPFF) sole source gap and integration contract to Preliminary Design Review (PDR) with a follow-on one-year CPFF sole source contract from PDR to Critical Design Review (CDR). Follow-on will be a sole source Firm Fixed Price (FFP) two year EMD effort. Sub to Northrup Grumman Systems (NG) through the Precision Attack SPO (PASPO) for LITENING Digital Pod (LDP) kit development, new pod procurement, and Pod Integration.

Production will be a sole source FFP contract with a two-year Production and Installation effort.

Mode 5/S ADS-B Out, Radio Crypto Compliance, and MIDS-JTRS acquisition strategies will be a CPFF sole source contract with a four-year EMD effort and a Firm Fixed Price (FFP) competitively-selected contract with a four-year Production and Installation effort.

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

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101126F / B-1B Squadrons	<b>Project (Number/Name)</b> 675344 / B-1B Modernization
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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)	SS/CPFF	Boeing : OKC, OK	-	19.861	Dec 2018	4.217	Sep 2019	-		-		-	0.000	24.078	-
Fully Integrated Targeting Pod (FITP) (Sub-Contract)	SS/CPAF	Northrop Grumman : Rolling Meadow, IL	-	2.517	Feb 2019	2.632	Feb 2019	-		-		-	0.000	5.149	-
Mode 5/S Automatic Dependent Surveillance Broadcast (ADS-B) Out	SS/CPFF	Boeing : OKC, OK	-	12.336	Dec 2018	15.876	Aug 2019	-		-		-	0.000	28.212	-
Radio Crypto Compliance	SS/CPFF	Boeing : OKC, OK	-	4.894	Dec 2018	7.590	Aug 2019	-		-		-	0.000	12.484	-
Multifunctional Information Distribution System (MIDS) Joint Tactical Radio System (JTRS)	SS/CPFF	Boeing : OKC, OK	-	4.766	Dec 2018	6.420	Aug 2019	-		-		-	0.000	11.186	-
Multifunctional Information Distribution System (MIDS ) Joint Tactical Radio System (JTRS)	SS/FFP	Viasat : Carlsbad, CA	-	3.356	May 2018	-		-		-		-	0.000	3.356	-
Bomb Rack Unit - (BRU) 56	Various	Boeing : OKC, OK	-	5.631	Sep 2018	19.117	May 2019	1.000	Mar 2020	-		1.000	0.000	25.748	-
<b>Subtotal</b>			-	53.361		55.852		1.000		-		1.000	0.000	110.213	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Mode 5/S Automatic Dependent Surveillance Broadcast (ADS-B) Out - Technical Support	SS/CPFF	Boeing : OKC, OK	-	0.739	Jun 2018	-		-		-		-	0.000	0.739	-
Gap And Integration Analysis - Defense Avionic Systems	SS/CPFF	Georgia Tech Corp : Atlanta, GA	-	1.012	Jul 2018	-		-		-		-	0.000	1.012	-
Documentation - Technical Support	MIPR	Booz Allen Hamilton : OKC, OK	-	0.988	Dec 2018	1.500	Sep 2019	-		-		-	0.000	2.488	-
<b>Subtotal</b>			-	2.739		1.500		-		-		-	0.000	4.239	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101126F / B-1B Squadrons	<b>Project (Number/Name)</b> 675344 / B-1B Modernization

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B-1B Modernization</i></b>				
Gap & Integration Analysis Contract Award	4	2018	4	2018
Fully Integrated Targeting Pod - TMRR Activities	4	2018	1	2021
Fully Integrated Targeting Pod - MS B	1	2021	1	2021
Fully Integrated Targeting Pod - EMD Activities	1	2021	2	2023
Fully Integrated Targeting Pod - MS C	2	2023	2	2023
Fully Integrated Targeting Pod - Production and Installation	2	2023	4	2024
Mode 5/S ADS-B Out - EMD Activities	2	2019	4	2022
Mode 5/S ADS-B Out - MS C	4	2022	4	2022
Mode 5/S ADS-B Out - Production and Installation	4	2022	4	2024
Radio Crypto Compliance - EMD Activities	2	2019	4	2022
Radio Crypto Compliance - MS C	4	2022	4	2022
Radio Crypto Compliance - Production and Installation	4	2022	4	2024
MIDS JTRS - EMD Activities	2	2019	4	2022
MIDS JTRS - MS C	4	2022	4	2022
MIDS JTRS - Production and Installation	4	2022	4	2024
BRU-56 - EMD Activities	4	2018	3	2022
BRU-56 - MS C	3	2022	3	2022
BRU-56 - Production and Installation	3	2022	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / <i>B-2 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	89.781	105.508	97.276	0.000	97.276	48.827	50.947	25.521	13.929	Continuing	Continuing
675345: <i>B-2 Modernization</i>	0.000	50.017	78.419	82.925	0.000	82.925	34.228	36.044	10.346	13.929	Continuing	Continuing
676021: <i>BASELINE SUPPORT</i>	0.000	13.052	14.089	14.351	0.000	14.351	14.599	14.903	15.175	0.000	Continuing	Continuing
676022: <i>AEHF Strategic Comm</i>	0.000	26.712	13.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	39.712

**Note**

This program, BA 7, PE 0101127F, project 675345, B-2 Expanded Strike, is a new start.

\$13M in FY 2019 BPAC 676022 is misaligned in the database, funds are being executed within FY 2019 BPAC 675345.

**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) provides SATCOM connectivity for Command and Control enroute to the target with Airborne Mission Transfer and Beyond Line-of-Site Situational Awareness. This effort includes incremental improvements to the suite of B-2 ACS UHF communications system.

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. Upgrades includes Flex Strike, JASSM-ER integration and Expanded Strike.

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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons
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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.

The B-2 Identification Friend or Foe (IFF) Mode 5/S modification program provides new equipment to the B-2 for airspace compliance on a global stage. Mode 5 is a new, cryptographically secure mode used solely by the military, which is replacing Mode 4. Mode S is a secondary surveillance radar process that allows selective interrogation of aircraft using a uniquely assigned 24-bit address.

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.

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, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	193.108	105.561	106.376	0.000	106.376
Current President's Budget	89.781	105.508	97.276	0.000	97.276
Total Adjustments	-103.327	-0.053	-9.100	0.000	-9.100
• Congressional General Reductions	-0.033	-0.053			
• Congressional Directed Reductions	-97.000	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	-6.294	0.000			
• Other Adjustments	0.000	0.000	-9.100	0.000	-9.100

**Change Summary Explanation**

FY 2018: Congress reduced AEHF SATCOM by \$97M, \$0.033M for Congressional General Reduction, and \$6.294M for SBIR.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / <i>B-2 Squadrons</i>	
FY 2020: \$9.1M reduction from Expanded Strike, Airspace Compliance, CSMU and LOSSM to re-phase early to need funding.		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons				<b>Project (Number/Name)</b> 675345 / B-2 Modernization			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675345: B-2 Modernization	0.000	50.017	78.419	82.925	0.000	82.925	34.228	36.044	10.346	13.929	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0101127F, project 675345, B-2 Expanded Strike, is a new start.

\$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error.

**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. B-2 cryptographic modernization updates cryptographic equipment for B-2 AIT/ARC-234, AN/ARC-211 and MIDS/LVT communication systems. The Adaptive Communication Suite (ACS) explores incremental improvements to the B-2 ACS UHF communication system in order to modernize the system and increase data throughput.

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. The Flexible Strike Phase 1 program will re-host the current B-2 stores management software onto a new integrated processor. 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 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.

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

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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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).

The B-2 Identification Friend or Foe (IFF) Mode 5/S modification upgrades equipment on the B-2 in order to ensure compliance in the global airspace. Mode 5 provides improved combat identification security, with better 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 is the DoD standard for secure combat ID. Mode S is a 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.

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> B-2 Flexible Strike Phase 1	0.494	0.000	0.000	0.000	0.000
<b>Description:</b> Rehost the currently separate Stores Management Operational Flight Programs onto the new integrated processor unit made available by the B-2 EHF Increment 1 program.					
<b>FY 2019 Plans:</b>					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>N/A</p> <p><b>FY 2020 Base Plans:</b> N/A</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>					
<p><b>Title:</b> Low Observable Signature and Supportability Mods and Trainers</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> Continue development of on-going LOSSM and Training System core upgrades. Accelerate 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 (TOMIS), tailpipe testing, and Signature Diagnostic System Spiral 11. Continues development efforts for advanced LO materials, structures, procedures, and other enhanced diagnostics and measurement systems.</p> <p>\$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error.</p> <p><b>FY 2020 Base Plans:</b> 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. Mature the Radar Radome Design and begin Signature Diagnostic System Spiral 12.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	18.972	19.521	18.831	-	18.831

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
LOSSM funding increased from FY18 to FY19 as the majority of the development effort is in FY19. The funding decreased in FY20 due to decreased scope of work across the LOSSM portfolio.					
<p><b>Title:</b> B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration</p> <p><b>Description:</b> Integrates the Joint Air to Surface Standoff Missile, Extended Range weapon (JASSM-ER) onto the B-2.</p> <p><b>FY 2019 Plans:</b> Complete Requirements Maturation (RM) effort and begin EMD activities to include design finalization for Critical Design Review (CDR) and Tech Order generation.</p> <p><b>FY 2020 Base Plans:</b> 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><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increases from FY 2019 to FY 2020 due to increase in development activities and execution of CDR, TRR, and FRR.</p>	9.406	12.220	25.316	-	25.316
<p><b>Title:</b> B-2 Cryptographic Modernization</p> <p><b>Description:</b> Provides NSA-mandated cryptographic modifications to three communication system components on the aircraft: Advanced Integrated Terminal (AIT) also known as AN/ARC-234 (UHF/VHF Radio), AN/ARC-211 (HF Radio), and the Multifunction Information Distribution System (MIDS) Low Volume Terminal (Link-16 Terminal).</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Base Plans:</b> N/A</p>	18.633	0.000	0.000	-	0.000
<p><b>Title:</b> B-2 Adaptable Communications Suite (ACS)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p>	0.026	1.428	0.197	-	0.197

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Conduct 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><b>FY 2020 Base Plans:</b> Continue risk reduction activities for a modernized ACS system.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Reduction in funding from FY19 to FY20 as risk reduction effort concludes.</p>					
<p><b>Title:</b> B-2 Identification Friend or Foe (IFF) Mode 5/S Program</p> <p><b>Description:</b> B-2 IFF Mode 5/S provides improved combat identification security 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><b>FY 2019 Plans:</b> Complete Milestone B Decision and award Engineering &amp; Manufacturing Development (EMD) delivery order.</p> <p><b>FY 2020 Base Plans:</b> Continue executing EMD activities to include Preliminary Design Review (PDR) and Critical Design Review (CDR).</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>	0.440	16.764	16.754	-	16.754
<p><b>Title:</b> B-2 Crash Survivable Memory Unit (CSMU)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p>	2.046	4.818	1.870	-	1.870

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>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 OFF. 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><b>FY 2020 Base Plans:</b> 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 OFF.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreases from FY 2019 to FY 2020 due to decrease in development activities.</p>					
<p><b>Title:</b> B-2 Radar Aided Targeting System (RATS)</p> <p><b>Description:</b> 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 Type 2 nuclear weapons in a non-GPS environment.</p> <p><b>FY 2019 Plans:</b> Radar Aided Targeting System (RATS) is a new start. FY19 activities include EMD activities, including Preliminary Design Review (PDR).</p> <p><b>FY 2020 Base Plans:</b> 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><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreases from FY 2019 to FY 2020 as development activities decrease.</p>	0.000	23.668	18.957	-	18.957
<p><b>Title:</b> B-2 Expanded Strike</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p>	-	0.000	1.000	-	1.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
N/A - FY 2020 New Start					
<b>FY 2020 Base Plans:</b> Conduct acquisition planning, affordability assessments, and other pre-EMD activities.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 New Start					
<b>Accomplishments/Planned Programs Subtotals</b>	50.017	78.419	82.925	0.000	82.925

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line Item B00200: <i>B-2 Training Support Modification, PE 0809731F</i>	9.082	7.800	0.000	-	0.000	8.080	8.242	8.392	16.481	Continuing	Continuing
• APAF 05 Line Item B00200 (1)...: <i>B-2 Flexible Strike Mod Funding, PE 0101127F</i>	5.629	7.959	4.894	-	4.894	-	-	-	-	0.000	18.482
• APAF 05 Line Item B00200 (2)...: <i>B-2 LOSSM Mod Funding, PE 0101127F</i>	5.890	14.831	0.276	-	0.276	19.878	24.009	26.244	21.017	Continuing	Continuing
• APAF 05 Line Item B00200 (3)...: <i>B-2 CSMU Mod Funding, PE 0101127F</i>	-	-	-	-	-	3.273	1.601	1.631	1.660	Continuing	Continuing
• APAF 05 Line Item B00200 (4)...: <i>B-2 IFF Mode 5/S Mod Funding, PE 0101127F</i>	-	-	-	-	-	7.239	15.420	15.894	97.723	Continuing	Continuing
• APAF 05 Line Item B00200 (5)...: <i>B-2 B61-12 Integration Mod</i>	39.549	-	-	-	-	-	-	-	-	0.000	39.549
• APAF 05 Line Item B00200 (6)...: <i>B-2 MGUE Mod</i>	15.625	1.281	0.990	-	0.990	-	0.320	0.480	-	0.000	18.696

**Remarks**

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / <i>B-2 Squadrons</i>	<b>Project (Number/Name)</b> 675345 / <i>B-2 Modernization</i>

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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-2 Flex Strike Phase 1	Various	Various : Various	0.000	0.381	Dec 2017	-		-		-		-	0.000	0.381	-
Low Observable Signature and Supportability Mods	Various	Various : Various	0.000	17.272	Dec 2017	16.578	Nov 2018	16.876	Oct 2019	-		16.876	Continuing	Continuing	-
B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration	Various	Various : Various	0.000	7.679	Dec 2018	8.673	Jan 2019	20.745	Oct 2019	-		20.745	0.000	37.097	-
B-2 Cryptographic Modernization	Various	Various : Various	0.000	18.225	Dec 2018	-		-		-		-	0.000	18.225	-
B-2 Adaptable Communications Suite (ACS)	Various	Various : Various	0.000	0.015	Dec 2017	1.412	Dec 2018	0.179	Dec 2019	-		0.179	Continuing	Continuing	-
B-2 IFF Mode 5/S	Various	Various : Various	0.000	0.000		14.739	Jun 2019	12.772	Jun 2020	-		12.772	Continuing	Continuing	-
B-2 Crash Survivable Memory Unit (CSMU)	Various	Various : Various	0.000	1.892	Jul 2019	4.166	Jul 2019	1.403	Jul 2020	-		1.403	4.713	12.174	-
B-2 RATS	Various	Various : Various	0.000	-		19.244	Oct 2018	8.939	Oct 2019	-		8.939	0.000	28.183	-
B-2 Expanded Strike	Various	Various : Various	0.000	-		-		0.914	Dec 2019	-		0.914	0.000	0.914	-
Aircrew Training	Various	Various : Various	0.000	0.086	Dec 2017	1.091	Dec 2018	6.318	Dec 2019	-		6.318	Continuing	Continuing	-
Mission Planning	Various	Various : Various	0.000	0.430	Jan 2018	1.100	Jan 2019	5.272	Jan 2020	-		5.272	Continuing	Continuing	-
<b>Subtotal</b>			0.000	45.980		67.003		73.418		-		73.418	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.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	MIPR	Various : CA	0.000	0.663	Nov 2017	3.525	Nov 2018	1.321	Dec 2019	-		1.321	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.663		3.525		1.321		-		1.321	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various : TBD	0.000	3.374	Oct 2017	7.891	Oct 2018	8.186	Oct 2019	-		8.186	Continuing	Continuing	-
<b>Subtotal</b>			0.000	3.374		7.891		8.186		-		8.186	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			0.000	50.017		78.419		82.925		-		82.925	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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>B-2 Modifications Schedule</b>																												
Flexible Strike EMD																												
Flexible Strike Ph 1 Milestone C																												
Flexible Strike Ph 1 Production Contract Award																												
Flexible Strike Production																												
Flexible Strike Ph 1 Required Assets Available																												
Low Observable Signature and Supportability Mods and Trainers																												
JASSM-ER Integration Preliminary Design																												
JASSM-ER Integration Milestone B																												
Crypto Modification Contract Award																												
IFF Mode 5/S Milestone B																												
IFF Mode 5/S EMD Phase																												
IFF Mode 5/S Milestone C																												
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) Software Development and Fielding																												
Expanded Strike Acquisition Planning Contract Award																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 675345 / B-2 Modernization
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B-2 Modifications Schedule</i></b>				
Flexible Strike EMD	1	2018	2	2019
Flexible Strike Ph 1 Milestone C	2	2018	2	2018
Flexible Strike Ph 1 Production Contract Award	2	2018	2	2018
Flexible Strike Production	2	2018	4	2021
Flexible Strike Ph 1 Required Assets Available	4	2020	4	2020
Low Observable Signature and Supportability Mods and Trainers	1	2018	4	2024
JASSM-ER Integration Preliminary Design	1	2019	3	2019
JASSM-ER Integration Milestone B	3	2019	3	2019
Crypto Modification Contract Award	1	2019	1	2019
IFF Mode 5/S Milestone B	3	2019	3	2019
IFF Mode 5/S EMD Phase	3	2019	2	2021
IFF Mode 5/S Milestone C	2	2021	2	2021
Crash Survivable Memory Unit Milestone B	3	2019	3	2019
Crash Survivable Memory Unit EMD Contract	4	2019	3	2021
Crash Survivable Memory Unit Milestone C / Production and Deployment	1	2021	4	2024
Radar Aided Targeting System (RATS) Software Development and Fielding	1	2019	1	2021
Expanded Strike Acquisition Planning Contract Award	1	2020	1	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons				<b>Project (Number/Name)</b> 676021 / BASELINE SUPPORT			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676021: BASELINE SUPPORT	0.000	13.052	14.089	14.351	0.000	14.351	14.599	14.903	15.175	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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Baseline Support Acq Plan/Studies/Integr Test Support	0.297	0.297	0.297	-	0.297
<b>Description:</b> 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.					
<b>FY 2019 Plans:</b> Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, program integration activities, integration and test support of upgraded crypto components.					
<b>FY 2020 Base Plans:</b> Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, and program integration activities.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No change to Baseline Support/Acq Plan/Integr Test Support funding from FY 2019 to FY 2020					
<b>Title:</b> Baseline Support Flight Test	12.755	13.792	14.054	-	14.054
<b>Description:</b> 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,					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676021 / BASELINE SUPPORT
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
reducing the need for additional operational aircraft and accelerating deployment of advanced operational capabilities to the warfighter.					
<b>FY 2019 Plans:</b> 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, and test aircraft de-mod efforts.					
<b>FY 2020 Base Plans:</b> 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.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No significant change to Baseline Support Flight Test funding from FY 2019 to FY 2020.					
<b>Accomplishments/Planned Programs Subtotals</b>	13.052	14.089	14.351	-	14.351

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676021 / BASELINE SUPPORT
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<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Other Government Costs	Various	Various : Various	0.000	9.004	Oct 2017	9.658	Oct 2018	9.378	Oct 2019	-		9.378	Continuing	Continuing	-
<b>Subtotal</b>			0.000	9.004		9.658		9.378		-		9.378	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Government Test	MIPR	AFTC : CA	0.000	3.200	Oct 2017	3.268	Oct 2018	3.597	Oct 2019	-		3.597	Continuing	Continuing	-
<b>Subtotal</b>			0.000	3.200		3.268		3.597		-		3.597	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
PMA	Various	Various : TBD	0.000	0.848	Oct 2017	1.163	Oct 2018	1.376	Oct 2019	-		1.376	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.848		1.163		1.376		-		1.376	Continuing	Continuing	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	0.000	13.052	14.089	14.351	-	14.351	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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676021 / BASELINE SUPPORT
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>B-2 Baseline Support</b>																												
FY18 Flight Test Core Support Contract Award	█																											
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	█																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676021 / BASELINE SUPPORT

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B-2 Baseline Support</i></b>				
FY18 Flight Test Core Support Contract Award	1	2018	1	2018
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

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons				<b>Project (Number/Name)</b> 676022 / AEHF Strategic Comm			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676022: AEHF Strategic Comm	0.000	26.712	13.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	39.712
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

FY18 funding does not reflect the \$13M rescission due to a technical error.  
 \$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error.

**A. Mission Description and Budget Item Justification**

The B-2 Advanced Extremely High Frequency (AEHF) Satellite Communications (SATCOM) system provides secure, strategic, two-way, survivable Anti-Access/Area Denial communications capability for conventional and nuclear missions. The effort was established in Project 675345 B-2 Modernization; the B-2 AEHF effort continued in FY 2017 and subsequent years under Project 676022 AEHF Strategic Comm. The AEHF SATCOM program was terminated in the FY 2019 Budget.

\$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> B-2 AEHF (Strategic Communication)	26.712	13.000	0.000	-	0.000
<b>Description:</b> B-2 AEHF (Strategic Communication) provides secure, strategic, two-way, survivable Anti-Access/Area Denial communications capability for conventional and nuclear missions.					
<b>FY 2019 Plans:</b> B-2 EHF SATCOM program was terminated in FY 2019 Budget.					
<b>FY 2020 Base Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> B-2 EHF SATCOM program was terminated in FY 2019 Budget.					
<b>Accomplishments/Planned Programs Subtotals</b>	26.712	13.000	0.000	-	0.000

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

N/A

**Remarks**

FY18 funding does not reflect the \$13M rescission due to a technical error.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / <i>B-2 Squadrons</i>	<b>Project (Number/Name)</b> 676022 / <i>AEHF Strategic Comm</i>
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**D. Acquisition Strategy**

N/A

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676022 / AEHF Strategic Comm
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
AEHF Strategic Comm	Various	Not specified. : TBD	0.000	22.936		13.000		-		-		-	0.000	35.936	-
<b>Subtotal</b>			0.000	22.936		13.000		-		-		-	0.000	35.936	N/A

**Remarks**  
Northrop-Grumman is the prime contractor and lead integrator.

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
PMA	Various	Various : TBD	0.000	3.776	Jan 2018	-		-		-		-	Continuing	Continuing	0.000
<b>Subtotal</b>			0.000	3.776		-		-		-		-	Continuing	Continuing	N/A

<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>			
<b>Project Cost Totals</b>			0.000	26.712	13.000	-	-	-	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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676022 / AEHF Strategic Comm
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Program Terminated</i></b>	
Termination	■

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101127F / B-2 Squadrons	<b>Project (Number/Name)</b> 676022 / AEHF Strategic Comm
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Program Terminated</i></b>				
Termination	1	2019	1	2019

**Note**

Program was terminated in the FY 2019 Budget. No events are planned.

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	204.208	154.733	128.961	0.000	128.961	133.978	115.728	117.926	0.000	Continuing	Continuing
672983: <i>MM Ground and Comm Equipment</i>	0.000	115.626	90.459	93.993	0.000	93.993	118.442	99.037	98.425	0.000	Continuing	Continuing
672984: <i>MM III Baseline Support</i>	0.000	57.929	36.871	14.816	0.000	14.816	11.084	12.940	13.176	0.000	Continuing	Continuing
672985: <i>MM Support Equip</i>	0.000	30.653	12.863	6.859	0.000	6.859	0.000	0.000	3.201	0.000	Continuing	Continuing
672986: <i>MM Crypto Mods</i>	0.000	0.000	14.540	13.293	0.000	13.293	4.452	3.750	3.124	0.000	0.000	39.159
672987: <i>MM Ops Equip*</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	Continuing	Continuing

\*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2020

**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 Air Launch Control System Replacement (ALCS-R), 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 Phase II (RVA II).

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 newly developed or modified 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.

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 G6B4 Build Equipment Replacement (G6B4 BER), 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), LGM-30G Simulated Electronic Launch Minuteman Replacement (SELM-R), and LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER).

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>
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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 nuclear weapon support 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	210.845	156.047	128.961	0.000	128.961
Current President's Budget	204.208	154.733	128.961	0.000	128.961
Total Adjustments	-6.637	-1.314	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.314			
• 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	-6.637	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY 2018 funding reflects a SBIR adjustment of \$6.637M.

FY 2019 funding reflects a Congressional Directed Reduction of \$1.314M for the Fast Rising B-plug program being under reassessment and the Ground Test Unit program being descope.

In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7M, not reflected here. The correct total for FY18 is \$197.208M.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>				<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
672983: <i>MM Ground and Comm Equipment</i>	0.000	115.626	90.459	93.993	0.000	93.993	118.442	99.037	98.425	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**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 Air Launch Control System Replacement (ALCS-R), 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 Phase II (RVA II).

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> LGM-30G Air Launch Control System Replacement (ALCS-R)	52.546	74.531	86.619
<p><b>Description:</b> ALCS-R will replace the legacy nuclear command and control system that provides the capability to launch Intercontinental Ballistic Missiles (ICBMs) from an airborne platform, currently the Navy E-6B. The system consists of a nuclear hardened radio and MM III interface at each LF, and a suite of launch and cryptographic equipment that generates and transmits commands from the E-6B. ALCS-R is 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 LFs. The approved acquisition strategy will replace ALCS equipment by 2024 to resolve critical sustainment and cryptographic sunset issues and assure survivable, airborne launch capability for current and future ICBMs. ALCS-R will be designed for Ground Based Strategic Deterrent (GBSD) airborne survivable launch platform capability maximizing investment across both ICBM weapon systems.</p>			
<p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete System Preliminary Design Review</li> <li>• Begin Prototype Evaluation</li> <li>• Complete Development Request for Proposal Decision Point</li> <li>• Complete System Requirements Document</li> <li>• Complete System Integration Lab Development</li> <li>• Complete EMD Acquisition Strategy</li> <li>• Complete Phase II Cost Capability Analysis and Support CDD Finalization</li> <li>• Continue Development Test and Evaluation planning</li> </ul>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>• Begin Operational Test and Evaluation planning</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Continue Prototype Evaluation</li> <li>• Complete Development Request for Proposal Decision Point</li> <li>• Begin EMD/P&amp;D Source Selection</li> <li>• Further Risk Reduction for EMD</li> <li>• Continue Development Test and Evaluation planning</li> <li>• Continue Operational Test and Evaluation planning</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased as EMD risk reduction activities and prototyping ramps up in preparation for EMD contract award</p>				
<p><b>Title:</b> LGM-30G Automatic Switching Unit (ASU)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete integration testing, finalize design and validate installation</li> <li>• Conduct Functional Configuration Audit</li> <li>• Conduct Pre-Production Readiness Review</li> <li>• Complete Milestone C</li> </ul> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decrease due to production contract award in FY19 with no further FY20 requirement.</p>		4.559	2.658	0.000
<p><b>Title:</b> LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP)</p> <p><b>Description:</b> The Fast Rising B-Plug (FRBP) provides a secondary security element to 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>		1.204	0.000	4.656

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>This effort will include hardware and software solutions to a variety of safety and maintenance issues affecting the operational wings.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Finalize acquisition strategy</li> <li>• Draft and coordinate Milestone B regulatory and statutory documents</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Release Request For Proposal</li> <li>• Perform Source Selection</li> <li>• Award Engineering &amp; Manufacturing Development (EMD) contract</li> <li>• Complete system functional and requirements reviews</li> <li>• Award independent verification and validation EMD contract</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to EMD beginning in FY20.</p>				
<p><b>Title:</b> LGM-30G Launch Control Center Break-In-Kit (LCCB)</p> <p><b>Description:</b> The LCCB program will develop a kit that will enable 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete integration testing, finalize design and validate installation</li> <li>• Prepare and conduct Functional and Physical Configuration Audit</li> <li>• Prepare and conduct Production Readiness Review</li> <li>• Prepare and conduct Milestone C</li> <li>• Award production contract</li> </ul> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decrease due to production contract awarded in FY19 with no further FY20 requirement.</p>		1.871	1.363	0.000
<p><b>Title:</b> Launch Control Center (LCC) Block Upgrade (LCCBU)</p>		52.924	5.386	2.718

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> The LCCBU program addresses 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 will consist of Journal Memory Loader (JML), Floppy Disk Drive (FDD), Weapon System Control Console (WSCC) Printer, Oxygen Regeneration Unit (ORU), and with possible changes as requirements dictate.</p> <p>All LCCBU efforts will support 45 operational LCCs, 12 trainers, 2 Integration Facilities, 2 Test Launch Facilities, and additional support and test equipment for maintenance locations.</p> <p>The original development strategy was to retrofit production articles into the trainers. To ensure functionality and operational realism, the Program developed the trainer items in conjunction with the operational items making them trainer unique.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete Milestone C</li> <li>• Award production contract for FDD &amp; ORU</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete WSCC printer and JML design activities</li> <li>• Award production contract for WSCC printer and JML.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Production contract award in FY19 resulting in decrease in FY20 requirements.</p>			
<p><b>Title:</b> LGM-30G Remote Visual Assessment Phase II (RVA II)</p> <p><b>Description:</b> RVA II will provide enhanced situational awareness by providing the current remote camera feed to responding security vehicles and helicopters. RVA II will also increase backup power to current remote visual equipment, increase video archival storage, and implement auto-activation of outer and inner zone alarms. RVA II will also implement changes required to meet DoD CyberSecurity requirements.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete functional configuration and physical configuration audits</li> <li>• Complete development testing</li> <li>• Complete Critical Design Review and EMD Phase</li> <li>• Complete Milestone C</li> </ul> <p><b>FY 2020 Plans:</b></p>	2.522	6.521	0.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decrease due to development completion in FY19 with no further FY20 requirement.			
<b>Accomplishments/Planned Programs Subtotals</b>	115.626	90.459	93.993

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 Line Item M30MLG: <i>Minuteman III Modifications BP21</i>	23.976	41.228	26.402	-	26.402	32.120	20.982	81.260	41.132	Continuing	Continuing
• MPAF 01 Ballistic Missiles/ BSA 3...: <i>Minuteman III</i> <i>Replacement Eq-Ballistic BP22</i>	9.197	1.967	0.100	-	0.100	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>	0.355	0.000	0.000	-	0.000	0.000	0.000	0.000	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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672983 / MM Ground and Comm Equipment
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	21.043	Dec 2017	27.465	Oct 2018	24.212	Dec 2019	-		24.212	Continuing	Continuing	-
LGM-30G Airborne Launch Control System Replacement (ALCS-R) TMRR Contractor B	C/FPIF	Rockwell Collins : Cedar Rapids, IA	0.000	16.880	Dec 2017	20.720	Oct 2018	26.766	Dec 2019	-		26.766	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) SIL	MIPR	Aerospace : El Segundo, CA	0.000	0.300	May 2018	0.110	May 2019	0.100	May 2020	-		0.100	Continuing	Continuing	0.000
LGM-30G Automatic Switching Unit (ASU) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	4.231	Oct 2017	2.308	Dec 2018	-		-		-	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) EMD	C/TBD	TBD : TBD	0.000	-		-		5.018	Jan 2020	-		5.018	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit EMD	MIPR	Navy Crane : Crane, IN	0.000	1.521	Apr 2018	0.713	Apr 2019	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	51.011	Jul 2018	3.670	Oct 2018	1.000	Oct 2019	-		1.000	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD	C/CPFF	Sentry View Systems : Melbourne, FL	0.000	1.167	Jan 2018	4.165	Nov 2018	-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD Other Development	Various	Various : Various	0.000	0.004	Apr 2018	0.850	Jan 2019	-		-		-	Continuing	Continuing	0.000
<b>Subtotal</b>			0.000	96.157		60.001		57.096		-		57.096	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672983 / MM Ground and Comm Equipment
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<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
LGM-30G Airborne Launch Control System Replacement (ALCS-R) MITRE	MIPR	MITRE : Bedford, MA	0.000	1.528	Mar 2018	2.769	Oct 2018	4.724	Oct 2019	-		4.724	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Aerospace	MIPR	Aerospace Corporation : El Segundo, CA	0.000	2.874	Jan 2018	3.895	Oct 2018	4.011	Oct 2019	-		4.011	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Navy Crane	MIPR	Naval Surface War Ctr : Crane, IN	0.000	1.800	Nov 2017	1.450	Feb 2019	2.285	Oct 2019	-		2.285	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) NSCCA/PATE IV&V	C/CPFF	Northrop Grumman : Herndon, VA	0.000	-		0.515	May 2019	2.080	Oct 2019	-		2.080	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Design Support	Various	Various : Various	0.000	1.806	Oct 2017	4.156	Jan 2019	5.955	Oct 2019	-		5.955	Continuing	Continuing	0.000
LGM-30G Launch Control Center Break-In-Kit Test Support	Various	Various : Various	0.000	-		0.060	Sep 2019	-		-		-	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) Support	Various	Various : Various	0.000	-		0.494	Feb 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	8.008		13.339		19.055		-		19.055	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
LGM-30G Airborne Launch Control System	Various	Various : Various	0.000	0.448	Jan 2018	1.042	Jan 2019	1.546	Dec 2019	-		1.546	Continuing	Continuing	0.000

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672983 / MM Ground and Comm Equipment
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Replacement (ALCS-R) Testing															
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) Testing	C/TBD	Various : TBD	0.000	-		-		0.078	Jun 2020	-		0.078	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit Test Repair	PO	Naval Surface Warfare Ctr : Crane, IN	0.000	0.008	Sep 2018	0.233	Apr 2019	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade Test & Evaluation	Various	Various : Various	0.000	1.017	Jul 2018	0.779	Oct 2018	-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment II (RVA II) Test & Evaluation	Various	Various : Various	0.000	0.087	Oct 2018	-		-		-		-	Continuing	Continuing	0.000
<b>Subtotal</b>			0.000	1.560		2.054		1.624		-		1.624	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Integration Support Contract	C/FP	BAE : Layton, UT	0.000	4.967	Jan 2018	7.158	Oct 2018	7.383	Oct 2019	-		7.383	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) A&AS	C/FPIF	Peerless Technologies : Fairborn, OH	0.000	-		1.446	Oct 2018	2.214	Oct 2019	-		2.214	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) PMA	Various	Various : Various	0.000	0.900	Oct 2017	3.805	Jan 2019	5.343	Oct 2019	-		5.343	Continuing	Continuing	0.000

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672983 / MM Ground and Comm Equipment
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Automatic Switching Unit (ASU) PMA	Various	Various : Various	0.000	0.044	Oct 2017	0.050	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Automatic Switching Unit (ASU) A&AS	C/FP	BAE : Layton, UT	0.000	0.284	Oct 2017	0.300	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit PMA	Various	Various : Various	0.000	0.017	Jun 2018	0.043	Feb 2019	-		-		-	Continuing	Continuing	0.000
LGM-30G Launch Control Center Break-In-Kit A&AS	C/FP	BAE : Layton, UT	0.000	0.325	Mar 2018	0.314	Nov 2018	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade PMA	Various	Various : Various	0.000	0.030	Feb 2018	0.230	Jul 2019	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade A&AS	C/FP	BAE : Layton, UT	0.000	0.866	Jan 2018	0.707		-		-		-	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) A&AS	C/FP	BAE : Layton, UT	0.000	1.204	Feb 2018	-		0.807	Dec 2019	-		0.807	Continuing	Continuing	0.000
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) PMA	Various	Various : Various	0.000	-		-		0.471	Dec 2019	-		0.471	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) PMA	Various	Various : Various	0.000	0.347	Nov 2017	0.056		-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment Phase II (RVA II) A&AS	C/FP	BAE : Layton, UT	0.000	0.917	Jan 2018	0.956		-		-		-	Continuing	Continuing	0.000
<b>Subtotal</b>			0.000	9.901		15.065		16.218		-		16.218	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			0.000	115.626		90.459		93.993		-		93.993	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
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**Remarks**  
 In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672983 / MM Ground and Comm Equipment
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Air Launched Control System Replacement (ALCS-R)</i></b>	
ALCS-R Technology Maturation and Risk Reduction Phase	
ALCS-R PDR (Sep 2019)	
ALCS-R Development RFP Release Decision Point (Oct 2019)	
ALCS-R Milestone B (Nov 2020)	
ALCS-R Engineering and Manufacturing Development Phase	
ALCS-R CDR (May 2021)	
ALCS-R Milestone C (Nov 2022)	
ALCS-R Production and Deployment Phase	
ALCS-R IOC	
ASU Engineering and Manufacturing Development Phase	
ASU CDR (Jul 2018)	
ASU Milestone C (Mar 2019)	
ASU Production and Deployment Phase	
FRBP SLEP Milestone B ( Jan 2020)	
FRBP SLEP Engineering & Manufacturing Development Phase	
FRBP SLEP Milestone C (Aug 2022)	
FRBP SLEP Production & Deployment Phase	
FRBP SLEP RAA	
LCCB Engineering and Manufacturing Development Phase	

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
LCCB CDR (Mar 2018)	■																											
LCCB Milestone C (Feb 2019)							■																					
LCCB Production and Deployment Phase							■	■																				
LCCB RAA (Aug 2019)								■																				
LCCBU Engineering and Manufacturing Development Phase	■	■	■	■	■	■	■	■	■	■	■	■																
LCCBU CDR (Mar 2018)		■																										
LCCBU Milestone C (Jul 2019)								■																				
LCCBU Production and Deployment Phase								■	■	■	■	■																
LCCBU RAA (Jan 2021)															■													
RVA II Engineering and Manufacturing Development Phase I	■																											
RVA II PDR (Oct 2017)	■																											
RVA II Engineering and Manufacturing Development Phase II		■	■	■	■	■	■	■	■	■	■	■																
RVA II CDR (Feb 2019)							■																					
RVA II Milestone C (Sep 2019)								■																				
RVA II Production and Deployment Phase								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
RVA II IOC (Dec 2020)															■													
RVA II FOC (Dec 2023)																											■	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Air Launched Control System Replacement (ALCS-R)</i></b>				
ALCS-R Technology Maturation and Risk Reduction Phase	1	2018	1	2021
ALCS-R PDR (Sep 2019)	4	2019	4	2019
ALCS-R Development RFP Release Decision Point (Oct 2019)	1	2020	1	2020
ALCS-R Milestone B (Nov 2020)	1	2021	1	2021
ALCS-R Engineering and Manufacturing Development Phase	1	2021	1	2023
ALCS-R CDR (May 2021)	3	2021	3	2021
ALCS-R Milestone C (Nov 2022)	1	2023	1	2023
ALCS-R Production and Deployment Phase	1	2023	4	2024
ALCS-R IOC	1	2024	1	2024
ASU Engineering and Manufacturing Development Phase	1	2018	2	2019
ASU CDR (Jul 2018)	4	2018	4	2018
ASU Milestone C (Mar 2019)	2	2019	2	2019
ASU Production and Deployment Phase	3	2019	4	2024
FRBP SLEP Milestone B ( Jan 2020)	2	2020	3	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	2024
FRBP SLEP RAA	2	2024	2	2024
LCCB Engineering and Manufacturing Development Phase	1	2018	2	2019
LCCB CDR (Mar 2018)	2	2018	2	2018
LCCB Milestone C (Feb 2019)	2	2019	2	2019
LCCB Production and Deployment Phase	2	2019	4	2019

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672983 / <i>MM Ground and Comm Equipment</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LCCB RAA (Aug 2019)	4	2019	4	2019
LCCBU Engineering and Manufacturing Development Phase	1	2018	1	2020
LCCBU CDR (Mar 2018)	2	2018	2	2018
LCCBU Milestone C (Jul 2019)	4	2019	4	2019
LCCBU Production and Deployment Phase	4	2019	1	2021
LCCBU RAA (Jan 2021)	2	2021	2	2021
RVA II Engineering and Manufacturing Development Phase I	1	2018	1	2018
RVA II PDR (Oct 2017)	1	2018	1	2018
RVA II Engineering and Manufacturing Development Phase II	2	2018	4	2019
RVA II CDR (Feb 2019)	2	2019	2	2019
RVA II Milestone C (Sep 2019)	4	2019	4	2019
RVA II Production and Deployment Phase	2	2020	1	2024
RVA II IOC (Dec 2020)	1	2021	1	2021
RVA II FOC (Dec 2023)	1	2024	1	2024

**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.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>				<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
672984: <i>MM III Baseline Support</i>	0.000	57.929	36.871	14.816	0.000	14.816	11.084	12.940	13.176	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 newly developed or modified 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), LGM-30G Flight Test Telemetry and Termination System (FT3), LGM-30G Ground Test Upgrade (GTU), and LGM-30G Squadron Data Simulator (SDS). 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> LGM-30G Arm Disarm Switch Replacement (ADSR)	0.146	0.948	2.820
<p><b>Description:</b> 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 tradeoff curve between reliability/availability and cost.</p> <p>Reliability/availability are monitored by periodic testing to discover unforeseen issues. Because all existing A/D switches cannot 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete Milestone B</li> <li>• Award EMD contract</li> <li>• Initiate design development</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Conduct System Requirement Review/System Functional Review</li> </ul>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>• Complete Integrated Baseline Review</li> <li>• Complete Preliminary Design Review</li> <li>• Complete Critical Design Review</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p> <ul style="list-style-type: none"> <li>• Funding increase due to ramp-up of design activities in FY20.</li> </ul>				
<p><b>Title:</b> LGM-30G Flight Test Telemetry and Termination System (FT3)</p> <p><b>Description:</b> 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 current 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.</p> <p>The AODS, Mod 7 Instrumentation Wafer, and current 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) starting in FY22 based on current USSTRATCOM requirements.</p> <p>The OTLs are critical to validating the continued accuracy and reliability of the MM III ICBM Weapon System and 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 Commanders Council 319, Flight Termination Systems Commonality Standard, and RCC-324, Global Positioning and Inertial Measurements Range Safety Tracking Systems' Commonality Standard.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Conduct System of Systems Critical Design Reviews</li> <li>• Prepare for and conduct component level qualification testing</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Continue component level qualification testing</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreases in FY20 due to higher Air Force priorities.</p>		50.260	33.923	9.996
<b>Title:</b> LGM-30G Baseline Support		5.000	2.000	2.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Conduct studies of system performance.</li> <li>• Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities.</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Conduct studies of system performance.</li> <li>• Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>			
<p><b>Title:</b> LGM-30G Ground Test Upgrade (GTU)</p> <p><b>Description:</b> GTU will address parts obsolescence and an A4 drawer interface change through a design that replaces the Guided Missile Launcher Electronic Circuit (GMLEC) test sets. GTU supports Operational Force Development Evaluation testing by enabling operational checkout and test of LFs up to the point of a launch.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Program was cancelled in FY18</li> </ul> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>	0.125	0.000	0.000
<p><b>Title:</b> LGM-30G Squadron Data Simulator (SDS)</p> <p><b>Description:</b> Design and develop the SDS to replace the current test set. SDS will increase the Mean Time Between Failures (MTBF), improve user interface, and meet DoD Cyber Security requirements. Additionally, this modeling and simulation tool is used to replicate the message traffic for a selectable number of Launch Control Centers and Launch Facilities within an ICBM squadron.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Program was cancelled in FY18</li> </ul> <p><b>FY 2020 Plans:</b></p>	2.398	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	57.929	36.871	14.816

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</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	0.000	14.551	10.460	0.000	Continuing	Continuing
• MPAF 01 00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	5.200	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• MPAF 04 000999: <i>Replen Spares/Repair Parts BP25/26</i>	2.752	0.000	20.333	-	20.333	13.815	14.163	0.000	0.000	Continuing	Continuing

**Remarks**

**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 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
LGM-30G Arm Disarm Switch Replacement (ADSR)	C/CPFF	TBD : TBD	0.000	-		0.848	Aug 2019	1.964	Aug 2020	-		1.964	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) TMRR/EMD	C/CPIF	Boeing : Clearfield, UT	0.000	39.805	Sep 2018	27.333	Nov 2018	8.013	Nov 2019	-		8.013	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) MOTP	C/CPIF	Northrop Grumman : Clearfield, UT	0.000	3.798	Jan 2018	3.319	Aug 2019	0.998	Aug 2020	-		0.998	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) TMRR/EMD	C/CPFF	Lockheed Martin : Bethesda, MD	0.000	2.263	Sep 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	45.866		31.500		10.975		-		10.975	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
LGM-30G Arm Disarm Switch Replacement (ADSR) Support	TBD	TBD : TBD	0.000	-		-		0.290	Mar 2020	-		0.290	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) Support	C/Variou	BAE : Clearfield, UT	0.000	1.243	Oct 2017	1.021	Oct 2018	0.306	Oct 2019	-		0.306	Continuing	Continuing	-
LGM-30G Baseline Support	C/Variou	Various : TBD	0.000	5.000	Mar 2018	2.000	Mar 2019	2.000	Mar 2020	-		2.000	Continuing	Continuing	-
<b>Subtotal</b>			0.000	6.243		3.021		2.596		-		2.596	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672984 / MM III Baseline Support
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/Various	Northrop Grumman : Clearfield, UT	0.000	0.275	Jun 2018	0.410	Jun 2019	0.060	Jun 2020	-		0.060	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) Lead Developmental Test Organization	MIPR	AEDC/TST : AAFB, TN	0.000	0.408	Dec 2017	-		0.066	Dec 2019	-		0.066	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.683		0.410		0.126		-		0.126	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/FPIF	Peerless Tech Corp : Fairborn, OH	0.000	0.131	May 2018	0.100	Oct 2018	0.429	Oct 2019	-		0.429	Continuing	Continuing	-
LGM-30G Arm Disarm Switch Replacement (ADSR) PMA	Various	Various : Various	0.000	0.015	Feb 2019	-		0.137	Nov 2019	-		0.137	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) PMA	Various	Various : Various	0.000	3.000	Oct 2017	1.840	Oct 2018	0.553	Oct 2019	-		0.553	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) A&AS	C/FFP	BAE : Clearfield, UT	0.000	1.731	Oct 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Ground Test Upgrade (GTU) A&AS	C/FFP	BAE : Clearfield, UT	0.000	0.125	Oct 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) A&AS	C/FFP	BAE : Clearfield, UT	0.000	0.135	Nov 2017	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	5.137		1.940		1.119		-		1.119	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	57.929	36.871	14.816	-	14.816	Continuing	Continuing	N/A

**Remarks**  
In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>MM III Baseline Support</b>																												
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 (Nov 2021)																												
FT3 Milestone C (Dec 2021)																												
FT3 Production and Deployment Phase																												
FT3 RAA (Feb 2022)																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672984 / <i>MM III Baseline Support</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>MM III Baseline Support</i></b>				
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	2018	2	2023
FT3 CDR (Dec 2018)	1	2019	1	2019
FT3 PRR (Nov 2021)	1	2021	1	2021
FT3 Milestone C (Dec 2021)	1	2022	1	2022
FT3 Production and Deployment Phase	1	2022	2	2024
FT3 RAA (Feb 2022)	2	2022	2	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>				<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
672985: <i>MM Support Equip</i>	0.000	30.653	12.863	6.859	0.000	6.859	0.000	0.000	3.201	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**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 G6B4 Build Equipment Replacement (G6B4 BER), LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU), LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER), LGM-30G Payload Transporter Replacement (PTR), LGM-30G Simulated Electronic Launch Minuteman Replacement (SELM-R), and LGM-30G Transporter Erector Replacement Program (TERP).

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> LGM-30G G6B4 Build Equipment Replacement (G6B4 BER)	1.007	1.515	0.954
<p><b>Description:</b> The G6B4 BER program 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.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Prepare and conduct MS B</li> <li>• Begin Engineering and Manufacturing Development (EMD) Phase</li> <li>• Prepare and conduct Critical Design Review #1</li> <li>• Prepare and conduct Test Readiness Review #1</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Prepare and conduct Critical Design Review #2</li> <li>• Prepare and conduct Functional and Physical Configuration Audit #1</li> <li>• Prepare and conduct Production Readiness Review #1</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Program decrease due to completion of CDR Event #2				
<p><b>Title:</b> LGM-30G Pendulous Integrated Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER)</p> <p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Prepare and conduct MS B</li> <li>• Begin Engineering and Manufacturing Development (EMD) Phase</li> <li>• Prepare and conduct Critical Design Review #1</li> <li>• Prepare and conduct Test Readiness Review #1</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Prepare and conduct Critical Design Review #2</li> <li>• Prepare and conduct Functional and Physical Configuration Audit #1</li> <li>• Prepare and conduct Production Readiness Review #1</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program decrease due to completion of CDR Event #2</p>		1.425	5.250	3.164
<p><b>Title:</b> LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT)</p> <p><b>Description:</b> 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/unsupported 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Prepare for Test Readiness Review</li> <li>• Prepare and conduct Critical Design Review</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Prepare and conduct MS C</li> <li>• Conduct Test Readiness Review</li> </ul>		2.215	2.800	2.741

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>• Prepare and conduct Functional and Physical Configuration Audit</li> <li>• Begin Production and Deployment phase</li> </ul> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decreased due to ramp down of EMD</p>				
<p><b><i>Title:</i></b> LGM-30G Transporter Erector Replacement Program (TERP)</p> <p><b><i>Description:</i></b> 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><b><i>FY 2019 Plans:</i></b></p> <ul style="list-style-type: none"> <li>• Complete Functional Configuration Audit</li> <li>• Complete Operational Test</li> <li>• Complete Physical Configuration Audit</li> <li>• Conduct Milestone C</li> <li>• Award production option</li> </ul> <p><b><i>FY 2020 Plans:</i></b></p> <ul style="list-style-type: none"> <li>• Program in production</li> </ul> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b></p> <ul style="list-style-type: none"> <li>• Decrease of funds due to completion of EMD and production start FY19</li> </ul>		17.674	1.133	0.000
<p><b><i>Title:</i></b> LGM-30G Payload Transporter Replacement (PTR)</p> <p><b><i>Description:</i></b> Designs and develops the capabilities necessary to replace the current Payload Transporter tractor and trailer, mitigating emerging threat technologies and methods. The PTR emplaces, 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.</p> <p><b><i>FY 2019 Plans:</i></b></p> <ul style="list-style-type: none"> <li>•Conduct delta qualification of tractor</li> <li>•Conduct milestone C</li> </ul> <p><b><i>FY 2020 Plans:</i></b></p>		3.691	1.465	0.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>Program in production</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p> <ul style="list-style-type: none"> <li>Decrease of funds due to completion of EMD and production start FY19</li> </ul>			
<p><b>Title:</b> LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU)</p> <p><b>Description:</b> 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 non-classified 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.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>Complete Milestone C</li> <li>Begin Production and Deployment Phase</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>Program in production</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease of funds due to completion of EMD and production start in FY19.</p>	4.641	0.700	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	30.653	12.863	6.859

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 Line Item M30MLG: <i>MM III Modifications BP21</i>	0.000	0.000	0.859	-	0.859	0.000	0.000	0.000	0.000	Continuing	Continuing
• MPAF 01 Line Item 00099L: <i>Missile Replacement</i> <i>Eq-Ballistic BP22</i>	78.094	8.960	55.683	-	55.683	12.645	14.050	14.135	4.870	Continuing	Continuing
• MPAF 04 Line Item 000999: <i>Replen Spares/</i> <i>Repair Parts BP25/26</i>	0.029	0.000	0.410	-	0.410	0.000	0.000	0.000	0.000	Continuing	Continuing

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>
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**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672985 / MM Support Equip
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 G6B4 Build Equipment Replacement (G6B4 BER)	SS/FPIF	Boeing : Layton, UT	0.000	1.002	May 2018	1.490	May 2019	0.747	Nov 2019	-		0.747	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) EMD	PO	309th SMXG : Hill AFB, UT	0.000	1.682	Dec 2017	2.500	Dec 2018	2.265	Dec 2019	-		2.265	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) EMD	SS/FPIF	Boeing : Layton, UT	0.000	1.349	May 2018	4.944	May 2019	2.672	Nov 2019	-		2.672	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) EMD	C/FPIF	DRS Environmental Systems : Cincinnati, OH	0.000	16.744	Dec 2017	0.473	Dec 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	2.417	Oct 2017	1.050	May 2019	-		-		-	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) Software Development	SS/CPIF	Boeing : Layton, UT	0.000	4.631	Apr 2018	0.630		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	27.825		11.087		5.684		-		5.684	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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) Organic Support	PO	OOALC : Hill AFB, UT	0.000	0.104	Nov 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Performance Assessment Data	Various	Various : Various	0.000	-		0.070	Mar 2019	-		-		-	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672985 / MM Support Equip
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Communications Equipment Interface Unit (PADS CEIU) Support															
<b>Subtotal</b>			0.000	0.104		0.070		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Payload Transporter Replacement (PTR) Delta Qualification Testing	MIPR	586 FLTS : WSMR, NM	0.000	-		0.300	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) Qualification Testing	MIPR	AEDS/TSTS : Arnold AFB, TN	0.000	0.234	Dec 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) Delta Qualification Testing	MIPR	586 FLTS : WSMR, NM	0.000	-		0.067	May 2019	-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) Qualification Testing	MIPR	AEDS/TSTS : Arnold AFB, TN	0.000	0.086	Dec 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER)	TBD	TBD : TBD	0.000	-		-		0.330	Nov 2019	-		0.330	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.320		0.367		0.330		-		0.330	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672985 / MM Support Equip
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 G6B4 Build Equipment Replacement (G6B4 BER)PMA	Various	Various : Various	0.000	0.005	May 2018	0.025	May 2019	0.207	May 2020	-		0.207	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) PMA	Various	Various : Various	0.000	0.038	Nov 2017	0.032	Apr 2019	-		-		-	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) PMA	Various	Various : Various	0.000	0.243	Jan 2018	0.300	Jan 2019	0.291	Jan 2020	-		0.291	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) A&AS	C/FFP	BAE : Clearfield, UT	0.000	0.290	Dec 2017	-		0.185	Dec 2019	-		0.185	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) PMA	Various	Various : Various	0.000	0.076	May 2018	0.306	May 2019	0.162	May 2020	-		0.162	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) PMA	Various	Various : Various	0.000	0.010	Apr 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) PMA	Various	Various : Various	0.000	0.206	Nov 2017	0.115	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) A&AS Support	C/FFP	BAE Systems : Clearfield	0.000	0.834	Dec 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) A&AS Support	C/FFP	BAE Systems : Clearfield, UT	0.000	0.702	Oct 2017	0.561	Oct 2018	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	2.404		1.339		0.845		-		0.845	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	30.653	12.863	6.859	-	6.859	Continuing	Continuing	N/A

**Remarks**  
 In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672985 / MM Support Equip
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>MM Support Equipment</b>																												
G6B4 BER TMRR Phase																												
G6B4 BER PDR (Jul 2018)																												
G6B4 BER Milestone B (Jun 2019)																												
G6B4 BER Engineering and Manufacturing Development Phase																												
G6B4 BER CDR #1 (Jun 2019)																												
G6B4 BER CDR #2 (Sep 2020)																												
G6B4 BER Milestone C (Mar 2021)																												
G6B4 BER Production and Deployment Phase																												
G6B4 BER RAA (Jun 2022)																												
CMPT Milestone B (Oct 2017)																												
CMPT Engineering and Manufacturing Development Phase																												
CMPT PDR (Feb 2018)																												
CMPT CDR (Dec 2018)																												
CMPT Milestone C (Jun 2020)																												
CMPT Production and Deployment Phase																												
CMPT RAA (Sep 2020)																												
PTR Engineering and Manufacturing Development Phase																												
PTR Milestone C (Mar 2019)																												
PTR Production and Deployment Phase																												
TERP Engineering and Manufacturing Development Phase																												

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672985 / MM Support Equip
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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 Milestone C (Apr 2019)																												
TERP Production and Deployment Phase																												
TERP RAA (Apr 2022)																												
PADS CEIU Technology Maturation and Risk Reduction (TMRR) Phase																												
PADS CEIU Milestone B (Dec 2017)																												
PADS CEIU Engineering and Manufacturing Development Phase																												
PADS CEIU CDR (Nov 2017)																												
PADS CEIU Milestone C (Mar 2019)																												
PADS CEIU Production and Deployment Phase																												
PADS CEIU RAA (Jul 2020)																												
PIGA BER TMRR Phase																												
PIGA BER PDR (Jul 2018)																												
PIGA BER Milestone B (Jun 2019)																												
PIGA BER Engineering and Manufacturing Development Phase																												
PIGA BER CDR #1 (Jun 2019)																												
PIGA BER CDR #2 (Sep 2020)																												
PIGA BER Milestone C (Mar 2021)																												
PIGA BER Production and Deployment Phase																												
PIGA BER RAA (Jun 2022)																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>MM Support Equipment</b>				
G6B4 BER TMRR Phase	1	2018	3	2019
G6B4 BER PDR (Jul 2018)	4	2018	4	2018
G6B4 BER Milestone B (Jun 2019)	3	2019	3	2019
G6B4 BER Engineering and Manufacturing Development Phase	3	2019	2	2021
G6B4 BER CDR #1 (Jun 2019)	3	2019	3	2019
G6B4 BER CDR #2 (Sep 2020)	4	2020	4	2020
G6B4 BER Milestone C (Mar 2021)	2	2021	2	2021
G6B4 BER Production and Deployment Phase	2	2021	2	2022
G6B4 BER RAA (Jun 2022)	3	2022	3	2022
CMPT Milestone B (Oct 2017)	1	2018	1	2018
CMPT Engineering and Manufacturing Development Phase	1	2018	3	2020
CMPT PDR (Feb 2018)	2	2018	2	2018
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 (Sep 2020)	4	2020	4	2020
PTR Engineering and Manufacturing Development Phase	1	2018	3	2019
PTR Milestone C (Mar 2019)	2	2019	2	2019
PTR Production and Deployment Phase	2	2019	4	2024
TERP Engineering and Manufacturing Development Phase	1	2018	3	2019
TERP Milestone C (Apr 2019)	3	2019	3	2019
TERP Production and Deployment Phase	3	2019	3	2022

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672985 / <i>MM Support Equip</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
TERP RAA (Apr 2022)	3	2022	3	2022
PADS CEIU Technology Maturation and Risk Reduction (TMRR) Phase	1	2018	1	2018
PADS CEIU Milestone B (Dec 2017)	1	2018	1	2018
PADS CEIU Engineering and Manufacturing Development Phase	1	2018	2	2019
PADS CEIU CDR (Nov 2017)	1	2018	1	2018
PADS CEIU Milestone C (Mar 2019)	2	2019	2	2019
PADS CEIU Production and Deployment Phase	2	2019	4	2020
PADS CEIU RAA (Jul 2020)	4	2020	4	2020
PIGA BER TMRR Phase	1	2018	3	2019
PIGA BER PDR (Jul 2018)	4	2018	4	2018
PIGA BER Milestone B (Jun 2019)	3	2019	3	2019
PIGA BER Engineering and Manufacturing Development Phase	3	2019	2	2021
PIGA BER CDR #1 (Jun 2019)	3	2019	3	2019
PIGA BER CDR #2 (Sep 2020)	4	2020	4	2020
PIGA BER Milestone C (Mar 2021)	2	2021	2	2021
PIGA BER Production and Deployment Phase	2	2021	2	2022
PIGA BER RAA (Jun 2022)	3	2022	3	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>				<b>Project (Number/Name)</b> 672986 / <i>MM Crypto Mods</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
672986: <i>MM Crypto Mods</i>	0.000	0.000	14.540	13.293	0.000	13.293	4.452	3.750	3.124	0.000	0.000	39.159
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> LGM-30G ICBM Cryptography Upgrade II (ICU II)	0.000	14.540	13.293
<b>Description:</b> ICU II completes design and development, implements KS-60 remote key/code change, irreversible transformation capabilities, and prevents continuous signal lockout.			
<b>FY 2019 Plans:</b>			
• Develop Depot Support Equipment (DSE)			
• Perform Independent Validation and Verification (IV&V)			
<b>FY 2020 Plans:</b>			
• Continue DSE development			
• Continue IV&V			
• Develop Guided Missile Launcher Electronic Circuit (GMLEC) interface modification			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>			
Funding decreased due to ramp down of support equipment and GMLEC development activities.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	14.540	13.293

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• MPAF 03 Line Item M30MLG: <i>MM III Modifications BP21</i>	30.483	69.060	23.570	-	23.570	20.494	54.192	0.000	0.000	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672986 / <i>MM Crypto Mods</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 04 Line Item 000999: <i>Replen Spares/ Repair Parts BP25/26</i>	-	4.190	-	-	-	1.936	3.081	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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672986 / MM Crypto Mods
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	0.000	Dec 2017	2.700	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II EMD Extension	C/CPAF	Northrop Grumman : Clearfield, UT	0.000	0.000	Jan 2018	0.300	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Support Equipment development	C/CPFF	Northrop Grumman : Clearfield, UT	0.000	0.000	Jun 2018	8.840	Oct 2018	10.408	Oct 2019	-		10.408	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Support GMLEC	C/CPAF	Northrop Grumman : Clearfield, UT	0.000	-		-		0.000	Oct 2019	-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.000		11.840		10.408		-		10.408	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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)	C/CPIF	Northrop Grumman : Clearfield, UT	0.000	0.000	Mar 2018	1.418	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Nuclear TopVue	C/FFP	Compusearch Software Sys : Dulles, VA	0.000	0.000	Nov 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.000		1.418		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	TBD : TBD	0.000	0.000	Mar 2018	-		1.183	Dec 2019	-		1.183	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / Minuteman Squadrons	<b>Project (Number/Name)</b> 672986 / MM Crypto Mods
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Hardware, Software, and components testing															
LGM-30G ICBM Cryptography Upgrade II LDTO	PO	AEDC/TSTS : Arnold AFB, TN	0.000	0.000	Feb 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.000		-		1.183		-		1.183	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 PMA	Various	Various : Various	0.000	0.000	Nov 2017	0.500	Dec 2018	0.924	Jan 2020	-		0.924	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II A&AS	C/FFP	BAE Systems : Clearfield, UT	0.000	0.000	Jan 2018	0.782	Nov 2018	0.778	Oct 2019	-		0.778	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.000		1.282		1.702		-		1.702	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	0.000	14.540	13.293	-	13.293	Continuing	Continuing	N/A

**Remarks**  
 In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672986 / <i>MM Crypto Mods</i>
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>MM Crypto Mods</i></b>	
ICU II Engineering and Manufacturing Development Phase	
ICU II Engineering and Manufacturing Development Phase (GMLEC)	
ICU II Milestone C (Aug 2018)	
ICU II Production and Deployment Phase	
ICU II Initial Operational Capability (Jun 2021)	
ICU II Full Operational Capability (Mar 2024)	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101213F / <i>Minuteman Squadrons</i>	<b>Project (Number/Name)</b> 672986 / <i>MM Crypto Mods</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>MM Crypto Mods</i></b>				
ICU II Engineering and Manufacturing Development Phase	1	2018	1	2020
ICU II Engineering and Manufacturing Development Phase (GMLEC)	1	2020	2	2024
ICU II Milestone C (Aug 2018)	4	2018	4	2018
ICU II Production and Deployment Phase	1	2019	2	2024
ICU II Initial Operational Capability (Jun 2021)	3	2021	3	2021
ICU II Full Operational Capability (Mar 2024)	2	2024	2	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	24.898	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	330.008	354.906
675059: <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>	0.000	24.898	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	330.008	354.906

**Program MDAP/MAIS Code:** 481

**A. Mission Description and Budget Item Justification**

In FY 2018, PE 0101313F, Strategic War Planning System - USSTRATCOM, Project 675059, will be completed.

The Integrated Strategic Planning and Analysis Network (ISPAN) (formerly known as SWPS) is a USSTRATCOM system that must be capable of both deliberate and adaptive planning employing the full spectrum of kinetic and non-kinetic weapons. The planning system will continue to evolve as weapon systems are matured, new systems are developed, and the threat changes, particularly in the area of worldwide proliferation of Weapons of Mass Destruction (WMD).

ISPAN Increment 4 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. Increment 4 will fulfill MPAS requirements by reducing Crisis Action Planning and Time Sensitive Planning timelines, integrating nuclear and conventional kinetic weapon capabilities with non-kinetic effects, providing the capability to integrate planning and analysis capabilities of future Global Strike weapons, updating the MPAS system to provide the ability to train users in significantly less time, and leveraging new technologies to lower sustainment costs. ISPAN Inc 4 is an evolution of the ISPAN Block 1 baseline system using proven technologies.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	25.736	0.000	0.000	0.000	0.000
Current President's Budget	24.898	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

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>				<b>Project (Number/Name)</b> 675059 / <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675059: <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>	0.000	24.898	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	330.008	354.906
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Integrated Strategic Planning and Analysis Network (ISPAN) (formerly known as SWPS) is a USSTRATCOM system that must be capable of both deliberate and adaptive planning employing the full spectrum of kinetic and non-kinetic weapons. The planning system will continue to evolve as weapon systems are matured, new systems are developed, and the threat changes, particularly in the area of worldwide proliferation of Weapons of Mass Destruction (WMD).

ISPAN Increment 4 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. Increment 4 will fulfill MPAS requirements by reducing Crisis Action Planning and Time Sensitive Planning timelines, integrating nuclear and conventional kinetic weapon capabilities with non-kinetic effects, providing the capability to integrate planning and analysis capabilities of future Global Strike weapons, updating the MPAS system to provide the ability to train users in significantly less time, and leveraging new technologies to lower sustainment costs. ISPAN Inc 4 is an evolution of the ISPAN Block 1 baseline system using proven technologies.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ISPAN 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> ISPAN Increment 4	24.898	0.000	0.000
<b>Description:</b> ISPAN Increment 4 (aka MPAS Modernization) will reduce Crisis Action Planning and Time Sensitive Planning timelines, integrates nuclear and conventional kinetic weapon capabilities with non-kinetic effects, and provides the capability to integrate planning and analysis capabilities of future Global Strike weapons. ISPAN Inc 4 is an evolution of the Block 1 baseline system using proven technologies.			
<b>FY 2019 Plans:</b> -N/A			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>	<b>Project (Number/Name)</b> 675059 / <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
-N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	24.898	0.000	0.000

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• OPAF 03 Line Item 833560: <i>Integrated Strategic Planning and Analysis Network</i>	9.187	7.769	9.901	-	9.901	9.820	9.491	9.660	9.833	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

ISPAN develops and modernizes strategic planning tools for the combatant commanders using an evolutionary acquisition strategy with development contracts that are negotiated and awarded in a competitive environment.

The program development is accomplished via Indefinite Delivery/Indefinite Quantity (ID/IQ) contracts. Other efforts such as Program Management Administration are accomplished via Fixed Price (FP) contracts. Activities are also accomplished via Military Interdepartmental Purchase Requests (MIPR).

Air Force Life Cycle Management Center at Hanscom AFB (AFLCMC/HB) and the 55 CONS office at Offutt AFB are contracting authorities for ISPAN and provide Contracts, Legal, and Comptroller Support.

Air Force Program Executive Officer (PEO) for Battle Management (AFPEO/BM) is the PEO. The Secretary of the Air Force (SECAF) was delegated as the Milestone Decision Authority (MDA) 30 Nov 2017 (USA003782-17).

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>	<b>Project (Number/Name)</b> 675059 / <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
ISPAN Increment 2	C/CPIF	Various : Various, NV	0.000	-		-		-		-		-	0.000	0.000	114.006
ISPAN Inc 4 Pre-B Risk Reduction	C/CPIF	Various : Various, NV	0.000	-		-		-		-		-	0.000	0.000	12.548
ISPAN Inc 4 Spiral 1 Dev	C/CPIF	Various : Various, NV	0.000	-		-		-		-		-	0.000	0.000	26.363
ISPAN Inc 4 Spiral 2 Dev	C/CPIF	Various : Various, NV	0.000	-		-		-		-		-	0.000	0.000	26.642
ISPAN Inc 4 Spiral 3 Dev	C/CPIF	Various : Various, NV	0.000	-		-		-		-		-	0.000	0.000	31.516
ISPAN Inc 4 Post IOC Enhancements	C/CPIF	Various : Various, NV	0.000	19.493	Jun 2018	-		-		-		-	0.000	19.493	20.257
<b>Subtotal</b>			0.000	19.493		-		-		-		-	0.000	19.493	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
ISPAN Responsible Test Organization	C/CPIF	RTO : Bellevue, NE	0.000	0.210	Oct 2017	-		-		-		-	0.000	0.210	2.322
ISPAN Certification and Accreditation	MIPR	JTIC : Ft Hichuaha, AZ	0.000	0.075	Jan 2018	-		-		-		-	0.000	0.075	1.001
<b>Subtotal</b>			0.000	0.285		-		-		-		-	0.000	0.285	N/A

**Remarks**  
 - Responsible Test Organization is funded at the beginning of the each FY for testing performed during the FY  
 - Certification and accreditation is accomplished by Joint Test Interoperability Center (JTIC) and is funded at the beginning of each FY interoperability certification and accreditation performed during the FY



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>	<b>Project (Number/Name)</b> 675059 / <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>ISPAN Inc 4</b>																												
ISPAN Inc 4 (MPAS) Spiral 3 Development Testing																												
ISPAN Inc 4 (MPAS) Post IOC Enhancements																												
ISPAN Inc 4 (MPAS) FDD (Jun 2018)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101313F / <i>Integrated Strategic Planning and Analysis Network (ISPAN) - USSTRATCOM</i>	<b>Project (Number/Name)</b> 675059 / <i>Integrated Strategic Planning and Analysis Network (ISPAN)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>ISPAN Inc 4</i></b>				
ISPAN Inc 4 (MPAS) Spiral 3 Development Testing	1	2018	3	2018
ISPAN Inc 4 (MPAS) Post IOC Enhancements	1	2018	4	2018
ISPAN Inc 4 (MPAS) FDD (Jun 2018)	3	2018	3	2018

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	12.868	18.442	18.177	0.000	18.177	27.284	15.453	2.502	2.547	Continuing	Continuing
671820: <i>Strategic Automated Command and Control System</i>	-	12.868	18.442	18.177	0.000	18.177	27.284	15.453	2.502	2.547	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 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	6.272	10.442	18.177	0.000	18.177
Current President's Budget	12.868	18.442	18.177	0.000	18.177
Total Adjustments	6.596	8.000	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	7.000	8.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.404	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY18 Congressional Add (\$7.0M) for NC3 Architecture Development.

FY18 SBIR reduction (-\$0.404M)

FY19 Congressional Add (\$8.0M) for NC3 Architecture Development.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> SACCS Replacement	12.868	18.442	18.177
<b>Description:</b> Design and develop replacement Strategic Automated Command Control System (SACCS). Replaces all SACCS network components with the Navy Automated Message Store and Forward (NOVA) System. Removing the Message Processing Server at Offutt AFB, NE. New equipment mitigates cybersecurity issues, 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).			
<b>FY 2019 Plans:</b>			
- Continue software development of the core message processor, the HAC/RMPE adapter, and the end user terminal software			
- Continue EMD system design up to Critical Design Review (CDR) (ensure critical supportability aspects including materiel availability, reducing the logistics footprint, incorporating cybersecurity and program protection measures in the design)			
- Finalize system/subsystem specifications, interface control documents, software requirements specifications and drawing package			
- Complete PDR			
- Develop RFP for Missile Procedure Training contractors			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101316F / <i>Worldwide Joint Strategic Communications</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
- Begin missile procedure trainer development			
<b><i>FY 2020 Plans:</i></b>			
- Continue software development of the core message processor, the HAC/RMPE adapter, and the end user terminal software			
- Continue EMD system design up to Critical Design Review (CDR) (ensure critical supportability aspects including materiel availability, reducing the logistics footprint, incorporating cybersecurity and program protection measures in the design)			
- Finalize system/subsystem specifications, interface control documents, software requirements specifications and drawing package			
- Begin developmental testing			
- Complete CDR			
- Begin missile procedure trainer development			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b>			
N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	12.868	18.442	18.177

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 PE 0101316F: <i>Strategic Command and Control (833140)</i>	5.938	2.979	0.300	-	0.300	3.349	1.525	0.258	0.263	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**  
Programmed funds continue to leverage technology development and architecture analysis conducted as part of MS B activities. Development activities transition to the 309 SMXG as the organic design agent.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	<b>Project (Number/Name)</b> 671820 / <i>Strategic Automated Command and Control System</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
SACCS-R TMRR	SS/CPFF	Northrop Grumman : Layton, UT	-	2.555	Apr 2018	2.714	Oct 2018	-		-		-	Continuing	Continuing	-
SACCS-R TMRR Organic	PO	OO-ALC : Hill AFB, UT	-	1.111	Jun 2018	1.706	Oct 2018	-		-		-	Continuing	Continuing	-
SACCS-R EMD Organic	PO	OO-ALC : Hill AFB, UT	-	-		1.067	Jun 2019	5.956	Oct 2019	-		5.956	Continuing	Continuing	-
SACCS-R EMD	SS/CPFF	Northrop Grumman : Layton, UT	-	-		2.332	Jun 2019	5.826	Oct 2019	-		5.826	Continuing	Continuing	-
<b>Subtotal</b>			-	3.666		7.819		11.782		-		11.782	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
SACCS-R Engineering Development	Various	Various : Various	-	0.921	May 2018	0.840	Oct 2018	1.741	Dec 2019	-		1.741	Continuing	Continuing	-
NC3 Architecture Development	Various	Various : Various	-	6.842	Oct 2018	8.000	Feb 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	7.763		8.840		1.741		-		1.741	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
SACCS-R Development Test & Evaluation	Various	Various : Various	-	0.409	Aug 2018	0.500	Jan 2019	2.099	Nov 2019	-		2.099	Continuing	Continuing	-
<b>Subtotal</b>			-	0.409		0.500		2.099		-		2.099	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	<b>Project (Number/Name)</b> 671820 / <i>Strategic Automated Command and Control System</i>
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
SACCS-R Program Management Administration	Various	Various : Various	-	0.206	Dec 2017	0.957	Nov 2018	1.998	Nov 2019	-		1.998	Continuing	Continuing	-
SACCS-R Integration Support	C/FFP	BAE Systems, Inc. : Hill AFB, UT	-	0.824	Feb 2018	0.326	Oct 2018	0.557	Nov 2019	-		0.557	Continuing	Continuing	-
<b>Subtotal</b>			-	1.030		1.283		2.555		-		2.555	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	12.868	18.442	18.177	-	18.177	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101316F / <i>Worldwide Joint Strategic Communications</i>	<b>Project (Number/Name)</b> 671820 / <i>Strategic Automated Command and Control System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Strategic Automated Command and Control System</i></b>				
SACCS-R Technology Maturation/Risk Reduction	1	2018	3	2019
SACCS-R PDR (May 2019)	3	2019	3	2019
SACCS-R Milestone B (Jun 2019)	3	2019	3	2019
SACCS-R Engineering and Manufacturing Development	4	2019	4	2022
SACCS-R CDR (Jun 2020)	3	2020	3	2020
SACCS-R Milestone C (Jun 2022)	3	2022	3	2022
SACCS-R Production and Deployment	3	2022	4	2023
SACCS-R Full Operational Capability (FOC)	4	2023	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	10.757	22.833	24.261	0.000	24.261	25.807	26.380	23.540	22.928	0.000	156.506
675029: <i>ISPAN Increment 5</i>	0.000	10.757	22.833	24.261	0.000	24.261	25.807	26.380	23.540	22.928	0.000	156.506
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 522

**A. Mission Description and Budget Item Justification**

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. Increment 5 will fulfill MPAS requirements of Resiliency and Enhanced Consequences Analysis. Increment 5 is an evolution of the ISPAN Increment 4 baseline system using proven technologies. MPAS Increment 5 will utilize AFLCMC/HBC software factory resources to enable developers to build and integrate software at the Top Secret level as part of the agile software development effort.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NPES 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.

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.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>				
<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	
Previous President's Budget	11.032	22.833	26.804	0.000	26.804	
Current President's Budget	10.757	22.833	24.261	0.000	24.261	
Total Adjustments	-0.275	0.000	-2.543	0.000	-2.543	
• 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	-0.275	0.000				
• Other Adjustments	0.000	0.000	-2.543	0.000	-2.543	
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>				<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> ISPAN Increment 5				10.757	22.833	24.261
<b>Description:</b> 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.						
<b>FY 2019 Plans:</b> - Funds will be used for Engineering and Manufacturing Development (EMD) of hardware and software architecture for Mission Planning and Analysis System (MPAS) Increment 5 Modernization.						
<b>FY 2020 Plans:</b> - Funds will be used for EMD activities to develop the hardware and software architecture for MPAS Increment 5 modernization.						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to program acceleration.						
<b>Accomplishments/Planned Programs Subtotals</b>				10.757	22.833	24.261
<b>D. Other Program Funding Summary (\$ in Millions)</b>						
N/A						
<b>Remarks</b> Procurement funds (3080) required starting in FY24.						

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>	
<b>E. Acquisition Strategy</b> 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). MPAS Increment 5 will utilize AFLCMC/HBC software factory resources to enable developers to build and integrate software at the Top Secret level as part of the agile software development effort.  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.		
<b>F. Performance Metrics</b> 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>	<b>Project (Number/Name)</b> 675029 / <i>ISPAN Increment 5</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Pre-Milestone B Risk Reduction	Various	Offutt AFB : Offutt AFB, NE	0.000	7.267	Jan 2018	-		-		-		-	0.000	7.267	-
ISPAN Inc 5 EMD	Various	Offutt AFB : Offutt AFB, NE	0.000	-		15.100	Jan 2019	16.297	Jan 2020	-		16.297	0.000	31.397	-
<b>Subtotal</b>			0.000	7.267		15.100		16.297		-		16.297	0.000	38.664	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Technical DMS	C/CPAF	Not specified. : TBD	0.000	1.150	Nov 2017	4.333	Nov 2018	4.463	Nov 2019	-		4.463	0.000	9.946	-
<b>Subtotal</b>			0.000	1.150		4.333		4.463		-		4.463	0.000	9.946	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Item	Various	Not specified. : TBD	0.000	-		0.319	Nov 2018	0.329	Nov 2019	-		0.329	0.000	0.648	-
<b>Subtotal</b>			0.000	-		0.319		0.329		-		0.329	0.000	0.648	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 and Operations	Various	Offutt AFB : Offutt AFB, NE	0.000	0.900	Nov 2017	1.528	Nov 2018	1.573	Nov 2019	-		1.573	0.000	4.001	-
Program Management Administration	Various	Offutt AFB : Offutt AFB, NE	0.000	1.440	Nov 2017	1.553	Nov 2018	1.599	Nov 2019	-		1.599	0.000	4.592	-
<b>Subtotal</b>			0.000	2.340		3.081		3.172		-		3.172	0.000	8.593	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>									<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>				<b>Project (Number/Name)</b> 675029 / <i>ISPAN Increment 5</i>			
	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	0.000	10.757	22.833	24.261	-	24.261	0.000	57.851	N/A		

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>	<b>Project (Number/Name)</b> 675029 / <i>ISPAN Increment 5</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>ISPAN Increment 5</b>	
ISPAN Inc 5 (MPAS) Pre-B Risk Reduction Activities	
Program Initiation in Progress Review (IPR)	
Progress Check IPR	
Sustainment Decision IPR	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101324F / <i>Integrated Strategic Planning &amp; Analysis Network</i>	<b>Project (Number/Name)</b> 675029 / <i>ISPAN Increment 5</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>ISPAN Increment 5</b>				
ISPAN Inc 5 (MPAS) Pre-B Risk Reduction Activities	1	2018	1	2019
Program Initiation in Progress Review (IPR)	1	2019	2	2022
Progress Check IPR	1	2022	1	2024
Sustainment Decision IPR	1	2024	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / <i>ICBM Reentry Vehicles</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	14.167	75.571	0.000	75.571	112.959	74.868	81.905	101.000	Continuing	Continuing
674920: <i>IW1/Mk21A</i>	-	0.000	14.167	75.571	0.000	75.571	112.959	74.868	81.905	101.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**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, aero shell 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 includes 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 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / <i>ICBM Reentry Vehicles</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	18.412	75.571	0.000	75.571
Current President's Budget	0.000	14.167	75.571	0.000	75.571
Total Adjustments	0.000	-4.245	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-4.245			
• 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**

FY 2019 funds reflect a congressional reduction of \$4.245 million for "funding excess to need."

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Title:</b> Mk21A Technology Maturation Risk Reduction</p> <p><b>Description:</b> 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</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>• Complete Milestone A</li> <li>• Award one TMRR contract</li> <li>• Initiate reentry vehicle preliminary design development</li> <li>• Develop ground and flight test plans for prototypes</li> <li>• Begin development of prototype test vehicles</li> <li>• Begin trade studies</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Continue to mature reentry vehicle preliminary design</li> </ul>	0.000	14.167	75.571

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / ICBM Reentry Vehicles
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<ul style="list-style-type: none"> <li>• Continue to develop ground and flight test plans for prototypes</li> <li>• Continue development of prototype test vehicle</li> <li>• Complete trade studies</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>                      Increased cost due to vendor advancing from design work into prototyping efforts. The program will also be conducting a System Requirements Review (SRR), System Functional Review (SFR), preparing for a Preliminary Design Review (PDR), beginning nuclear certification, and starting initial flight test support in FY20.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	14.167	75.571

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE 04 0605230F/641025: <i>Ground Based Strategic Deterrent</i>	221.536	414.441	570.373	-	570.373	1,527.545	2,540.300	3,039.900	3,078.800	Continuing	Continuing
• RDTE 05 0604933F/655082: <i>Fuze Modernization</i>	166.571	167.659	161.199	-	161.199	132.926	60.016	2.035	2.071	Continuing	Continuing
• RDTE 04 060351F/641022: <i>Dem/Val - RVAP</i>	24.543	12.720	24.439	-	24.439	39.776	40.186	40.554	0.000	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**  
 The Mk21A Reentry Vehicle (RV) program acquisition strategy is to deliver an integrated RV capable of delivering the W87-1 Warhead to target beginning in FY30. For the Technology Maturation and Risk Reduction (TMRR) phase, the Program Office will competitively award one cost plus fixed fee (CPFF) contract in FY19. This contract will be for 36 months with a 12 month option. The Air Force is responsible for developing, producing, and maintaining the Reentry Vehicle (RV). The National Nuclear Security Administration develops/modifies the nuclear weapon inside the RV, including the Weapon Electrical System (WES), 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 (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 test flight of two prototype RVs in ICBM-like environment.

The TMRR phase will include a System Requirements Review (SRR), System Functional Review (SFR), Preliminary Design Review (PDR), and Prototype RV demonstrations. The contractor may elect to perform additional risk reduction testing on select components to further evolve the design during TMRR, in order to lower

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / <i>ICBM Reentry Vehicles</i>
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component integration risk during the Engineering and Manufacturing Development (EMD) phase. The reference design for the Mk21A includes use of Mk21 Mod 6 aeroshells. Because the Mod 6 vehicles 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 will be a three year base contract plus a one year option potentially extending TMRR and test related activities through 3QFY23. After Milestone B approval, the EMD contract will be competitively awarded as early as 4QFY23.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / ICBM Reentry Vehicles	<b>Project (Number/Name)</b> 674920 / IW1/Mk21A
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	TBD : TBD	-	-		6.083	Jun 2019	39.870	Nov 2019	-		39.870	Continuing	Continuing	-
<b>Subtotal</b>			-	-		6.083		39.870		-		39.870	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Integration Support	C/FP	BAE : Hill AFB, UT	-	-		3.137	Jan 2019	3.380	Oct 2019	-		3.380	Continuing	Continuing	-
Mk21A Fuze Trade Study	MIPR	Sandia National Lab : Albuquerque, NM	-	-		0.500	May 2019	2.500	Nov 2019	-		2.500	Continuing	Continuing	-
Mk21A TMRR Support	Various	Various : Various	-	-		0.373	Jan 2019	0.497	Nov 2019	-		0.497	Continuing	Continuing	-
<b>Subtotal</b>			-	-		4.010		6.377		-		6.377	Continuing	Continuing	N/A

**Remarks**

- FY19 support requirements increase over FY19 PB reflect costs of the Own the Technical Baseline strategy.
- FY19 Integration Support includes temporary increase in support of Source Selection.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Support	Various	Various : Various	-	-		0.900	Jan 2019	22.170	Nov 2019	-		22.170	Continuing	Continuing	-
<b>Subtotal</b>			-	-		0.900		22.170		-		22.170	Continuing	Continuing	N/A

**Remarks**

- FY20 Test & Evaluation support includes developing ground test plans and flight test plans to support development of prototype test vehicles and provide detailed, reliable data to inform Engineering and Manufacturing Development.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / ICBM Reentry Vehicles	<b>Project (Number/Name)</b> 674920 / IW1/Mk21A
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Civilian Manpower	Various	US Gov Civilians : Hill AFB, UT	-	-		0.864	Jan 2019	5.040	Oct 2019	-		5.040	Continuing	Continuing	-
Mk21A PMA	C/Various	Various : Various	-	-		2.310	Jan 2019	2.114	Nov 2019	-		2.114	Continuing	Continuing	-
<b>Subtotal</b>			-	-		3.174		7.154		-		7.154	Continuing	Continuing	N/A

**Remarks**  
Civilian manpower increase supports ramp up of Program Office and Lead Project Officer (LPO) operations. Twenty five additional personnel will be added in FY20 (15 at the program office and 10 at the LPO).

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	-	14.167	75.571	-	75.571	Continuing	Continuing	N/A

**Remarks**



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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0101328F / ICBM Reentry Vehicles	<b>Project (Number/Name)</b> 674920 / IW1/Mk21A
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Mk21A Reentry Vehicle (RV)</i></b>				
Milestone A (Apr 2019)	3	2019	3	2019
TMRR Phase	3	2019	3	2023
PDR (Jan 2021)	2	2021	2	2021
Milestone B (Jul 2023)	4	2023	4	2023
EMD Phase	4	2023	4	2024

**Note**

- EMD Phase continues beyond FY2024 to FY2027

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / <i>UH-1N Replacement Program</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	3.398	188.259	258.022	170.975	0.000	170.975	44.544	16.400	4.300	0.400	0.000	686.298
672021: <i>UH-1N Replacement Program</i>	3.398	188.259	258.022	170.975	0.000	170.975	44.544	16.400	4.300	0.400	0.000	686.298
Quantity of RDT&E Articles	-	4	-	2	-	2	-	-	-	-		

**Program MDAP/MAIS Code:** 562

**A. Mission Description and Budget Item Justification**

The UH-1N Replacement 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 five Air Force major commands and operating agencies: Air Force Global Strike Command (AFGSC), Air Force District of Washington, Air Education and Training Command, Pacific Air Forces, and Air Force Materiel Command. 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 UH-1N Replacement Program 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / <i>UH-1N Replacement Program</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	108.617	288.022	16.575	0.000	16.575
Current President's Budget	188.259	258.022	170.975	0.000	170.975
Total Adjustments	79.642	-30.000	154.400	0.000	154.400
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-30.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	83.458	0.000			
• SBIR/STTR Transfer	-3.816	0.000			
• Other Adjustments	0.000	0.000	154.400	0.000	154.400

**Change Summary Explanation**

FY18: \$83.458 increase for Omnibus reprogramming. \$3.816 decrease for SBIR reduction.

FY19: \$30M decrease due to a Congressional mark for "program delay".

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Title:</b> UH-1N Replacement</p> <p><b>Description:</b> Development of UH-1N Replacement 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 UH-1N Replacement operational capability requirements.</p> <p><b>FY 2019 Plans:</b> Continue 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.</p> <p><b>FY 2020 Plans:</b> Continue 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.</p>	185.788	248.761	144.841

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / <i>UH-1N Replacement Program</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased due to the completed purchase of 4 RDT&E aircraft (2nd Qtr FY20).			
<b>Title:</b> UH-1N Replacement Government Test and Evaluation  <b>Description:</b> System and subsystem test and evaluation of the UH-1N Replacement solution.  <b>FY 2019 Plans:</b> Continue test planning activities (Developmental Test (DT), Operational Test (OT) support and Operational Assessment (OA)) and start Live Fire Test & Evaluation (LFT&E) execution. Conduct technical reviews of the UH-1N Replacement contractor's (Boeing) NDI integration onto an airworthiness-certified baseline aircraft system.  <b>FY 2020 Plans:</b> Continue LFT&E, DT and OA, and begin OT support execution. Conduct technical reviews of the UH-1N Replacement contractor's NDI integration onto an airworthiness-certified baseline aircraft system.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to phasing of LFT&E, DT/OA and OT support.	2.471	9.261	26.134
<b>Accomplishments/Planned Programs Subtotals</b>	188.259	258.022	170.975

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 04 Line Item H0106O: <i>UH-1N Replacement</i>	-	0.000	0.000	-	0.000	195.400	270.460	308.159	406.867	1,672.800	2,853.686
• APAF 06 Line Item H0106O: <i>UH-1N Replacement</i> <i>Initial Spares/Repair Parts</i>	-	-	0.000	-	0.000	16.593	17.063	17.373	17.685	0.000	68.714
• MILCON 0: <i>UH-1N</i> <i>Replacement - Primary Facility</i>	62.000	66.000	46.000	-	46.000	40.000	0.000	0.000	0.000	49.300	263.300

**Remarks**

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / <i>UH-1N Replacement Program</i>
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**E. Acquisition Strategy**  
The Air Force intends to procure an airworthiness-certified baseline helicopter that requires NDI 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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / UH-1N Replacement Program	<b>Project (Number/Name)</b> 672021 / UH-1N Replacement Program
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
UH-1N Replacement weapon system integration and type/airworthiness certification	C/FFP	Boeing : Philadelphia, PA	0.000	180.000	Sep 2018	221.572	Jan 2019	125.275	Dec 2019	-		125.275	24.544	551.391	-
<b>Subtotal</b>			0.000	180.000		221.572		125.275		-		125.275	24.544	551.391	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
UH-1N Replacement other government costs and civilian pay	C/Various	Various : TBD	0.061	0.146	Jan 2018	19.115	Jan 2019	13.909	Jan 2020	-		13.909	24.615	57.846	-
<b>Subtotal</b>			0.061	0.146		19.115		13.909		-		13.909	24.615	57.846	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
UH-1N Replacement live fire, developmental, and operational test and evaluation, planning and technical support	Various	Various : TBD	0.418	2.471	Jul 2018	9.261	May 2019	26.134	Dec 2019	-		26.134	16.147	54.431	-
<b>Subtotal</b>			0.418	2.471		9.261		26.134		-		26.134	16.147	54.431	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / UH-1N Replacement Program	<b>Project (Number/Name)</b> 672021 / UH-1N Replacement Program

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>UH-1N Replacement Program</b>																												
Pre-Milestone C Review and Contract Award				■																								
UH-1N Replacement 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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0102110F / <i>UH-1N Replacement Program</i>	<b>Project (Number/Name)</b> 672021 / <i>UH-1N Replacement Program</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>UH-1N Replacement Program</i></b>				
Pre-Milestone C Review and Contract Award	4	2018	4	2018
UH-1N Replacement NDI Contract	4	2018	4	2021
Test and Evaluation	1	2019	3	2022
System/Subsystem Test and Integration	2	2018	1	2022
Weapon System Integration	4	2018	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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	3.766	6.112	0.000	0.000	0.000	6.427	0.783	0.797	0.811	Continuing	Continuing
674592: <i>R/SAOC MODERNIZATION</i>	-	3.766	6.112	0.000	0.000	0.000	6.427	0.783	0.797	0.811	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 integrate Automatic Dependent Surveillance-Broadcast (ADS-B) data feeds and Earth Center Earth Fixed (ECEF) into the BCS-F system. ADS-B provides the BCS-F system the capability to ingest Global Position System (GPS) based location data, from ADS-B equipped aircraft, at the Air Defense Sectors. Integration of ADS-B on aircraft flying in US airspace is mandated by the Federal Aviation Administration (FAA) by 2020. ECEF is a three-dimensional earth model that eliminates artificial boundaries in the two-dimensional BCS-F stereographic plane. ECEF also allows the ingestion and processing of sensor, target, track, and graphical data without compromising data accuracy due to translation errors. The BCS-F Modification 1 effort will be executed as a Cooperative Development Program between the US and Canada.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BCS-F Modification 1 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	3.347	9.252	0.000	0.000	0.000
Current President's Budget	3.766	6.112	0.000	0.000	0.000
Total Adjustments	0.419	-3.140	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	-0.087	-3.140			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.628	0.000			
• SBIR/STTR Transfer	-0.121	0.000			
• Other Adjustments	-0.001	0.000	0.000	0.000	0.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> BATTLE CONTROL SYSTEMS MODIFICATION 1	3.766	6.112	0.000
<b>Description:</b> Begin 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 Development Program between the US and Canada.			
<b>FY 2019 Plans:</b> Activities include, but are not limited to: <ul style="list-style-type: none"> <li>- Continue developing test strategy and systems engineering related documentation</li> <li>- Continue the ADS-B and ECEF systems engineering development, integration, test and evaluation, risk reduction</li> <li>- Continue to document changes to the program that could affect the system baseline</li> <li>- Continue test and cyber-security planning</li> <li>- Conduct Technical Interchange Meetings, Preliminary Design Review, Critical Design Review and finalize technical order development and required training materials to support fielding activities in FY20.</li> </ul>			
<b>FY 2020 Plans:</b> Activities include, but are not limited to: <ul style="list-style-type: none"> <li>- Will continue ADS-B and ECEF integration, test and evaluation, risk reduction, and documentation</li> <li>- Will conduct training and fielding at operational sites.</li> <li>- Presently there is no funding in FY20, if no funding is found this will be treated as a skip year.</li> </ul>			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
Funding is decreased due to lack of FY20 funding.			
<b>Accomplishments/Planned Programs Subtotals</b>	3.766	6.112	0.000

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPAF 03 080330: <i>Battle Control System - Fixed</i>	6.415	3.012	3.063	-	3.063	3.119	3.175	3.232	-	0.000	27.693

**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 for the ADS-B and ECEF efforts. These two efforts will conclude with development and a single release to the Air Defense Sectors.

Management Strategy: Efforts supporting ADS-B and ECEF 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.

Contracting Strategy: The BCS-F PMO utilized a full and open competition to complete the development and integration of ADS-B and ECEF capabilities. Cost Plus contract with some Fixed Price and Time & Material CLINs will be utilized where possible and appropriate.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0102326F / Region/Sector Operation Control Center Modernization Program	<b>Project (Number/Name)</b> 674592 / R/SAOC MODERNIZATION
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 MODIFICATION 1	Various	Various : Various	-	3.706	Jun 2018	4.923	Apr 2019	-		-		-	Continuing	Continuing	0.000
<b>Subtotal</b>			-	3.706		4.923		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	-		0.105	Jul 2019	-		-		-	Continuing	Continuing	0.000
<b>Subtotal</b>			-	-		0.105		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.060	Apr 2018	0.676	Oct 2018	-		-		-	Continuing	Continuing	-
PMA - FRDC	Various	Various : Hanscom AFB	-	-		0.408	Oct 2018	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.060		1.084		-		-		-	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	3.766	6.112	-	-	-	Continuing	Continuing	N/A

**Remarks**  
 FY19 Milestones: Critical Design Review, Test Readiness Review, Developmental Test and Operational Test.  
 Presently there is no funding in FY20, if no funding is found this will be treated as a skip year.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>	<b>Project (Number/Name)</b> 674592 / <i>R/SAOC MODERNIZATION</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Battle Control System Fixed Modification 1</b>																												
BCS MODIFICATION 1																												
Milestone B (MAR)																												
Contract Award Date (JUN)																												
PAC/SRR (JUL)																												
BIR/IBR (SEP)																												
TIM #1 (DEC)																												
TIM #2 (APR)																												
SAT TRR (JUN)																												
SAT (JUN)																												
DTRR (JUL)																												
DT/OT (JAN)																												
AFSIT (JAN)																												
BCS MODIFICATION 2																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0102326F / <i>Region/Sector Operation Control Center Modernization Program</i>	<b>Project (Number/Name)</b> 674592 / <i>R/SAOC MODERNIZATION</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Battle Control System Fixed Modification 1</i></b>				
BCS MODIFICATION 1	3	2018	4	2020
Milestone B (MAR)	2	2018	2	2018
Contract Award Date (JUN)	3	2018	3	2018
PAC/SRR (JUL)	4	2018	4	2018
BIR/IBR (SEP)	4	2018	4	2018
TIM #1 (DEC)	1	2019	1	2019
TIM #2 (APR)	3	2019	3	2019
SAT TRR (JUN)	3	2019	3	2019
SAT (JUN)	3	2019	3	2019
DTRR (JUL)	4	2019	4	2019
DT/OT (JAN)	2	2020	2	2020
AFSIT (JAN)	2	2020	2	2020
BCS MODIFICATION 2	2	2021	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	48.864	184.353	108.845	154.996	0.000	154.996	236.000	168.416	172.000	43.000	1,116.995	2,233.469
675212: <i>MQ-9 SLAM</i>	0.000	0.000	0.000	6.290	0.000	6.290	92.940	76.830	119.680	8.788	194.031	498.559
675246: <i>MQ-9 Development and Fielding</i>	0.000	115.618	28.244	50.931	0.000	50.931	61.003	33.006	33.607	34.212	0.000	356.621
675247: <i>Squadron Operations Centers (SOC)</i>	0.000	7.011	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.763
675249: <i>MQ-9 Upgrade</i>	48.864	61.724	74.849	97.775	0.000	97.775	82.057	58.580	18.713	0.000	922.964	1,365.526

**Program MDAP/MAIS Code:** 424

**Note**  
 This program, BA 7, PE 0205219F, project 675212, MQ-9 SLAM, is a new start.  
 This program, BA 7, PE 0205219F, project 675212, Reliability and Maintainability, is a new start.  
 This program, BA 7, PE 0205219F, project 675212, Test Support, is a new start.  
 This program, BA 7, PE 0205219F, project 675212, Communications, is a new start.

**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 on specific aircraft and control station configurations to be tailored to fit mission needs.

The MQ-9 Reaper system has four separate development programs. This PE includes:

1. 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 and support equipment as well as resolving Diminishing Manufacturing Sources (DMS) issues.
2. Squadron Operations Centers (SOC). This effort is for development and fielding of standardized operations centers containing the equipment necessary for remote split operation, to provide mission data and tasking information to the aircrew and disseminate and/or exchange mission data with decision-makers and the intelligence community.
3. 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.
4. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV
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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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	201.394	119.845	225.619	0.000	225.619
Current President's Budget	184.353	108.845	154.996	0.000	154.996
Total Adjustments	-17.041	-11.000	-70.623	0.000	-70.623
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-10.400	-11.000			
• 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	-6.641	0.000			
• Other Adjustments	0.000	0.000	-70.623	0.000	-70.623

**Change Summary Explanation**

**FY18 Base**

The total distributed to AFLCMC/WII was \$178.840M. PRPC has a total of \$184.353 which does not match. The delta is \$5.513. This is documented in the Thrust labeled Other Rescissions in the R-2A for BPAC 675249. The remaining deltas are explained below.

- \$10.4M Reduction in FY18 Spending bill - "Release 3 excess to need"
- \$6.641M Small Business Innovation Rescission

**FY19 Base**

- \$11M reduction in FY19 Spending Bill - "Program excess"

**FY20 Base**

- \$10M reversal of Dismount Radar Integration (BMC2)

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	
<ul style="list-style-type: none"><li>- \$15.614M reduced to fund Air Force priorities</li><li>- \$45.009M reduced to account for the availability of prior year execution balances</li></ul>		

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675212: MQ-9 SLAM	0.000	0.000	0.000	6.290	0.000	6.290	92.940	76.830	119.680	8.788	194.031	498.559
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
 This program, BA 7, PE 0205219F, project 675212, MQ-9 SLAM, is a new start.  
 This program, BA 7, PE 0205219F, project 675212, Reliability and Maintainability, is a new start.  
 This program, BA 7, PE 0205219F, project 675212, Test Support, is a new start.  
 This program, BA 7, PE 0205219F, project 675212, Communications, is a new start.

**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.

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 prototyping.

Activities also include, but are not limited to, 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 Det 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.

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

	FY 2018	FY 2019	FY 2020
<b>Title:</b> MQ-9 SLAM	0.000	0.000	5.963

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675212 / MQ-9 SLAM	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>
<p><b>Description:</b> Develop and integrate upgrade capabilities to support of the MQ-9 modernization strategy. Development will combine 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 will include, but will not be limited to, upgrades of existing aircraft, Ground Control Station (GSC), communication, payload systems, and software updates needed to support new configurations and development, the addition of new capabilities and subsystems, as well as addressing and resolving Diminishing Manufacturing Sources (DMS) issues.</p> <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>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><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Plans:</b> Begin TME developing upgrade capabilities in conjunction with the CCL to include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Weapons usability improvements</li> <li>• Unified Tactical Situational Awareness</li> <li>• Design, development, integration, and testing of Moving Target Indicator (MTI) capability on medium altitude air vehicles for improved dismount and moving target detection, identification, tracking, and classification</li> <li>• Anti-ice/De-ice, Mode 5, Automated Dependent Surveillance - Broadcast (ADS-B)</li> <li>• Ku or Global Positioning System (GPS) jamming; data encryption, Identification Friend or Foe (IFF), electronic warfare, signature reduction</li> <li>• Link-16 (Airborne Mission Networking) capability, effort includes, but is not limited to, developmental testing, software updates, documentation and training</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase from FY 2019 to FY 2020 due to MQ-9 SLAM in first year execution in FY20.</p>			
<b>Title:</b> Reliability and Maintainability		-	0.000
			0.199

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675212 / MQ-9 SLAM	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>
<p><b>Description:</b> Develop MQ-9 Reliability and Maintainability (R&amp;M) improvements for aircraft and ground base infrastructure. Includes engineering change orders and associated studies, and general research. Address and resolve DMS issues.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Plans:</b> Begin 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><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase from FY 2019 to FY 2020 due to Reliability and Maintainability in first year execution in FY20.</p>			
<p><b>Title:</b> Test Support</p> <p><b>Description:</b> MQ-9 SLAM testing will provide support for, but will not be limited to, activities for MQ-9 testing of weapon system hardware and software in accordance with (IAW) contract standards, developmental testing of new capabilities, and R&amp;M upgrades.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Plans:</b> Provide 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&amp;M improvements.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase from FY 2019 to FY 2020 due to Test Support in first year execution in FY20.</p>		-	0.000
<p><b>Title:</b> Communications</p> <p><b>Description:</b> Develop MQ-9 communications capabilities such as, 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., Bandwidth Efficient Common Data Link(BE-CDL) Secure Voice Multi Level Security (MLS), ARC-210 Guard Squelch and Secure Communications).</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Plans:</b></p>		-	0.000
			0.117
			0.011

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675212 / MQ-9 SLAM
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
Develop communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM usage, integrate IP-based network interfaces, improve primary data links, network system managers, operational durability, enhance remote split operations, supporting communications equipment and associated technical orders and flight manuals.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Increase from FY 2019 to FY 2020 due to Communications in first year execution in FY20.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	6.290

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 06 PRDTB1: MQ-9	-	-	-	-	-	-	-	-	-	138.700	138.700
• APAF 05 PRDTB2: MQ-9 Mods	-	-	0.100	-	0.100	0.100	0.100	26.793	0.000	144.888	171.981

**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, the prime contractors. 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675212 / MQ-9 SLAM
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
MQ-9 SLAM	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		2.311	Jul 2020	0.000		2.311	403.049	405.360	-
Operator Simulator	SS/CPAF	L3 : Salt Lake City, UT	0.000	-		-		-		-		-	16.469	16.469	-
Reliability and Maintainability	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		0.199	Jul 2020	-		0.199	16.737	16.936	-
Communications	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		0.011	Jul 2020	-		0.011	4.646	4.657	-
<b>Subtotal</b>			0.000	-		-		2.521		0.000		2.521	440.901	443.422	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	Various : Various	0.000	-		-		0.117	Jul 2020	-		0.117	11.035	11.152	-
<b>Subtotal</b>			0.000	-		-		0.117		-		0.117	11.035	11.152	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Costs	Various	Various : Various	0.000	-		-		3.652		-		3.652	40.333	43.985	-
<b>Subtotal</b>			0.000	-		-		3.652		-		3.652	40.333	43.985	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		0.000	-	0.000	6.290	0.000	6.290	492.269	498.559	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675212 / MQ-9 SLAM
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>MQ-9 SLAM</b>																												
MQ-9 SLAM																												
Reliability and Maintainability																												
Communications																												
Test Support																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675212 / MQ-9 SLAM

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>MQ-9 SLAM</b>				
MQ-9 SLAM	4	2020	4	2024
Reliability and Maintainability	4	2020	4	2024
Communications	4	2020	4	2024
Test Support	4	2020	4	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675246: MQ-9 Development and Fielding	0.000	115.618	28.244	50.931	0.000	50.931	61.003	33.006	33.607	34.212	0.000	356.621
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 on 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 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 aircraft, payloads, and system communications status. It incorporates secure data links to send aircraft and payload commands and receive system telemetry and

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding
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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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018	FY 2019	FY 2020
<p><b>Title:</b> Ground Control Station (GCS) Development</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> Will continue GCS design/development, manufacturing and testing to include, but not limited to:</p> <ul style="list-style-type: none"> <li>• Hardware/Software Development</li> <li>• Integration and test</li> <li>• Procure additional Block 50 GCS Development Test assets</li> <li>• Continue Contractor test build</li> <li>• Maintenance evaluation team event</li> <li>• Military Flight Release</li> <li>• Resolution of DMS issues</li> <li>• Field Service Representative (FSR) support during IOT&amp;E</li> </ul>	53.255	18.878	28.130

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>
<ul style="list-style-type: none"> <li>• Block 30 Articulating Arm</li> <li>• Block 30 Monitor</li> <li>• Processor(s)</li> </ul> <p><b>FY 2020 Plans:</b> Will continue GCS design/development, manufacturing and testing to include, but not limited to:</p> <ul style="list-style-type: none"> <li>• Hardware/Software Development</li> <li>• Integration and test</li> <li>• Procure additional Block 50 GCS Development Test assets</li> <li>• Continue Contractor test build</li> <li>• Maintenance evaluation team event</li> <li>• Military Flight Release</li> <li>• Resolution of DMS issues</li> <li>• Field Service Representative (FSR) support during IOT&amp;E</li> <li>• Block 30 Articulating Arm</li> <li>• Block 30 Monitor</li> <li>• Processor(s)</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to support the Block 30 monitor, articulating arm, and Linux processor hardware, Block 50 development effort, Block 50 DMS, and Block 50 software update ramps up.</p>			
<p><b>Title:</b> MQ-9 MTS-B Electro-Optic/Infrared (EO/IR) Sensor</p> <p><b>Description:</b> Develop improved Multi-Spectral Targeting System (MTS-B) modes of operation and upgrade full motion video capability to include, but not limited to, an all digital architecture employing High-Definition (HD) camera formats, imagery improvements across all multi-spectral bands (color and infrared) and Target Location Accuracy (TLA) enhancements to support use of coordinate seeking weapons, and integration of High Definition Electro-optical Infra-red sensor upgrades, and software updates.</p> <p><b>FY 2019 Plans:</b> Develop improved MTS-B modes of operation and upgrade full motion video capability to include, but not limited to, an all digital architecture employing HD camera formats, imagery improvements across all multi-spectral bands (color and infrared) and TLA enhancements to support use of coordinate seeking weapons, and integrated of HD EO/IR sensor upgrades and software updates. Effort will continue under the MQ-9 ACATII programs.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>		7.840	0.005
		-	

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Funding decreased as the MTS-B development efforts continue under the MQ-9 ACATII programs.				
<p><b>Title:</b> Operator Simulator</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> 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"> <li>• Sensors</li> <li>• Databases</li> <li>• Weapons upgrades</li> <li>• Resolution of DMS issues</li> </ul> <p><b>FY 2020 Plans:</b> 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"> <li>• Sensors</li> <li>• Databases</li> <li>• Weapons upgrades</li> <li>• Resolution of DMS issues</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased as the Operator Simulator development efforts continue under the MQ-9 ACATII programs.</p>		4.690	3.769	1.925
<p><b>Title:</b> Release 1 and Release 2</p> <p><b>Description:</b> 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: Take Off and Landing Data (TOLD), MTS-B Integration, GCS Block 50, Internet Protocol (IP) Migration, Synthetic Aperture Radar (SAR) Development, GCS Block 30, Extended Range, Station 1 &amp; 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</p>		37.783	1.574	4.122

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
AFSOC will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.				
<p><b>FY 2019 Plans:</b> Continue developing and integrating the software and data to update the MQ-9 Block 5 capabilities that includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>• Resolution of DMS issues</li> </ul> <p><b>FY 2020 Plans:</b> Continue developing and integrating the software and data to update the MQ-9 Block 5 capabilities that includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>• Resolution of DMS issues</li> <li>• Verified maintenance technical orders</li> <li>• Flight manuals</li> <li>• Training</li> <li>• System supportability analysis</li> <li>• Design code software evaluation.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased to support test assets verified maintenance technical orders, flight manuals, training, system supportability analysis, logistic analysis, and design code software evaluation.</p>				
<p><b>Title:</b> Test Support</p> <p><b>Description:</b> 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&amp;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><b>FY 2019 Plans:</b> Will continue test support</p> <p><b>FY 2020 Plans:</b> Will continue test support</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased as the Test Support development efforts continue to support GCS, Hybrid Release 2 software test support.</p>		2.120	0.262	0.397
<p><b>Title:</b> Communications</p>		-	0.010	6.389

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> 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><b>FY 2019 Plans:</b> Begin to develop and enhance MQ-9 communications capabilities, to include but not limited to reduction of legacy signal blockages, control module, and secure triple link modem and solutions of various DMS issues.</p> <p><b>FY 2020 Plans:</b> Continue to develop and enhance MQ-9 communications capabilities, to include but not limited to, solutions of various DMS issues.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to the communications development effort contract award of the reduction of legacy C-band signal blockages effort.</p>			
<p><b>Title:</b> MQ-9 Technology Insertion</p> <p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b> Develop program protection Technology Insertion capabilities, functionality for the MQ-9 Weapon System and control module. 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 and will continue under the MQ-9 ACATII programs.</p> <p><b>FY 2020 Plans:</b> MQ-9 Technology Insertion efforts will continue during FY20</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	9.930	3.746	9.968

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Funding increased in order to support the communications security control module contract award.			
<b>Accomplishments/Planned Programs Subtotals</b>	115.618	28.244	50.931

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APAF 04 Line Item PRDTB1: MQ-9	228.253	135.903	189.205	-	189.205	90.047	284.887	167.759	0.000	0.000	1,096.054
• APAF 06 Line Item PRDTB1: MQ-9 Spares	30.093	103.890	72.852	-	72.852	44.041	81.412	38.268	0.000	0.000	370.556
• APAF 05 Line Item PRDTB2: MQ-9 Mods	121.945	153.387	100.296	-	100.296	84.076	36.913	22.110	0.000	0.000	518.727
• APAF 07 Line Item PRDTB1: MQ-9	36.368	25.671	26.607	-	26.607	26.622	27.154	27.648	-	0.000	170.070

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Ground Control Station (GCS) Development	SS/CPFF	GA-ASI : Poway, CA	0.000	48.452	Oct 2017	15.636	Oct 2018	24.371	Oct 2019	-		24.371	102.951	191.410	349.818
Multi-Spectral Targeting System (MTS)-B EO/IR Sensor	SS/CPFF	Raytheon : McKinney, TX	0.000	7.107	Mar 2018	-		-		-		-	0.000	7.107	112.944
Operator Simulator	SS/CPFF	L3 Comm : Salt Lake City, UT	0.000	4.690	Mar 2018	3.769	Mar 2019	1.925	Mar 2020	-		1.925	31.391	41.775	56.512
Release1 and Release 2	SS/CPFF	GA-ASI : Poway, CA	0.000	34.247	Feb 2018	1.195	Feb 2019	3.571	Feb 2020	-		3.571	0.000	39.013	161.096
Communication	SS/CPFF	GA-ASI : Poway, CA	0.000	-		0.010	Sep 2019	6.389	Nov 2019	-		6.389	0.727	7.126	17.336
MQ-9 Program Protection Technology Insertion	SS/CPFF	GA-ASI : Poway, CA	0.000	9.000	Apr 2018	2.845	Apr 2019	8.637	Apr 2020	-		8.637	19.105	39.587	58.239
Completed Efforts	SS/ Various	Various : Various	0.000	-		-		-		-		-	0.000	0.000	77.805
<b>Subtotal</b>			0.000	103.496		23.455		44.893		-		44.893	154.174	326.018	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Test Support	Various	Various : Various, CA	0.000	2.120	May 2018	0.262	May 2019	0.397	May 2020	-		0.397	0.759	3.538	22.665
<b>Subtotal</b>			0.000	2.120		0.262		0.397		-		0.397	0.759	3.538	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Other Government Costs	Various	Various : Various	0.000	10.002	May 2018	4.527	May 2019	5.641	May 2020	-		5.641	6.895	27.065	119.924
<b>Subtotal</b>			0.000	10.002		4.527		5.641		-		5.641	6.895	27.065	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	115.618	28.244	50.931	-	50.931	161.828	356.621	N/A

**Remarks**  
PMA costs are included in Other Government Costs.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>MQ-9 ACAT IC Development</b>																												
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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675246 / MQ-9 Development and Fielding

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>MQ-9 ACAT IC Development</i></b>				
Ground Control Station (GCS) Development	1	2018	4	2024
MTS-B Updates (Electro-Optical/Infrared (EO/IR) Sensor)	1	2018	1	2020
Operator Simulator	1	2018	4	2023
Release 1 & Release 2	1	2018	4	2020
Test Support	1	2018	4	2023
Communications	1	2018	2	2021
MQ-9 Technology Insertion	1	2018	4	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV				<b>Project (Number/Name)</b> 675247 / Squadron Operations Centers (SOC)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675247: Squadron Operations Centers (SOC)	0.000	7.011	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.763
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 integrate 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Squadron Operations Center	7.011	5.752	-
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> -Complete design review, development, and delivery of Developmental Test (DT) SOC to integrate capabilities into Remotely Piloted Aircraft (RPA) SOC. -Integration of emerging technologies into the SOC baseline.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> RDT&E efforts for MQ-9 DT SOC completed in FY19; RDT&E for further RPA SOC development not funded in FY20.			
<b>Accomplishments/Planned Programs Subtotals</b>	7.011	5.752	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675247 / Squadron Operations Centers (SOC)

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• OPAF 03 Line Item 837300: <i>Base Communications Infrastructure</i>	7.529	87.378	7.898	-	7.898	82.282	83.292	53.818	0.000	0.000	322.197

**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.

**E. 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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675247 / Squadron Operations Centers (SOC)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>RPA SOC SIL</i></b>				
DT SOC Development	2	2019	4	2019
DT SOC HW/SW Procurement	4	2019	2	2020
DT SOC Delivery	2	2020	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV				<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675249: MQ-9 Upgrade	48.864	61.724	74.849	97.775	0.000	97.775	82.057	58.580	18.713	0.000	922.964	1,365.526
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 19 July 2018, 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> MQ-9 Upgrade	56.919	69.535	87.217
<b>Description:</b> 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 (GSC), 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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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Candidate capabilities are determined by Major Command (Air Combat Command (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 operator priorities.

Activities also include, but are not limited to, operator simulators, reliability and maintainability, test support, communications, and urgent services.

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.

**FY 2019 Plans:**

- Continue TME development of upgrade capabilities in conjunction with the CCL to include, but not limited to:
- Auto Take-off and Landing Capability (ATLC), Take off & Landing Data (TOLD)
  - Weapons usability improvements (i.e. auto-lockout, Joint Air to Ground Missile (JAGM))
  - Reconnaissance, targeting and technology improvements in MTS-B, Synthetic Aperture Radar, sensors, and Global Positioning System (GPS)
  - System corrections, technology upgrades within the GCS, Unmanned Aerial Vehicle communications and ground support (i.e. batteries, engine, Bandwidth Efficient (BE) Common Data Link (CDL) and Beyond Line of Sight)
  - Expand theater capabilities with Anti-ice/De-ice, Mode 5, Automated Dependent Surveillance - Broadcast (ADS-B)
  - Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, Identification Friend or Foe(IFF), electronic warfare, signature reduction
  - High Definition Electro-optical Infra-red sensor upgrades
  - Link-16 (Airborne Mission Networking) capability

**FY 2020 Plans:**

- Continue TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to:
- 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
  - 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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>• 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))</li> <li>• Expand theater capabilities with Anti-ice/De-ice, Mode 5, ADS-B</li> <li>• MTS-B High-Definition Short Wave Infrared/Pulse Repetition Frequency, two-color laser system, inertial measurement unit/ autoloader</li> <li>• Audio-Multi Level Security (MLS) system</li> <li>• Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, (IFF), electronic warfare, signature reduction</li> <li>• Link-16 (Airborne Mission Networking) capability</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to MQ-9 Upgrade continuing at an increased level as efforts under MQ-9 Development program (BPAC:675246) decelerate.</p>				
<p><b>Title:</b> Operator Simulator</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> Continue implementing updates to keep the operator simulator current with the aircraft and GCS, including but not limited to:</p> <ul style="list-style-type: none"> <li>• Sensors</li> <li>• Databases</li> <li>• Weapons usability improvements (i.e. auto-lockout, JAGM)</li> <li>• Software</li> </ul> <p><b>FY 2020 Plans:</b> Continue implementing updates to keep the operator simulator current with the aircraft and GCS.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to MQ-9 Upgrade operator simulators continue to update in order to keep concurrent with aircraft and GCS configurations.</p>		2.500	2.309	8.000
<p><b>Title:</b> Reliability and Maintainability</p> <p><b>Description:</b> Develop MQ-9 Reliability and Maintainability (R&amp;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>		-	0.839	0.561

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b><i>FY 2019 Plans:</i></b> Begin 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><b><i>FY 2020 Plans:</i></b> 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><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decreased as reliability and maintainability improvements will continue at a decreased level as efforts under MQ-9 SLAM program (BPAC: 675212) ramps up.</p>			
<p><b><i>Title:</i></b> Test Support</p> <p><b><i>Description:</i></b> 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&amp;M upgrades.</p> <p><b><i>FY 2019 Plans:</i></b> Continue testing support including, but not limited to, activities for MQ-9 testing of weapon system hardware and software (i.e., platform, weapon usability, SAR, MTS-B, CGS) support IAW contract standards.</p> <p><b><i>FY 2020 Plans:</i></b> 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&amp;M improvements.</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding increased due to MQ-9 Upgrade continuing to ramp up testing of weapon system hardware and software.</p>	0.020	0.934	1.829
<p><b><i>Title:</i></b> Communications</p> <p><b><i>Description:</i></b> 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><b><i>FY 2019 Plans:</i></b> Continue developing communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM usage, integrate IP-based network interfaces, improve primary data links,</p>	2.285	1.232	0.168

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
network system managers, operational durability, enhance Remote Split Operations, supporting communications equipment and associated technical orders and flight manuals.			
<b><i>FY 2020 Plans:</i></b> MQ-9 Upgrade communications capabilities development will continue			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decreased due to MQ-9 Upgrade Communications continuing at a decreased level as efforts under MQ-9 SLAM program (BPAC: 675212) ramps up.			
<b>Accomplishments/Planned Programs Subtotals</b>	61.724	74.849	97.775

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 06 PRDTB1: MQ-9 UAV	0.000	1.730	78.070	-	78.070	42.290	38.080	50.340	14.358	98.505	323.373
• APAF 05 PRDTB2: MQ-9 Mods	112.848	15.821	280.848	-	280.848	104.262	122.186	103.968	11.897	357.100	1,108.930

**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, the prime contractors. 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
MQ-9 Upgrade	SS/CPFF	GA-ASI : Poway, CA	45.990	53.242	Apr 2018	63.262	Mar 2019	83.565	Jan 2020	-		83.565	123.728	369.787	-
Operator Simulator	SS/CPFF	L3 Comm : Salt Lake City, UT	0.000	2.500	Feb 2018	2.309	Jun 2019	8.000	Jan 2020	-		8.000	23.500	36.309	-
Reliability and Maintainability	SS/CPFF	GA-ASI : Poway, CA	0.000	-		0.839	Jun 2019	0.561	Apr 2020	-		0.561	2.967	4.367	-
Communications	SS/CPFF	GA-ASI : Poway, CA	0.000	2.285	Aug 2018	1.232	May 2019	0.168	Oct 2019	-		0.168	0.849	4.534	-
<b>Subtotal</b>			45.990	58.027		67.642		92.294		-		92.294	151.044	414.997	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	Various : Various	0.031	0.020	Apr 2018	0.934	Nov 2018	1.829	Nov 2019	-		1.829	1.892	4.706	-
<b>Subtotal</b>			0.031	0.020		0.934		1.829		-		1.829	1.892	4.706	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Costs	Various	Various : Various	2.843	3.677	May 2018	6.273	May 2019	3.652	May 2020	-		3.652	6.415	22.860	-
<b>Subtotal</b>			2.843	3.677		6.273		3.652		-		3.652	6.415	22.860	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		48.864	61.724	74.849	97.775	-	97.775	159.351	442.563	N/A

**Remarks**  
PMA costs are included in Other Government Costs.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>MQ-9 ACAT II Development</b>	
MQ-9 Upgrade	
Operator Simulator	
Reliability and Maintainability	
Test Support	
Communications	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205219F / MQ-9 UAV	<b>Project (Number/Name)</b> 675249 / MQ-9 Upgrade
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>MQ-9 ACAT II Development</i></b>				
MQ-9 Upgrade	3	2018	4	2023
Operator Simulator	2	2018	4	2023
Reliability and Maintainability	4	2018	4	2023
Test Support	3	2018	4	2023
Communications	4	2018	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205671F <i>Joint Counter RCIED Electronic Warfare</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	4.000	0.000	4.000	4.000	4.080	3.796	3.559	3.222	0.000	22.657
674518: <i>JCREW VEHICLE INTEGRATION</i>	-	0.000	4.000	0.000	4.000	4.000	4.080	3.796	3.559	3.222	0.000	22.657
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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	4.000	0.000	0.000	0.000
Current President's Budget	0.000	4.000	0.000	4.000	4.000
Total Adjustments	0.000	0.000	0.000	4.000	4.000
• 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	4.000	4.000

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> CREW device intregation	0.000	4.000	0.000	4.000	4.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205671F <i>I Joint Counter RCIED Electronic Warfare</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> CREW device integration.  <b>FY 2019 Plans:</b> CREW Device Integration  <b>FY 2020 Base Plans:</b> CREW device integration is FY20 OCO funding only.  <b>FY 2020 OCO Plans:</b> CREW Device Integration  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> decrease to support other higher Air Force requirements					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	4.000	0.000	4.000	4.000

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</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	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) vehicle mounted, Explosive Ordinance Disposal dismounted and Entry Control Point operations. Includes integration of the devices into currently fielded systems.

**E. Acquisition Strategy**

n/a

**F. 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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205671F / <i>Joint Counter RCIED Electronic Warfare</i>	<b>Project (Number/Name)</b> 674518 / <i>JCREW VEHICLE INTEGRATION</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>J CREW Integration</i></b>				
JCREW Vehicle Integration	1	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	17.459	27.738	36.816	0.000	36.816	24.581	24.248	24.193	23.670	Continuing	Continuing
674809: <i>A-10 Squadrons</i>	-	17.459	27.738	36.816	0.000	36.816	24.581	24.248	24.193	23.670	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, A-10 Thunderbolt Advanced-wing Continuation Kit (ATTACK), Central Interface Control Unit (CICU); accommodate technology insertion (Additional Gigabit Ethernet capability, High Resolution Display System (HRDS), 3-D Audio, On-Board Oxygen Generation System (OBOGS), and fulfill FAA and other mandates (IFF Mode-5, Automatic Dependent Surveillance Broadcast (ADS-B) Out, M-Code, NSA Crypto Modernization/ARC-210 radio/Mobile User Objective System (MUOS)) to ensure continued aircrew safety and mission effectiveness, Anti-Jam Embedded Global Positioning System within the provisions of 10 USC 2244A.

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 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons
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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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	17.459	27.738	39.171	0.000	39.171
Current President's Budget	17.459	27.738	36.816	0.000	36.816
Total Adjustments	0.000	0.000	-2.355	0.000	-2.355
• 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	-2.355	0.000	-2.355

**Change Summary Explanation**

No Significant Changes

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> OFP Development	13.459	13.700	13.800	-	13.800
<b>Description:</b> 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.					
This OFP effort also contains Program Management Administration (PMA) support activities to include travel, office supplies, training courses, Video Teleconferencing (VTC) and support contractors.					
<b>FY 2019 Plans:</b> Conclude Suite 9 development and continue Suite 10 development of the software design, development and integration.					
<b>FY 2020 Base Plans:</b>					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force			<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons				
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Continue Suite 10 Software development and integration <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Minimal Increase in budget						
<b>Title:</b> ARC-210 Gen 6 <b>Description:</b> 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. <b>FY 2019 Plans:</b> Funding will be used for 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. <b>FY 2020 Base Plans:</b> 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. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase in ARC-210 effort		0.000	4.200	11.174	-	11.174
<b>Title:</b> A-10 Small Projects <b>Description:</b> RDT&E funds provide for updates and incorporation of capabilities for weapons integration, targeting pod updates, and communication/navigation/data link improvements (e.g., Central Interface Control Unit (CICU); M-Code, MUOS communication system, Embedded GPS/ INS, Gigabit Ethernet. HRDS,. 3-D Audio, Smart (TER), Small Diameter Bomb (SDB) capability and cyber security upgrades). 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).		4.000	8.838	11.842	-	11.842

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b>FY 2019 Plans:</b> Begin efforts for integration of SDB onto the A-10 platform</p> <p><b>FY 2020 Base Plans:</b> Funding will be used for integration of SDB onto A-10 platform; to include power study, test, labor, materials, etc.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due increase in requirements</p>					
<p><b>Title:</b> J-Hook</p> <p><b>Description:</b> 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 &gt;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><b>FY 2019 Plans:</b> This effort will provide material solution kits based on current drawings/specs to improve the pylon retention snap hook system.</p> <p><b>FY 2020 Base Plans:</b> N/A</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> RDT&amp;E funding is only needed in FY19</p>	-	1.000	0.000	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	17.459	27.738	36.816	0.000	36.816

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item A01000: <i>A-10 Squadrons, PE 0207131F</i>	109.010	168.060	132.069	-	132.069	135.980	128.947	135.002	86.231	0.000	895.299

**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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons	<b>Project (Number/Name)</b> 674809 / A-10 Squadrons
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
OFP Development 1st Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	1.180	Nov 2017	-		-		-		-	Continuing	Continuing	-
OFP Development 2nd Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	1.800	Jan 2018	-		-		-		-	Continuing	Continuing	-
OFP Development 3rd Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	4.800	Apr 2018	-		-		-		-	Continuing	Continuing	-
OFP Development 4th Qtr FY18 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	2.870	Jun 2018	-		-		-		-	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	-		2.610	Continuing	Continuing	-
OFP Development 2nd Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Jan 2020	-		2.610	Continuing	Continuing	-
OFP Development 3rd Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Apr 2020	-		2.610	Continuing	Continuing	-
OFP Development 4th Qtr FY20 (309 SMXG)	PO	309 SMXG : Hill AFB, UT	-	-		-		2.610	Jun 2020	-		2.610	Continuing	Continuing	-
<b>Subtotal</b>			-	10.650		10.446		10.440		-		10.440	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
USAF (Multiple)	Various	Various : Various	-	4.799	Jan 2018	9.242	Jan 2019	18.326		-		18.326	Continuing	Continuing	-
<b>Subtotal</b>			-	4.799		9.242		18.326		-		18.326	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons	<b>Project (Number/Name)</b> 674809 / A-10 Squadrons
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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**  
 FY18 \$4.00M - A-10 Small Projects  
 FY18 \$0.750M - SIM SPO Full Mission Trainers (FMT)  
 FY18 \$0.049M - SPO TDY  
 FY19 \$6.288M - ARC-210 Crypto Mandate  
 FY19 \$6.750M - A-10 Small Projects  
 FY19 \$0.750M - SIM SPO Full Mission Trainers (FMT)  
 FY19 \$0.049M - SPO TDY  
 FY20 \$0.400M - SIM SPO Full Mission Trainers (FMT)  
 FY20 \$0.75M - SPO TDY  
 FY20 \$9.086 - ARC-210  
 FY20 \$10.835 - A-10 Small Projects  
 FY20 \$0.500M - PMA Tax

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
USAF (OFF)	Various	Various : Various	-	1.850	Sep 2018	3.250	Sep 2019	3.250	Sep 2019	-		3.250	Continuing	Continuing	-
<b>Subtotal</b>			-	1.850		3.250		3.250		-		3.250	Continuing	Continuing	N/A

**Remarks**  
 RDT&E Test and Evaluation will not begin until 1st Quarter FY18 due to FY17 cut/mark of \$10M.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various : Various	-	0.160	Aug 2018	4.800	Aug 2019	4.800		-		4.800	Continuing	Continuing	-
<b>Subtotal</b>			-	0.160		4.800		4.800		-		4.800	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	17.459	27.738	36.816	-	36.816	Continuing	Continuing	N/A





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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207131F / A-10 Squadrons	<b>Project (Number/Name)</b> 674809 / A-10 Squadrons
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>OFP</i></b>				
Suite 10 - OFP System Design, Development and Flight Test	2	2018	4	2020
Suite 10 - OFP Fields	4	2020	4	2021
ARC - 210 Crypto Mandate	2	2019	4	2020
Suite 11 - OFP System Design, Development and Flight Test	2	2018	2	2022
Suite 11 - OFP Fields	2	2022	2	2023
Suite 12 - OFP System Design, Development and Flight Test	2	2019	3	2023
Suite 12 - OFP Fields	3	2023	3	2024

**Note**

Suite 10 was subjected to a FY17 mark for \$10M. The program was reinstated upon receiving supplemental funding. As a result of the mark and late-to-need funding, 13 candidates were also lost from Suite 9.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	250.264	185.864	193.013	0.000	193.013	186.850	182.502	167.155	127.766	Continuing	Continuing
672671: <i>F-16 Squadrons</i>	-	250.264	185.864	193.013	0.000	193.013	186.850	182.502	167.155	127.766	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 50% 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.

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 DoD mandates and keep the F-16, the respective training simulators, and other hardware subsystems current; Legacy Service Life Extension Program (SLEP), which is a two-phased RDT&E effort, includes a Full Scale Durability Test (FSDT) and Engineering, Manufacturing and Development (EMD) to support structural modifications to increase Certified Service Life (CSL) from 8,000 Equivalent Flight Hours (EFH) to 10,000 EFH (Threshold), or 12,000 EFH (Objective); 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 narrowband SATCOM with better crypto capabilities; an active electronically scanned array (AESA) radar capable on all blocks that offers advanced electronic protection capabilities as well as improved reliability and maintainability on F-16 aircraft; 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 airspeed and location info to ground stations and other equipped aircraft in vicinity; Digital Radar Warning Receiver improves on existing radar warning receiver performance and improves Electronic Warfare (EW) threat detection range, azimuth, detection time, and allows reduction of radio frequency compatibility issues with other on board transmitters.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	246.578	191.564	175.610	0.000	175.610
Current President's Budget	250.264	185.864	193.013	0.000	193.013
Total Adjustments	3.686	-5.700	17.403	0.000	17.403
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-5.700			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	10.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.933	0.000			
• SBIR/STTR Transfer	-7.247	0.000			
• Other Adjustments	0.000	0.000	17.403	0.000	17.403

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

**Project:** 672671: *F-16 Squadrons*

Congressional Add: *Multifunctional Information Distribution System Joint Tactical Radio System (MIDS-JTRS)*

Congressional Add Subtotals for Project: 672671

Congressional Add Totals for all Projects

	<b>FY 2018</b>	<b>FY 2019</b>
	10.000	0.000
	10.000	0.000
	10.000	0.000

**Change Summary Explanation**

FY18: \$10M increase due to Congressional Add for MIDS-JTRS, \$0.933M increase for BTR, and decrease \$7.247 for SBIR Assessment

FY19: \$5.7M decrease for Comm Suite Congressional Mark

FY20: \$17.403M net increase, including +\$31.6M AESA, -\$10.4M DRWR Realignment, -\$3.8M MMC/PDG Realignment

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b>Title:</b> OFP Updates on all F-16 aircraft</p> <p><b>Description:</b> OFP tapes are updated continually to integrate new weapons, targeting pods, and improved avionics.</p> <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 keep the F-16 current. The OFPs are developed by the 309th SMXG at Hill AFB, UT.</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><b>FY 2019 Plans:</b>                      Complete dedicated OT&amp;E, Functional Configuration Audit (FCA), and field M7.2+ OFP. Continue software development of M7.3/M8.03 &amp; begin development M8.1. Continue to update M-Series requirements for future OFPs through Warfighter Council. Continue SCU9.1 and SCU10 design and code of selected candidates. Finalize developmental and operational flight test for SCU9.1 and field late 1Q FY19. SCU10 will continue to design and code and will field in 2020. M/SCU are continuing to pursue Agile Software Development Transformation to improve software delivery to the warfighter.</p> <p><b>FY 2020 Base Plans:</b>                      Begin M7.3/M8.03 SIL &amp; 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 2020. M/SCU are continuing to pursue Agile Software Development Transformation to improve software delivery to the warfighter.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>                      Decrease due to OFP: M7.2+ fielding in FY19. Once fielded, OFP development will decrease from three simultaneous software development projects back to the steady-state level of two simultaneous development projects</p>	108.061	100.383	86.520	-	86.520
<p><b>Title:</b> Flight Test</p> <p><b>Description:</b> Development Test and Evaluation (DT&amp;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</p>	17.759	17.044	17.613	0.000	17.613

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>			
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					
(AATC), including integration tests of associated subsystems and weapons as well as maintain test schedule for F-16 MMC OFPs, weapons integration, Radio Frequency (RF) compatibility, and sub-systems to ensure capabilities meet CAF's fielding schedule.					
<b>FY 2019 Plans:</b> Continue support of DT&E infrastructure. Finish M7.2+ test execution (Force Development Evaluation) for M7.2+ (AESA JEON, MIDS-JTRS, JASSM-ER, AIM-120 SIP2, ASQ-236 and Comm Suite - Integrated Waveform), and support out-of-cycle regression testing. M7.2+ fielding date is August 2019. Initiate M7.3 and M8 test planning.					
<b>FY 2020 Base Plans:</b> Continue support of DT&E infrastructure. 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+), Correlation (small fixes), AESA Phase 3 - Step 1, SATURN and RF Compatibility), and support out-of-cycle regression testing.					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to inflation and current estimate.					
<b>Title:</b> EMD HW/Advanced Capabilities Improvements					
<b>Description:</b> 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.					
<b>FY 2019 Plans:</b> 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.					
<b>FY 2020 Base Plans:</b>					
	0.000	0.200	0.200	-	0.200

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>			
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					
	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> MMC Upgrade / Display Generator Upgrade on F-16 aircraft  <b>Description:</b> 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 MMC with the M8.0.3 OFP and fielding of PDG with the M8.1 OFP. The addition of an Ethernet High Speed Data Network (HSDN) facilitates future increments of combat capability with the OFP and system compatibility/interoperability (e.g., digital targeting pod video). 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.  <b>FY 2019 Plans:</b> 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.  <b>FY 2020 Base Plans:</b> 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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease from FY19 to FY20 due to ramping down of development efforts for program.	18.958	11.613	3.837	-	3.837
<b>Title:</b> Simulator Trainers  <b>Description:</b> 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	3.292	14.323	14.594	-	14.594

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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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.

**FY 2019 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. Begin supporting development efforts for the F-16 MTC trainer.

**FY 2020 Base 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. Begin supporting development efforts for the F-16 MTC trainer.

**FY 2019 to FY 2020 Increase/Decrease Statement:**  
N/A

<b>Title:</b> AESA Radar	40.766	3.469	65.149	-	65.149
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**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.

**FY 2019 Plans:**  
Continues Phase III development efforts for full CDD radar development including flight testing and TO development.

**FY 2020 Base Plans:**

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>			
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					
	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Continues Phase III development efforts for full CDD radar development including flight testing and TO development. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to ramp up of radar software and radome development and purchase of 15 test assets needed in FY20 for continuation of full CDD radar development efforts.					
<b>Title:</b> Comm Suite Radio Upgrade Aircraft					
<b>Description:</b> Provides 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).					
<b>FY 2019 Plans:</b> No FY19 funding for this effort					
<b>FY 2020 Base Plans:</b> Continue NRE efforts, procure Group B test assets					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Ramp up of activities					
	4.287	0.000	5.099	-	5.099
<b>Title:</b> Hybrid Flight Control Computer (HFLCC) Auto Ground Collision Avoidance System (AGCAS)					
<b>Description:</b> Development for Hybrid Flight Control Computer (HFLCC) Auto Ground Collision Avoidance System (AGCAS).					
<b>FY 2019 Plans:</b> N/A					
<b>FY 2020 Base Plans:</b> N/A					
	1.200	0.000	0.000	-	0.000
<b>Title:</b> Digital Radar Warning Receiver					
<b>Description:</b> 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 (RF) compatibility with associated systems.					
	42.974	35.321	0.001	-	0.001

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b><i>FY 2019 Plans:</i></b>                      Continue efforts for Digital Radar Warning Receiver, continue NRE efforts for Group A and Group B Hardware, continue Digital RWR Software and any associated OFP updates. ALQ-213 system procurement for Blk 50C. Blk 50C kit build and TVI install. Blk 42C TVI install. Blk 40C design completion and kit build. D model design to commence. Fund ALR-69A SW changes to support AESA/RFC integration. JPRIMES chamber testing. Additional flight testing. Fund EMI ECP. Fund RFC SIE (SW). MDF continue work for lab expansion.</p> <p>This program includes execution of a Section 804 Rapid Prototyping effort to evaluate next-gen electronic warfare options that meet the DRWR requirements.</p> <p><b><i>FY 2020 Base Plans:</i></b>                      Continue efforts for Digital Radar Warning Receiver, continue NRE efforts for Group A and Group B Hardware, continue Digital RWR Software and any associated OFP updates. Seek MS C approval. Prep for kit proof on Blk 50C and other blocks ready to go. D model kit builds and TVI installs. MDF lab expansion and bench complete.</p> <p>This program includes execution of a Section 804 Rapid Prototyping effort to evaluate next-gen electronic warfare options that meet the DRWR requirements.</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b>                      Based on current constrained budget provided.</p>					
<p><b><i>Title:</i></b> Multifunctional Information Distribution System Joint Tactical Radio System(MIDS-JTRS)</p> <p><b><i>Description:</i></b> 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. Enhances situational awareness by exchanging digital data over a common communication link that is continuously and automatically updated in real time. Additionally MIDS JTRS enhanced capabilities provide concurrent multinetting which enhances 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.</p> <p><b><i>FY 2019 Plans:</i></b>                      Provide funding to the USN MPO development of the F-16 firmware build along with Ethernet capabilities. Fund the creation of technical data/orders. Fund remaining trial vehicle installations (TVIs) for test as well as</p>	0.000	3.511	0.000	-	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
kit proofing efforts. Fund group A IDIQ contracts required for TVIs and Kit proofing. Fund studies to explore expansion of additional/future MIDS JTRS capabilities including ICAS.  <b>FY 2020 Base Plans:</b> N/A  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No MIDS JTRS activity in FY20					
<b>Title:</b> Advanced Identification Friend or Foe (AIFF Mode5)  <b>Description:</b> Project 633032, F-16 AIFF Mode 5, changed from F-16 ADS-B Out.  Advanced Identification Friend or Foe (AIFF Mode 5) provides hardware and software/firmware update required to comply with DoD mandate for Advanced Identify Friend or Foe (IFF) Mode 5  Transponder upgrade program replaces/upgrades existing hardware with an AIFF Mode 5 capable system via software/firmware update.  Advanced Identify Friend or Foe system (AIFF) provides positive identification for Air Traffic Control reporting, combat targeting, and fratricide prevention.  <b>FY 2019 Plans:</b> N/A  <b>FY 2020 Base Plans:</b> N/A	2.967	0.000	0.000	-	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	240.264	185.864	193.013	0.000	193.013

	<b>FY 2018</b>	<b>FY 2019</b>
<b>Congressional Add:</b> Multifunctional Information Distribution System Joint Tactical Radio System (MIDS-JTRS)	10.000	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>
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	<b>FY 2018</b>	<b>FY 2019</b>
<b>FY 2018 Accomplishments:</b> Provide funding to the USN MPO development of the F-16 firmware build along with Ethernet capabilities. Fund the creation of technical data/orders. Fund remaining trial vehicle installations (TVIs) for test as well as kit proofing efforts. Fund group A IDIQ contracts required for TVIs and Kit proofing.		
<b>FY 2019 Plans:</b> N/A		
<b>Congressional Adds Subtotals</b>	10.000	0.000

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item F01600: <i>F-16 Aircraft Modifications</i>	223.948	303.424	234.782	-	234.782	765.616	594.616	602.437	682.441	Continuing	Continuing
• APAF 07 Line Item F0160P: <i>F-16 Post Production Support</i>	8.151	4.918	15.348	-	15.348	25.397	19.707	20.067	20.429	Continuing	Continuing
• APAF 06 Line Item <i>F01600: F-16 Initial Spares</i>	20.555	11.235	30.463	-	30.463	25.395	39.954	16.039	25.317	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 SMXG). Numerous Integration contracts (CPFF, FFP) are required to allow for Improved Avionics, Weapon, ADS-B, 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 31 May 2017. The US Government is the prime integrator and a separate contract is in work for Lockheed Martin to provide integration support.

AIFF Mode 5 Out program uses numerous contracts for DMS resolution, integration, production, support and installs. Funding will be awarded on the following contacts: harness IDIQ, Bracket IDIQ, Falcon 2020, Mode 5 IDIQ, and SASSM/EGI IDIQ.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>	
<p>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 are expected to be awarded by the end of 2018 with LM, flight test, and engineering contractors.</p> <p>DRWR is organically being integrated on the F-16 by F-16 System Program Office (AFLCMC/WWM) and the Electronic Warfare Avionics (EWA) group at AFLCMC/WNY, Warner 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). The ALR-69A software is organically managed by AFLCMC/WNY utilizing the 579 SMXS (Software Maintenance) team and the OEM Raytheon, Goleta, CA. The ALR-69A hardware is sustained by the 408 SCMS (Supply Chain) and 402MXW (Hardware Maintenance) group at Warner Robins AFB, GA.</p> <p>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 (RF) compatibility.</p> <p><b>F. Performance Metrics</b></p> <p>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.</p>		

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / F-16 Squadrons	<b>Project (Number/Name)</b> 672671 / F-16 Squadrons
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
OFP Updates on F-16 aircraft	Various	309th SMG : Hill AFB, UT	-	95.815	Nov 2017	87.005	Nov 2018	72.530	Nov 2019	-		72.530	Continuing	Continuing	-
MMC Upgrade / Display Generator Upgrade	Various	Various : Various	-	18.958	Jan 2018	11.613	Jan 2018	3.837	Jan 2019	-		3.837	Continuing	Continuing	-
EMD HW / Advanced Capabilities	Various	Various : Various	-	0.000	Aug 2018	0.000	Aug 2019	0.200	Aug 2020	-		0.200	Continuing	Continuing	-
Simulator Trainers	Various	Various : Various	-	3.292	Mar 2018	14.323	Mar 2019	14.594	Mar 2020	-		14.594	Continuing	Continuing	-
AESA Radars	Various	Various : Various	-	40.766	Jun 2018	3.469	May 2019	65.149	May 2020	-		65.149	Continuing	Continuing	-
Digital Radar Warning Receiver	Various	Various : Various	-	42.974	Apr 2018	35.321	Aug 2019	0.001	Aug 2020	-		0.001	Continuing	Continuing	-
Comm Suite Radio Upgrade	Various	Various : Various	-	4.287	Feb 2018	0.000	Feb 2019	5.099	Feb 2020	-		5.099	Continuing	Continuing	-
Hybrid Flight Control Computer (HFLCC) AGCAS	Various	Various : Various	-	1.200	Mar 2018	-		-		-		-	Continuing	Continuing	-
Advanced Identification Friend or Foe (AIFF MODE5)	Various	Various : Various	-	2.967	Mar 2018	-		-		-		-	Continuing	Continuing	-
MIDS JTRS	Various	Various : Various	-	10.000	Oct 2018	3.511	Nov 2018	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	220.259		155.242		161.410		-		161.410	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Flight Tests	Various	Various : Various	-	17.759	Nov 2017	17.044	Nov 2018	17.613	Nov 2019	0.000		17.613	Continuing	Continuing	-
<b>Subtotal</b>			-	17.759		17.044		17.613		0.000		17.613	Continuing	Continuing	N/A





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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207133F / <i>F-16 Squadrons</i>	<b>Project (Number/Name)</b> 672671 / <i>F-16 Squadrons</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-16 Development Efforts</i></b>				
Legacy Service Life Extension Program (SLEP) Structures Complete SLEP Kit Proof	3	2019	3	2019
MMC Upgrade / Display Generator Upgrade Flt Test Release	2	2019	2	2019
M7.2 OFP Field	3	2019	3	2019
AESA JEON Initial Fielding	3	2019	1	2020
Hybrid Flight Control Computer (HFLCC) AGCAS Field	1	2021	1	2021
Digital Radar Warning Receiver Flt Test Complete	1	2020	3	2020
Digital Radar Warning Receiver Fielding Recommendation	2	2021	2	2021
M7.3/8.03 OFP Fielding	3	2021	4	2021
M8.1 OFP Fielding	4	2021	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / <i>F-15E Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	308.218	203.183	336.079	0.000	336.079	382.204	185.237	188.136	70.442	Continuing	Continuing
670131: <i>F-15 Advanced Development</i>	0.000	42.107	0.000	67.400	0.000	67.400	0.000	0.000	0.000	0.000	0.000	109.507
676020: <i>F-15</i>	0.000	266.111	203.183	268.679	0.000	268.679	382.204	185.237	188.136	70.442	Continuing	Continuing

**Note**  
 This program, BA 7, PE 0207134F, project 670131, F-15EX, is a new start.  
 This program, BA 7, PE 0207134F, project 676020, F-15E Digital Color Display, is a new start.  
 This program, BA 7, PE 0207134F, project 676020, F-15E Data Transfer Module II, is a new start.

**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.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / <i>F-15E Squadrons</i>
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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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	320.271	192.883	241.404	0.000	241.404
Current President's Budget	308.218	203.183	336.079	0.000	336.079
Total Adjustments	0.000	0.000	94.675	0.000	94.675
• 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	94.675	0.000	94.675

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

**Project:** 676020: *F-15*

Congressional Add: *ALQ-128a*

	FY 2018	FY 2019
	-	50.000
Congressional Add Subtotals for Project: 676020	-	50.000
Congressional Add Totals for all Projects	-	50.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 670131 / F-15 Advanced Development
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
670131: F-15 Advanced Development	0.000	42.107	0.000	67.400	0.000	67.400	0.000	0.000	0.000	0.000	0.000	109.507
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0207134F, project 670131, F-15EX, is a new start.

**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 structures 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 35 years old with over 8,300 flight hours; the oldest F-15C was delivered in 1979. Logistics, maintenance, and training activities will heavily leverage existing the F-15 infrastructure.

ADCP II develops a common mission computer for the F-15C and F-15E. The current mission computers of both platforms have reached their limits of speed, memory and throughput. Additionally, digital systems have changed the security requirements of both platforms and the older mission computers cannot be upgraded to meet these new requirements. A common mission computer is expected to reduce future development and long term maintenance costs. The program will also develop a new F-15C cockpit display to replace an obsolete one. 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.

Mode 5 enables the NSA-mandated Mode 5 encryption and anti-jam for Air-Air Interrogator (AAI) and Identification Friend or Foe (IFF) systems. The Mode 5 program will remove, upgrade, and then replace the existing APX-114 and APX-119 on all F-15 aircraft in order to add Mode 5 capability.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> F-15EX	-	-	67.400	-	67.400
<b>Description:</b> 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.					
<b>FY 2020 Base Plans:</b>					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 670131 / F-15 Advanced Development
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>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). Pursue other non-recurring engineering activities to reduce integration risks. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> F-15EX will be a New Start program in FY20.</p>					
<p><b>Title:</b> Advanced Display Core Processor (ADCP ) II</p> <p><b>Description:</b> Program provides a new central computer for the entire F-15E fleet, replacing the ADCP I. Program also provides a new central computer, Remote Interface Unit (RIU) and Vertical Situation Display Replacement (VSDR)for the AESA-radar F-15C fleet, replacing the VCC and the existing F-15C Vertical Situation Display. This includes technical and acquisition-related studies.</p> <p><b>FY 2019 Plans:</b> Program funding ends in FY18</p> <p><b>FY 2020 Base Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>	40.918	0.000	0.000	-	0.000
<p><b>Title:</b> Mode 5</p> <p><b>Description:</b> Mode 5 enables the NSA-mandated Mode 5 encryption and anti-jam for Air-Air Interrogator (AAI) and Identification Friend or Foe (IFF) systems. The Mode 5 program will remove, upgrade, and then replace the existing APX-114 and APX-119 on all F-15 aircraft in order to add Mode 5 capability.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Base Plans:</b> N/A</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	1.189	0.000	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 670131 / F-15 Advanced Development

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	42.107	0.000	67.400	0.000	67.400

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 01 F015E0: F-15EX	-	-	1,050.000	-	1,050.000	1,652.000	1,685.000	1,719.000	1,753.000	Continuing	Continuing
• APAF 05 Line Item F01500: F-15 Modification of in Service Aircraft (PEs 0207130F, 0207134F, 0207445F, 0809731F)	137.882	103.066	169.200	0.000	169.200	144.726	74.673	76.042	51.517	0.000	757.106
• APAF 06 000999: Initial Spares/Repair Parts (BP16)	0.296	4.061	3.428	-	3.428	17.388	9.190	9.440	0.000	0.000	43.803
• APAF 07 F0150P: F-15 Post Production Support	0.000	0.000	7.500	-	7.500	4.500	4.500	0.000	0.000	0.000	16.500

**Remarks**

**D. Acquisition Strategy**

Development funds for F-15C/D and F-15E fleets 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.

At this time, the F-15EX acquisition strategy is pre-decisional since it has not been approved by the Milestone Decision Authority (MDA). However, 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 these systems are all projected to be mature when required for integration in the F-15EX, the acquisition strategy is deemed low risk. To rapidly field the F-15EX, the USAF plans to authorize long-lead procurements shortly after contract award, and focus engineering activities on ramping up the production line capacity and integrating existing systems. 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 670131 / F-15 Advanced Development
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	SS/CPFF	Boeing : St Louis, MO	0.000	-		-		67.400	Jun 2020	-		67.400	0.000	67.400	-
F-15 ADCP II Contract	SS/CPIF	Boeing : St Louis, MO	0.000	38.418	Nov 2017	-		-		-		-	0.000	38.418	-
F-15 ADCP II	C/Various	Various : Various	0.000	-		-		-		-		-	0.000	0.000	-
F-15 Mode 5	SS/Various	Boeing : St Louis, MO	0.000	1.189	Feb 2019	-		-		-		-	0.000	1.189	-
<b>Subtotal</b>			0.000	39.607		-		67.400		-		67.400	0.000	107.007	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.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Costs	Various	Various : Various	0.000	2.500	Sep 2018	-		-		-		-	0.000	2.500	-
<b>Subtotal</b>			0.000	2.500		-		-		-		-	0.000	2.500	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	42.107	0.000	67.400	-	67.400	0.000	109.507	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / <i>F-15E Squadrons</i>	<b>Project (Number/Name)</b> 670131 / <i>F-15 Advanced Development</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>F-15</b>																												
F-15EX NRE																												
ADCP II EMD																												
ADCP II FDE																												
ADS-B DT																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / <i>F-15E Squadrons</i>	<b>Project (Number/Name)</b> 670131 / <i>F-15 Advanced Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-15</i></b>				
F-15EX NRE	4	2020	4	2023
ADCP II EMD	1	2018	4	2018
ADCP II FDE	1	2018	2	2018
ADS-B DT	1	2018	3	2018

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons				<b>Project (Number/Name)</b> 676020 / F-15			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676020: F-15	0.000	266.111	203.183	268.679	0.000	268.679	382.204	185.237	188.136	70.442	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0207134F, project 676020, F-15E Digital Color Display, is a new start.  
 This program, BA 7, PE 0207134F, project 676020, F-15E Data Transfer Module II, is a new start.

**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 allows the Air Force to release software upgrades approximately every 2 to 3 years. 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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15
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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).

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b>Title:</b> Operational Flight Program (OFP) Development Efforts</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> 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, 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. Begin work on Future OFP's. Perform technical and acquisition related studies to ensure F-15 lethality and survivability beyond 2040.</p> <p><b>FY 2020 Base Plans:</b> 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, 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 lethality and survivability beyond 2040. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	111.047	33.992	73.493	-	73.493

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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Funding increased for increased OFP efforts					
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<b>Title:</b> Flight Test	28.744	17.314	27.346	0.000	27.346
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**Description:** Flight tested improvements initiated in prior years. 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.

**FY 2019 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 radar test aircraft instrumentation. Continues design of replacement radar test aircraft obsolete instrumentation. Continue Richter Lab modernization and sustainment provisions. Continue support to 896 TSS with additional manpower, to include prefabrication and surge capability, during increased F-15 modernization activity. This includes technical and acquisition-related studies.

**FY 2020 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 radar test aircraft 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. This includes technical and acquisition-related studies.

**FY 2020 OCO Plans:**

N/A

**FY 2019 to FY 2020 Increase/Decrease Statement:**

Funding increased due to additional flight test efforts.

<b>Title:</b> F-15 Radar Enhancements	49.892	45.831	69.523	-	69.523
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**Description:** Improvements to F-15 Radar Enhancements (EP). This includes technical and acquisition related studies.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b><i>FY 2019 Plans:</i></b> Continue implementation of EP into S9 and into Future OFFP's. Continue Special Projects testing support. Continue EP and Combat ID candidate risk reduction for future OFFP 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. This includes technical and acquisition-related studies.</p> <p><b><i>FY 2020 Base Plans:</i></b> Continue implementation of EP into OFFP's. Continue Special Projects testing support. Continue EP and Combat ID candidate risk reduction for future OFFP 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. This includes technical and acquisition-related studies. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding increased radar enhancement efforts</p>					
<p><b><i>Title:</i></b> F-15 Infrared Search and Track (IRST)</p> <p><b><i>Description:</i></b> The Infrared Search and Track (IRST) system provides F-15C/Ds 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, provides a passive infrared sensor system that searches for and detects infrared energy, and provides the aircraft mission computer track file data on infrared targets.</p> <p><b><i>FY 2019 Plans:</i></b> Continue technical and acquisitions studies, integration into OFFP, EMD asset build and qualification, integration testing and flight test. Begin integration of advanced sensors.</p> <p><b><i>FY 2020 Base Plans:</i></b> Continue technical and acquisitions studies, integration into OFFP, EMD asset build and qualification, integration testing and flight test. Continue integration of advanced sensors. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b></p>	57.256	45.376	18.272	-	18.272

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Funding decreased due to OFP 7.2 integration finishing and OFP 9.2 integration ramping up.					
<p><b>Title:</b> Mobile User Objective System (MUOS)/Second Generation Anti-jam Tactical UHF Radio for NATO(SATURN)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> FY 2019 Plan: Initiate study to identify gap and COAs; purchase preliminary test units and begin to integrate with GFP. Beginning of integration to the OFP's. Begin development of group A hardware.</p> <p><b>FY 2020 Base Plans:</b> 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.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased due to OFP 7.2 integration finishing and OFP 9.2 integration ramping up.</p>	0.000	4.000	65.000	-	65.000
<p><b>Title:</b> F-15 Multifunctional Information Distribution System - Joint Tactical Radio System (MIDS JTRS)</p> <p><b>Description:</b> This upgrade integrates and installs a new Link 16 system on the F-15C &amp; 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><b>FY 2019 Plans:</b> Continue ESIL and Boeing flight test program. This includes technical and acquisition-related studies, oversee ESIL &amp; flight test program. Monitoring, testing and incorporation of OFP fixes. System Verification Reviews on C &amp; E model aircraft.</p> <p><b>FY 2020 Base Plans:</b> Continue ESIL and Boeing flight test program. This includes technical and acquisition-related studies, oversee ESIL &amp; flight test program. Monitoring, testing and incorporation of OFP fixes. System Verification Reviews on C &amp; E model aircraft. Continue integration efforts to ensure system wide acceptance of new hardware/software and desired capabilities.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	15.672	6.670	11.320	-	11.320

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Funding increased due to an increase in integration costs.					
<p><b>Title:</b> Service Life Extension Program (SLEP) Wing Replacement</p> <p><b>Description:</b> The F-15C full scale fatigue test indicated the aircraft wing will not reach the required service life of 2045. This service life extension effort provides improved wings and internal components that may reduce Program Depot Maintenance requirements and supports ongoing development efforts.</p> <p><b>FY 2019 Plans:</b> Continue with developmental testing for the F-15C Wing variant and internal components. Conduct airworthiness assessment activities. This includes technical and acquisition-related studies</p> <p><b>FY 2020 Base Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>	1.470	0.000	0.000	-	0.000
<p><b>Title:</b> Cabin Pressure Indicator</p> <p><b>Description:</b> Cabin Pressure Indicator is an aircraft safety modification to help address situations in which aircrew incapacitation due to hypoxia may occur. The upgrade adds an improved cabin pressurization indication system to increase aircrew situational awareness when a gradual loss of cabin pressure occurs. Cabin Pressure Indicator was approved by Congress as a safety modification in FY16</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Base Plans:</b> N/A</p>	2.030	0.000	0.000	-	0.000
<p><b>Title:</b> F-15E Digital Color Display</p> <p><b>Description:</b> Digital Color Display will replace 2 F-15E current displays (1 in each cockpit) with digital color displays that allow for accurate distinction and identification of targets, ease pilot workload, improve identification of targets and friendlies, increase target accuracy, and decrease risk of frat/missed targeting.</p> <p><b>FY 2019 Plans:</b></p>	-	0.000	1.275	0.000	1.275

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
<p><b>FY 2020 Base Plans:</b> 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.</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program Funding begins in FY20.</p>					
<p><b>Title:</b> F-15E Data Transfer Module II</p> <p><b>Description:</b> Data Transfer Module II will replace current 2MB memory system with an updated data transfer device to improve mission planning capability and update interfaces.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Base Plans:</b> 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.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program Funding begins in FY20.</p>	-	0.000	2.450	-	2.450
<b>Accomplishments/Planned Programs Subtotals</b>	266.111	153.183	268.679	0.000	268.679

	FY 2018	FY 2019
<p><b>Congressional Add:</b> ALQ-128a</p> <p><b>FY 2019 Plans:</b> 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.</p>	-	50.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15
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	<b>FY 2018</b>	<b>FY 2019</b>
Complete Engineering and Manufacturing Development (EMD) and Integration.		
<b>Congressional Adds Subtotals</b>	-	50.000

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</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>	293.235	338.622	311.873	-	311.873	516.771	199.348	216.004	206.004	Continuing	Continuing
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts (BP16)</i>	6.176	7.718	34.718	-	34.718	39.173	12.048	12.624	20.401	Continuing	Continuing
• APAF 07 Line Item F0150P: <i>F-15 Post Production Support</i>	28.900	52.271	43.356	-	43.356	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**

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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
OFP Suite 8/9/10 Development and Test	SS/ Various	Boeing : St. Louis, MO	0.000	108.547	Aug 2018	30.492	Aug 2019	69.743	Aug 2020	-		69.743	Continuing	Continuing	-
F-15 Radar Enhancement	SS/ Various	Boeing : St Louis, MO	0.000	49.892	Aug 2018	45.831	Aug 2019	69.523	Aug 2020	-		69.523	Continuing	Continuing	-
F-15 Infrared Search and Track	SS/ Various	Boeing : St Louis, MO	0.000	57.256	Aug 2018	45.376	Feb 2019	18.272	Feb 2020	-		18.272	Continuing	Continuing	-
Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS)	SS/ Various	Boeing : St. Louis, MO	0.000	15.672	Jul 2018	6.670	Feb 2019	11.320	Feb 2020	-		11.320	Continuing	Continuing	-
Service Life Extension Program (SLEP) Wing Replacement	TBD	Not specified. : NV	0.000	1.470	Jan 2019	-		-		-		-	0.000	1.470	-
Cabin Pressure Indicator	TBD	TBD : Various	0.000	2.030	Jun 2019	-		-		-		-	0.000	2.030	-
Mobile User Objective System (MUOS) /Second Generation Anti-jam Tactical UHF Radio for NATO (SATURN)	C/CPAF	Boeing : St. Louis	0.000	-		4.000	Mar 2019	65.000	Jan 2020	-		65.000	Continuing	Continuing	-
F-15E Digital Color Display	TBD	TBD : TBD	0.000	-		-		1.275	Oct 2019	-		1.275	Continuing	Continuing	-
F-15E Data Transfer Module II	TBD	TBD : TBD	0.000	-		-		2.450	Apr 2020	-		2.450	Continuing	Continuing	-
ALQ-128a	TBD	TBD : TBD	0.000	-		45.176		-		-		-	0.000	45.176	-
<b>Subtotal</b>			0.000	234.867		177.545		237.583		-		237.583	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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / F-15E Squadrons	<b>Project (Number/Name)</b> 676020 / F-15
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Boeing (Contractor Test Support)	SS/CPFF	Boeing : St. Louis, MO	0.000	28.744	Aug 2018	17.314	Aug 2019	27.346	Aug 2020	-		27.346	Continuing	Continuing	-
<b>Subtotal</b>			0.000	28.744		17.314		27.346		-		27.346	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.

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Program Mgt Support Costs	Various	Various : Various	0.000	2.500	Sep 2018	8.324	Sep 2019	3.750	Sep 2020	-		3.750	Continuing	Continuing	-
<b>Subtotal</b>			0.000	2.500		8.324		3.750		-		3.750	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.

	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	0.000	266.111	203.183	268.679	-	268.679	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / <i>F-15E Squadrons</i>	<b>Project (Number/Name)</b> 676020 / <i>F-15</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>F-15</b>																												
OFP Continuous Development																												
OFP Suite 8E Fielding																												
OFP Integration and Test																												
OFP Suite 9 Fielding																												
Radar Enhancements Suite 8E Fielding																												
Radar Enhancements Suite 9 Fielding																												
Infrared Search and Track Integration and Test																												
Infrared Search and Track Integration and Test MS B																												
Infrared Search and Track Integration and Test EMD Award																												
Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS) Development																												
SLEP Wing Replacement Contract Award																												
ADS-B Contract Award																												
Mobile User Objective System (MUOS) Second Generation Anti-jam Tactical UUF Radio for NATO (SATURN) Study																												
ALQ-128a																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207134F / <i>F-15E Squadrons</i>	<b>Project (Number/Name)</b> 676020 / <i>F-15</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-15</i></b>				
OFP Continuous Development	1	2018	4	2022
OFP Suite 8E Fielding	1	2018	2	2018
OFP Integration and Test	1	2018	2	2019
OFP Suite 9 Fielding	1	2019	3	2021
Radar Enhancements Suite 8E Fielding	1	2018	2	2018
Radar Enhancements Suite 9 Fielding	1	2019	3	2021
Infrared Search and Track Integration and Test	1	2018	4	2020
Infrared Search and Track Integration and Test MS B	1	2018	1	2018
Infrared Search and Track Integration and Test EMD Award	4	2018	4	2018
Multifunctional Information Distribution System-Joint Technical Radio System (MIDS-JTRS) Development	1	2018	2	2020
SLEP Wing Replacement Contract Award	3	2018	3	2018
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

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / <i>Manned Destructive Suppression</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	11.735	15.238	15.521	0.000	15.521	15.792	16.119	16.413	16.709	Continuing	Continuing
674595: <i>F-16 HARM Targeting Sys</i>	-	11.735	15.238	15.521	0.000	15.521	15.792	16.119	16.413	16.709	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 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 HTS Revision 7 (HTS R7) 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 F-35 or a yet to be defined system. HTS R7 derived precision targeting data can be provided to all Joint Forces via Link-16. This effort continues preplanned product improvements (P3I) 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 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, 0605833F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / <i>Manned Destructive Suppression</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	15.106	15.238	15.521	0.000	15.521
Current President's Budget	11.735	15.238	15.521	0.000	15.521
Total Adjustments	-3.371	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	-2.934	0.000			
• SBIR/STTR Transfer	-0.437	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY18 reduction of \$0.437M for SBIR

FY18 reduction of \$2.934M due to Below Threshold Reprogramming for higher AF priorities.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> P3I R7 Software Upgrade (SWUP)	11.735	12.838	13.121	0.000	13.121
<b>Description:</b> P3I R7 Software Upgrade (SWUP). HTS SWUP risk reduction and software 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.					
<b>FY 2019 Plans:</b> HTS SWUP 3 risk reduction and software development efforts continue to include minor software updates (maintenance releases) in support of F-16 OFP M7.2 and M7.3, and candidate definition for the next SWUP upgrade. Mission support (i.e., program management for administrative and technical support) will continue. Down-selection of warfighter candidates for the next SWUP effort will occur, and risk reduction activities for subsequent SWUP upgrades will continue.					
<b>FY 2020 Base Plans:</b>					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / <i>Manned Destructive Suppression</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
HTS SWUP 3 continues from risk reduction to software development and preparation for flight testing. Mission support (i.e., program management for administrative and technical support) will continue. Risk reduction activities for subsequent SWUP 4 upgrades will continue.  <b>FY 2020 OCO Plans:</b> N/A  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase of \$283K to address inflation.					
<b>Title:</b> Flight Test  <b>Description:</b> 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.  <b>FY 2019 Plans:</b> Government flight test operations will begin for SWUP 3. This funding also includes baselining requirements from actual test data during recent flight testing.  <b>FY 2020 Base Plans:</b> 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.  <b>FY 2020 OCO Plans:</b> N/A  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No change	0.000	1.500	1.500	0.000	1.500
<b>Title:</b> Mission Planning  <b>Description:</b> 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.  <b>FY 2019 Plans:</b>	0.000	0.900	0.900	0.000	0.900

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / <i>Manned Destructive Suppression</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Continue mission planning in support of HTS SWUP 3 and future P3I upgrades. <b>FY 2020 Base Plans:</b> Continue mission planning in support of HTS SWUP 4 and future P3I upgrades. <b>FY 2020 OCO Plans:</b> N/A <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No Change					
<b>Accomplishments/Planned Programs Subtotals</b>	11.735	15.238	15.521	0.000	15.521

**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 Dec 15 as a Cost-Plus-Fixed-Fee (CPFF) contract type. This development effort will complete in Feb 19.

The SWUP 3 Engineering & Manufacturing Development (EMD) and SWUP 4 RR contract is planned to award in Mar 19 as a CPFF contract type and is a 36 month total 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 as effective as possible.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / Manned Destructive Suppression	<b>Project (Number/Name)</b> 674595 / F-16 HARM Targeting Sys
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/CPIF	Raytheon Systems Co. : Tucson, AZ	-	9.852	Feb 2018	10.803	Mar 2019	11.031	Feb 2020	-		11.031	Continuing	Continuing	-
JMPS	SS/CPIF	Multiple : Multiple	-	0.000	Sep 2018	0.900	May 2019	0.900	May 2020	-		0.900	Continuing	Continuing	-
<b>Subtotal</b>			-	9.852		11.703		11.931		-		11.931	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.000	Sep 2018	1.500	May 2019	1.500	Aug 2020	-		1.500	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		1.500		1.500		-		1.500	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	1.883	Mar 2018	2.035	Mar 2019	2.090	Mar 2020	-		2.090	Continuing	Continuing	-
<b>Subtotal</b>			-	1.883		2.035		2.090		-		2.090	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	<b>Project Cost Totals</b>		-	11.735	15.238	15.521	-	15.521	Continuing	Continuing

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / <i>Manned Destructive Suppression</i>	<b>Project (Number/Name)</b> 674595 / <i>F-16 HARM Targeting Sys</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Manned Destructive Suppression</i></b>																												
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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207136F / <i>Manned Destructive Suppression</i>	<b>Project (Number/Name)</b> 674595 / <i>F-16 HARM Targeting Sys</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Manned Destructive Suppression</i></b>				
SWUP 3 Risk Reduction	1	2018	2	2019
SWUP 3 Build A	2	2019	2	2020
SWUP 3 Build B	2	2019	2	2021
SWUP 4 Risk Reduction	2	2019	2	2022
SWUP 4 Build A	2	2020	2	2022
SWUP 4 Build B	2	2021	2	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	364.155	584.004	584.743	496.298	0.000	496.298	666.253	500.173	481.862	604.536	0.000	4,282.024
674785: <i>F-22</i>	85.835	390.539	387.807	420.138	0.000	420.138	488.216	500.173	481.862	604.536	Continuing	Continuing
674788: <i>F-22 Tactical Mandates</i>	278.320	193.465	196.936	76.160	0.000	76.160	178.037	0.000	0.000	0.000	0.000	922.918

**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 program 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	610.942	603.553	496.298	0.000	496.298
Current President's Budget	584.004	584.743	496.298	0.000	496.298
Total Adjustments	-26.938	-18.810	0.000	0.000	0.000
• Congressional General Reductions	-10.069	-18.810			
• 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	1.826	0.000			
• SBIR/STTR Transfer	-18.695	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY18 - (\$10.069M) Congressional mark for Small projects unjustified growth  
 - (\$18.695M) Small Business Innovation Research (SBIR) reduction  
 - \$ 1.826M Reprogramming

FY19 - (\$15.1M) Congressional mark for Navigation Systems program delay  
 - (\$3.61M) Federally Funded Research Development Center reduction

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons				<b>Project (Number/Name)</b> 674785 / F-22			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674785: F-22	85.835	390.539	387.807	420.138	0.000	420.138	488.216	500.173	481.862	604.536	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**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 program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Update 6 Interoperability	48.530	8.110	0.000
<p><b>Description:</b> Update 6 (U6) Interoperability, is an Operational Flight Program (OFP) update providing cryptographic updates required by the National Security Agency (NSA) to Intra-Flight Data Link (IFDL), Link-16, and Tactical Secure Voice (TSV) 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 previously 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 program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> 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.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Development program ends in FY19			
<p><b>Title:</b> Operational Software Development</p> <p><b>Description:</b> Operational Software Development (OSD) has been utilizing 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. OSD 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.</p> <p><b>FY 2019 Plans:</b> F-22 will establish an initial cloud-based computing environment to begin leveraging commercially-based Agile software and hardware development best practices and tools. Also, the F-22 enterprise will partner with commercial Agile hardware and software companies to increase the speed and quality of product delivery to the warfighter.</p> <p><b>FY 2020 Plans:</b> F-22 will continue maturing and scaling cloud-based computing environment to leverage commercially-based Agile software and hardware development best practices and tools. Also, the F-22 enterprise will continue partnerships with commercial Agile hardware and software companies to increase the speed and quality of product delivery to the warfighter.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$5.133M increase from FY19 to FY20. See above for details.</p>	3.400	7.717	12.850
<p><b>Title:</b> Advanced Technology Development (ATD)</p> <p><b>Description:</b> Technology maturation, risk reduction, studies, demonstrations and prototypes of classified F-22 development efforts. The F-22 ATD Program is conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> Continue technology maturation and risk reduction projects in support of various classified F-22 development efforts. Provide continued technology maturation and acquisition planning in support of the F-22 Sensor Enhancements Program.</p> <p><b>FY 2020 Plans:</b> Continue technology maturation and risk reduction projects in support of various classified F-22 development efforts. Provide continued technology maturation and acquisition planning in support of the F-22 Sensor Enhancements Program.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	124.939	102.310	59.088

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
\$43.222M decrease from FY19 to FY20. See above for details.				
<p><b>Title:</b> Sensor Enhancements</p> <p><b>Description:</b> As part of the F-22 Capability Pipeline and through Section 804 Middle Tier Acquisition authority, Sensor Enhancements improves sensor capabilities to maintain air dominance and preserve first shot, first kill capability. The F-22 Sensor Enhancement Program is conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> Continue integration studies to utilize the results from related ATD efforts as part of assessing the overall program technological readiness to support a 2020 Fielding Decision.</p> <p><b>FY 2020 Plans:</b> Provide a Fielding Decision and continue software development for fleet release in preparation for fielding.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$84.560M increase from FY19 to FY20. See above for details.</p>		-	92.870	177.430
<p><b>Title:</b> System Engineering/Program Management Support</p> <p><b>Description:</b> Provides F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.</p> <p><b>FY 2019 Plans:</b> Provide F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.</p> <p><b>FY 2020 Plans:</b> System Engineering/Program Management provides support to include F-22 Program-Wide Planning and Execution, Strategic Analysis and Support, Cost Estimating Data, and Systems engineering Process Management.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$0.230M increase from FY19 to FY20. See above for details.</p>		9.470	6.830	7.060
<p><b>Title:</b> Reliability and Maintainability Program (RAMP)</p> <p><b>Description:</b> The RAMP Program provides for solution identification and integration of modifications to improve reliability, availability and maintainability (RAM) for the F-22 combined test fleet, located at Edwards AFB. The associated RAMP effort (O&amp;M funded) develops candidate initiatives which are down-selected for implementation and integration based on their</p>		2.500	1.000	1.150

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
development maturity and impact on the F-22 life cycle costs. The RAMP program includes modifications to address corrosion, reduce maintenance hours, increase safety, and provide urgent response requirements to the F-22 fleet.				
<b>FY 2019 Plans:</b> Continue retrofit modifications on the combined test fleet aircraft in order to improve system/component reliability, maintainability and reduce F-22 weapon system life cycle costs. Beginning in FY 2019, the retrofit modification program will support four (4) operational test aircraft, with the addition of previously stored aircraft being brought into the combined test fleet.				
<b>FY 2020 Plans:</b> Continue retrofit modifications on the combined test fleet aircraft in order to improve system/component reliability, maintainability and reduce F-22 weapon system life cycle costs.				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$0.150M increase from FY19 to FY20. See above for details.				
<b>Title:</b> F-22 Small Projects		20.311	15.000	16.690
<b>Description:</b> Provides F-22 technology studies and demonstrations to include, but not be limited to, Low Observable (LO) Signature Management, Threat Modeling Support, Developmental Test (DT) Weapon Assets, Pilot Training (PT), Dynamic Synthetic Aperture Radar (SAR), Flight Test Engine Refurbishment, Support Equipment Development, Government Furnished Equipment (GFE), and Electronic Warfare (EW) system enhancements to counter evolving threats. F-22 Small Projects are conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.				
<b>FY 2019 Plans:</b> Continue F-22 technology studies and demonstrations for DT Weapon Assets, Threat Modeling Support, Test Support, Test Aircraft Modifications, CRIIS Network development, PT, Dynamic SAR, FES, GFE, and continue acquisition planning for EW enhancements.				
<b>FY 2020 Plans:</b> Continue F-22 technology studies and demonstrations for DT Weapon Assets, Threat Modeling Support, Test Support, Test Aircraft Modifications, CRIIS Network development, PT, Dynamic SAR, FES, GFE, and continue acquisition planning for EW enhancements.				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$1.690M increase from FY19 to FY20. See above for details.				
<b>Title:</b> Combined Test Force (CTF)		54.601	57.930	60.730

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> The F-22 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 flight testing is conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> Significant programs scheduled for flight test at AFTC include: F-22 Mode 5 Identification Friend &amp; Foe (IFF), Link 16, Sensor Enhancements, refueling certifications, Special Projects, ATD, and CRIIS. Also will continue flight test planning using Agile methods for the following programs: F-22 Mode 5 IFF, Link 16, Sensor Enhancements, Special Projects, Helmet Mounted Display, GPS M-Code, ATD, and CRIIS.</p> <p><b>FY 2020 Plans:</b> Significant programs scheduled for flight test at AFTC include: F-22 Mode 5 IFF, Link 16, Sensor Enhancements, refueling certifications, Special Projects, ATD, and CRIIS. Also will continue flight test planning using Agile methods for the following programs: F-22 Mode 5 IFF, Link 16, Sensor Enhancements, Special Projects, GPS M-Code, ATD, and CRIIS.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$2.800M increase from FY19 to FY20. See above for details.</p>			
<p><b>Title:</b> Laboratory Test and Operations (LTO)</p> <p><b>Description:</b> The LTO is a continuous activity that plans and conducts development, integration, test, and verification of F-22 OFPs with F-22 hardware. LTO provides maintenance, staffing, and operation of 18 development labs including five unique major System Integration Laboratories (SILs): the Agile Integration Lab (AIL), the Raptor Integration Lab (RaIL), the Air Combat Simulation (ACS) Lab, the Vehicle System Simulator (VSS), and the Flying Test Bed (FTB). Through the ACS, LTO provides the combat air forces with advanced mission-level test and training capability via a fully representative virtual simulation. F-22 LTO is conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> Maintain lab availability in support of F-22 programs. Update critical systems to include technology refresh and laboratory improvements required to support new aircraft configurations and capabilities. Accomplish OFP verification and risk reduction. Support pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test &amp; Evaluation Center test planning; and test event rehearsals. Support periodic AFWC operational mission data updates. Will continue Lab test planning</p>	123.588	83.330	65.290

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>using Agile methods for the following programs: F-22 Mode 5 IFF, Link 16, Update 6, Sensor Enhancements and ATD. The significant programs planned for lab test are F-22 Link 16, Mode 5 IFF, Update 6, ATD and AFWC mission data loads.</p> <p><b>FY 2020 Plans:</b> LTO plans to incorporate virtual components into the SILs to support faster testing and assessment of F-22 enhancements. Maintain lab availability in support of F-22 programs. Update critical systems to include technology refresh and laboratory improvements required to support new aircraft configurations and capabilities. Accomplish OFP verification and risk reduction. Support pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test &amp; Evaluation Center test planning; and test event rehearsals. Support periodic AFWC operational mission data updates. Will continue Lab test planning using Agile methods for the following programs: F-22 Mode 5 IFF, Link 16, Update 6, Sensor Enhancements and ATD. The significant programs planned for lab test are F-22 Link 16, Mode 5 IFF, Update 6, ATD and AFWC mission data loads.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$18.040M decrease from FY19 to FY20. See above for details.</p>			
<p><b>Title:</b> Navigation Systems</p> <p><b>Description:</b> 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 GPS degraded environments. As part of the F-22 Capability Pipeline and through Section 804 Middle Tier Acquisition authority, this effort will include the integration of Embedded Global Positioning System (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 assured PNT. This major thrust also captures F-22 program activities related to integrating the advanced Talon SPITBALL Link 16 antenna onto the F-22. 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 program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> Begin execution of Technical Maturation and Risk Reduction (TMRR) on the F-22 GPS CRPA. Support efforts for Engineering, Manufacturing and Development (EMD) of EGI-M as they relate to integration of EGI-M onto F-22, to include purchase orders of EGI-M Engineering Developmental Models for initial F-22 integration testing. Support studies and risk reduction activities for Talon SPITBALL</p> <p><b>FY 2020 Plans:</b> Complete TMRR activities for F-22 GPS CRPA and transition to EMD; FY2020 activities will include system level testing of the CRPA in F-22 system labs. Place purchase orders of EGI-M Production Representative Units that will support F-22 system test</p>	3.200	12.710	19.850

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
and flight test of the EGI-M. 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.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$7.140M increase from FY19 to FY20. See above for details.			
<b>Accomplishments/Planned Programs Subtotals</b>	390.539	387.807	420.138

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line Item F02200: <i>F-22A Squadrons, PE 0207138F*</i>	280.593	405.650	436.974	-	436.974	585.822	611.719	651.622	554.501	Continuing	Continuing
• RDTE 07 PE 0605213F: <i>Increment 3.2B, RDT&amp;E**</i>	13.600	0.000	0.000	-	0.000	0.000	-	-	-	0.000	13.600
• APAF 05 Line Item F2232B: <i>F-22 Increment 3.2B, PE 0207138F***</i>	102.907	2.000	20.200	-	20.200	5.963	-	-	-	0.000	131.070
• RDTE 07 PE 0207138F: <i>F-22 Tactical Mandates</i>	197.793	196.936	76.160	-	76.160	178.037	-	-	-	0.000	648.926

**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, RDT&E/PE 0605213F, includes funding for FY 2013 and beyond identified in the Increment 3.2B documentation. PEs 0605213F and 0207318F share lab and infrastructure support costs across the F-22 enterprise.

\*\*\*F-22 Increment 3.2B, APAF/PE 0207138F includes funding for associated 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 (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 (OFP) upgrades, and associated efforts essential to accomplishing the F-22 mission.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674785 / <i>F-22</i>

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Update 6 Interoperability	SS/ Various	Lockheed Martin : Fort Worth, TX	85.835	48.530	Mar 2018	8.110	Mar 2019	-		-		-	0.000	142.475	-
Operational Software Development	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	3.400	Nov 2017	7.717	Nov 2018	12.850	Nov 2019	-		12.850	Continuing	Continuing	-
Advanced Technology Development	Various	Various : Various	0.000	124.939	Nov 2017	102.310	Nov 2018	59.088	Nov 2019	-		59.088	Continuing	Continuing	-
Sensor Enhancements	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	-		92.870	Dec 2018	177.430	Dec 2019	-		177.430	651.220	921.520	-
System Engineering / Program Management	SS/CPFF	Lockheed Martin : Fort Worth, TX	0.000	9.470	Apr 2018	6.830	Apr 2019	7.060	Apr 2020	-		7.060	Continuing	Continuing	-
RAMP	SS/CPFF	Lockheed Martin : Fort Worth, TX	0.000	2.500	Dec 2017	1.000	Dec 2018	1.150	Dec 2019	-		1.150	Continuing	Continuing	-
F-22 Small Projects	Various	Various : Various	0.000	20.311	Feb 2018	15.000	Feb 2019	16.690	Feb 2020	-		16.690	Continuing	Continuing	-
Navigation Systems	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	3.200	Feb 2018	12.710	Jan 2019	19.850	Jan 2020	-		19.850	123.210	158.970	-
<b>Subtotal</b>			85.835	212.350		246.547		294.118		-		294.118	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Combined Test Force	Various	Various : Various	0.000	54.601	Jan 2018	57.930	Jan 2019	60.730	Jan 2020	-		60.730	Continuing	Continuing	-
Laboratory Test & Operations (LTO)	SS/ Various	Lockheed Martin : Ft Worth, TX	0.000	123.588	Jan 2018	83.330	Jan 2019	65.290	Jan 2020	-		65.290	Continuing	Continuing	-
<b>Subtotal</b>			0.000	178.189		141.260		126.020		-		126.020	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	85.835	390.539	387.807	420.138	-	420.138	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674785 / <i>F-22</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-22 Squadrons</i></b>				
Update 6 Interoperability Critical Design Review (CDR)	2	2018	2	2018
Update 6 Interoperability Flight Test	1	2018	1	2019
Update 6 Interoperability Deployment Decision Review	3	2019	3	2019
Update 6 Interoperability Full Deployment Decision(Fleet Release)	3	2019	3	2019
Advanced Technology Development Demonstrations	1	2018	4	2024
Advanced Technology Development Studies & Analysis	1	2018	4	2024
Pilot Systems Development, Integration and Test	4	2018	4	2019
Navigation Systems Development, Integration, and Test	2	2018	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons				<b>Project (Number/Name)</b> 674788 / F-22 Tactical Mandates			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674788: F-22 Tactical Mandates	278.320	193.465	196.936	76.160	0.000	76.160	178.037	0.000	0.000	0.000	0.000	922.918
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**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 program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Link 16	126.072	79.710	20.460
<p><b>Description:</b> This major thrust was formally known as TAClink 16. As part of the F-22 Capability Pipeline and through Section 804 Middle Tier Acquisition authority, Link 16 consists of software and hardware development necessary to field Link 16 Transmit capability on the F-22. Link 16 Transmit will be accomplished via an OSA architecture integrated with F-22 legacy avionics. The OSA implementation will provide a pathway to more competitive and open future F-22 modernization. Includes mission support requirements for the F-22 Program Office to include, but not be limited to, travel, computer costs, and other miscellaneous contract support. The F-22 Link 16 program is conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.</p> <p><b>FY 2019 Plans:</b> Link 16 will continue EMD and system lab test. Hardware for Development Test (DT) flight will deliver, DT aircraft will be modified, and DT flights will commence</p> <p><b>FY 2020 Plans:</b></p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674788 / F-22 Tactical Mandates		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Link 16 will complete DT and operational test (OT).				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$59.250M decrease from FY19 to FY20. See above for details.				
<b>Title:</b> Mode 5 Identification Friend or Foe (IFF)		59.700	92.066	41.540
<b>Description:</b> This Major thrust was formally known as F-22 Tactical Mandates (TACMAN). As part of the F-22 Capability Pipeline and through Section 804 Middle Tier Acquisition authority, Mode 5 IFF consists of software development and hardware necessary to provide tactical Mode 5 IFF Transpond and Interrogate on the F-22. Mode 5 IFF also provides an opportunity to incorporate other updates to Link 16 capabilities into the Raptor. Includes mission support requirements for the F-22 Program Office to include, but not be limited to, travel, computer costs, and other miscellaneous contract support. The F-22 Mode 5 IFF program is conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.				
<b>FY 2019 Plans:</b> Mode 5 IFF Transpond and Interrogate will continue EMD. Production representative hardware will deliver to system labs, followed by the beginning of system lab test of hardware and iterative software releases. Limited Mode 5 IFF Transpond capabilities will deliver into DT for Release 1.				
<b>FY 2020 Plans:</b> Mode 5 IFF Transpond capabilities will continue DT and OT. Mode 5 IFF Interrogate capabilities will continue EMD and begin system lab test of hardware and software.				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> \$50.526M decrease from FY19 to FY20. See above for details.				
<b>Title:</b> Lab and Combined Test Force (CTF)		7.693	25.160	14.160
<b>Description:</b> The Lab Test and Operations (LTO) is a continuous activity that plans and conducts development, integration, test, and verification of Link 16 and Mode 5 IFF OFPs and hardware. The LTO provides maintenance, staffing, and operation of 18 development labs including five unique major SILs: the AIL, RaIL, ACS, and VSS. The F-22 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 of Link 16 and Mode 5 IFF early before they are more difficult and costly to resolve. The F-22 Raptor's Lab and CTF are conducted using a rapid acquisition construct leveraging commercial best practices such as Agile and Lean. This allows the F-22 Raptor program to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature.				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674788 / <i>F-22 Tactical Mandates</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b><i>FY 2019 Plans:</i></b> Continue lab testing and planning for CTF testing for Link 16 and Mode 5 IFF.			
<b><i>FY 2020 Plans:</i></b> Continuous planning and execution of Lab and CTF testing for Link 16 and Mode 5 IFF capabilities.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> \$11.000M decrease from FY19 to FY20. See above for details.			
<b>Accomplishments/Planned Programs Subtotals</b>	193.465	196.936	76.160

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 07 PE 0207138F: <i>F-22A Squadrons*</i>	403.080	406.617	420.138	-	420.138	488.216	500.173	481.862	604.536	Continuing	Continuing
• APAF 05 Line Item F02200: <i>F-22A Squadrons, PE 0207138F**</i>	281.599	345.650	445.074	-	445.074	585.822	607.669	647.572	554.501	Continuing	Continuing
• RDTE 05 PE 0605213F: <i>F-22A Increment 3.2B***</i>	13.600	0.000	0.000	-	0.000	-	-	-	-	0.000	13.600
• APAF 05 Line Item F2232B: <i>F-22A Increment 3.2B, PE 0207138F****</i>	113.038	9.007	20.213	-	20.213	5.963	-	-	-	0.000	148.221

**Remarks**

\*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 Increment 3.2B, RDT&E/PE 0605213F, includes funding for the development of F-22A, Increment 3.2B and share lab and infrastructure costs across the F-22 enterprise.

\*\*\*\*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. manage various modernization projects. The REDI II contract is a follow-on to the initial REDI contract. REDI II

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
3600 / 7	PE 0207138F / <i>F-22A Squadrons</i>	674788 / <i>F-22 Tactical Mandates</i>

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.

**E. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674788 / F-22 Tactical Mandates
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>F-22 TACTICAL MANDATES</b>																												
Link 16 Development , Integration & Test																												
Link 16 Preliminary Design Review (PDR)																												
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 Preliminary Design Review (PDR)																												
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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674788 / <i>F-22 Tactical Mandates</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-22 TACTICAL MANDATES</i></b>				
Link 16 Development , Integration & Test	1	2018	3	2020
Link 16 Preliminary Design Review (PDR)	1	2018	1	2018
Link 16 & IFF Transpond Developmental Test	3	2019	2	2020
Link 16 & IFF Transpond Production Decision	4	2019	4	2019
Link 16 & IFF Transpond Installs	4	2020	4	2023
Mode 5 IFF Development, Integration & Test	1	2018	3	2023
Mode 5 IFF Preliminary Design Review (PDR)	1	2018	1	2018
Mode 5 IFF Interrogate Developmental Test	2	2022	3	2023
Mode 5 IFF Interrogate Production Decision	3	2022	3	2022
Mode 5 IFF Interrogate Installs	2	2023	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	399.460	325.224	503.928	99.943	0.000	99.943	132.471	70.160	36.121	15.597	Continuing	Continuing
675346: <i>F-35</i>	351.791	291.080	426.494	11.850	0.000	11.850	7.693	4.948	4.196	3.745	Continuing	Continuing
675349: <i>HPSI</i>	0.000	0.000	0.000	16.754	0.000	16.754	18.449	19.884	20.282	0.000	0.000	75.369
676011: <i>JSF DUAL CAPABLE AIRCRAFT</i>	47.669	34.144	77.434	71.339	0.000	71.339	106.329	45.328	11.643	11.852	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. 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).

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. Additionally, 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 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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	
<p>Beginning in FY20, 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.</p> <p>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.</p> <p>USAF F-35 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.</p> <p>This program element does 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.</p> <p>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 2018 Air Force penalty total is \$14.373M. 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.</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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	334.530	549.501	598.498	0.000	598.498
Current President's Budget	325.224	503.928	99.943	0.000	99.943
Total Adjustments	-9.306	-45.573	-498.555	0.000	-498.555
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-45.573			
• 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	-9.306	0.000			
• Other Adjustments	0.000	0.000	-498.555	0.000	-498.555

**Change Summary Explanation**

FY18: reduced -\$9.306M for SBIR/FFRDC

FY19: reduced -\$45.573 by Congress for excess growth

FY20: USAF Common Block 4 funding moved in FY20 from PE 0207142F to PE 0604840F. Funding remaining in PE 0207142F will resource USAF unique UIDES, Seek Eagle, and DCA requirements.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons				<b>Project (Number/Name)</b> 675346 / F-35			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675346: F-35	351.791	291.080	426.494	11.850	0.000	11.850	7.693	4.948	4.196	3.745	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Total cost, including International partner contributions, USN, USMC, and USAF funding: FY2018 \$725.610M; FY19 \$1,098.362M; FY20 USAF only \$11.850M. Other ongoing efforts previously included in this PE continue in PE 0604840F.

F-35 C2D2 Includes:

FY13-19 PE 0207142F BPAC 675346, 675349

FY20: USAF 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 FY20, 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.

USAF F-35 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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675346 / F-35

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Title:</b> Block 4 Planning and System Engineering</p> <p><b>Description:</b> Block 4 Planning and Systems Engineering preliminary design and delta Systems Requirements Review (SRR) for all variants of the F-35 Aircraft. Modernization efforts are the Requirements Decomposition of capabilities for the entire Block 4 upgrade to include Sub-blocks 4.1 and 4.2. This is a continuation of the previous Block 4 Requirements Decomposition effort which will include activities leading up to a successful 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. Expected completion of a Block 4.1 Preliminary Design Review (PDR) and a Block 4.2 SRR will address additional Block 4 capabilities requirements. Post-PDR risk reduction, preplanning for subsequent Block 4 Modernization events, and investments to deliver the full Block 4 Air System capabilities are included.</p> <p>Beginning in FY20, 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><b>FY 2019 Plans:</b> Continue Block 4 Phase II contract development. Conduct Block 4 SRR and PDR activities as well as continue risk reduction and planning. Continuing development and maturity of key long lead capabilities and service unique weapons. Begin Developmental Flight Test of initial Block 4 capabilities.</p> <p><b>FY 2020 Plans:</b> Continue to support/develop companion USAF F-35 UIDES projects to support the IER updates and related new functionality.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding previously programmed for this on-going effort has moved to the Common Block 4 requirements PE 0604840F beginning in FY20. USAF-unique UIDES funding remains in 0207142F.</p>	197.314	213.559	2.550
<p><b>Title:</b> Technology Refresh 3 (TR-3)</p> <p><b>Description:</b> Technology Refresh 3 (TR-3) Design Competition, Development, Integration, and Test. This is the design phase of the TR-3 program which fully supports Block 3F functionality and allows incorporation of all Block 4 capabilities documented in the</p>	144.550	98.000	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675346 / F-35		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>System Requirements Document (SRD). TR-3 hardware redesign is required to support 4X processing growth factor based on the current processing estimates for all 3F capabilities. Redesign of TR-3 subsystems Integrated Core Processor (ICP), Aircraft Memory System (AMS), and Panoramic Cockpit Display (PCD)) configurations will contain new backplane technology, commercial operating systems, and modified middleware necessary to take the design of the TR-3 System through Critical Design Review (CDR).</p> <p><b>FY 2019 Plans:</b> The TR-3 program will continue design toward Critical Design Review of the Integrated Core Processor (ICP), Panoramic Cockpit Display (PCD), and Aircraft Memory System (AMS). In addition the TR-3 program will prototype the middleware software that will enable F-35's new messaging architecture delivered as part of TR-3 and ensure compatibility with current F-35 sensors. Additionally the initial lab stand up will occur to ensure timely first article delivery to the production line in FY23.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Common Block 4 requirements moved to PE 0604840F beginning in FY20.</p>				
<p><b>Title:</b> Infrastructure and Support Costs</p> <p><b>Description:</b> 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. Other costs in support of ranges, chase planes and DT site operations.</p> <p><b>FY 2019 Plans:</b> Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Transfer of integrated test force requirement to C2D2 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. Conduct strategic basing analysis to determine permanent location for core of HPSI.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Common Block 4 requirements moved to PE 0604840F beginning in FY20. HPSI moved to BPAC 675349 (in PE 0207142F) beginning in FY20.</p>		172.641	185.163	-
<p><b>Title:</b> Test and Evaluation</p> <p><b>Description:</b> Developmental Test activities in support of Block 4. 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. 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).</p>		211.105	480.714	9.300

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675346 / F-35
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<p>Beginning in FY20, the USAF will support FTI wiring and weapons integration tasks related to Seek Eagle Requests. These tasks include, but aren't limited to, envelope expansion, mixed loads testing, and adding additional stores.</p> <p><b>FY 2019 Plans:</b> Funding will support flight test execution to ensure Block 4 capabilities are delivered as designed. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes instrumenting new DT aircraft, ordering the replacement of pre-LRIP aircraft engines, continuing the FY18 NRE work, and delivery and install of upgraded hardware as a part of the DT aircraft viability effort. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment.</p> <p><b>FY 2020 Plans:</b> USAF only funding will begin supporting Seek Eagle requests by providing FTI wiring and supporting weapons integration tasks.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding previously programmed for this on-going effort has moved to the Common Block 4 requirements PE 0604840F beginning in FY20. USAF-unique UIDES funding remains in 0207142F.</p>			
<p><b>Title:</b> Autonomic Logistics Information System (ALIS) Development</p> <p><b>Description:</b> Autonomic Logistics Information System (ALIS) continues to deliver the core logistics infrastructure requirements for the F-35 enterprise. ALIS includes features such as aircraft scheduling, training delivery and 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: current ALIS which includes Agile DevOps and ALIS Next.</p> <p>Current ALIS is focused on developing new software that uses the current software as a baseline. Upcoming software releases include 3.5, 3.6 and 3.7 builds. 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><b>FY 2019 Plans:</b></p>	0.000	120.926	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 675346 / <i>F-35</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Continue Current ALIS software development efforts and deliver ALIS build 3.5, which contains critical software stabilization improvements. Current ALIS efforts will also continue to transition to a pure Agile DevOps development framework. ALIS Next efforts will produce a reference architecture and a detailed transition plan to the new architecture.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding for this ongoing effort moved to PE 0604840F beginning FY20.			
<b>Accomplishments/Planned Programs Subtotals</b>	725.610	1,098.362	11.850
Other Service Funding Adjustment	434.530	671.868	-
<b>Air Force Subtotals</b>	291.080	426.494	11.850

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 07 0604840F: <i>F-35 C2D2</i>	0.000	0.000	694.455	-	694.455	786.513	550.100	451.737	522.023	Continuing	Continuing
• RDTE 07 PE 0207142F	34.145	77.434	71.339	-	71.339	103.329	45.328	11.643	11.852	Continuing	Continuing
6011: <i>Dual Capable Aircraft (DCA), BPAC 676011</i>											
• RDTE 05 PE 0604810N 2936: <i>F-35C Follow-on Modernization (CV)</i>	138.308	-	-	-	-	-	-	-	-	0.000	138.308
• RDTE 07 PE 0604840N 2936: <i>F-35C Follow-on Modernization (CV)</i>	-	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing
• RDTE 05 PE 0604810M 2935: <i>F-35B Follow-on Modernization (STOVL)</i>	139.369	-	-	-	-	-	-	-	-	0.000	139.369
• RDTE 07 PE 0604840M 3410: <i>F-35B Follow-on Modernization (STOVL)</i>	-	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing
• RDTE International: <i>International FoM</i>	157.042	209.763	281.887	-	281.887	339.139	224.501	189.728	158.811	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 675346 / <i>F-35</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**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 Air Force.

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

PE 0604810M/N ends in FY18 and continues in PE 0604840M/N as budget moves from BA05 to BA07.

PE 0207142F common Block 4 requirements moved in FY20 to PE 0604840F to separate USAF unique requirements.

**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. The F-35 Acquisition Strategy is currently being updated to add a section regarding C2D2.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675346 / F-35
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/CPFF	Lockheed Martin : Ft Worth, TX	28.140	198.478	Apr 2018	142.759	Dec 2018	-		-		-	1,031.289	1,400.666	1,614.161
Prime LM 14-G-0020 TR3	C/CPFF	Lockheed Martin : Ft Worth, TX	96.837	142.952	Mar 2018	98.000	Dec 2018	-		-		-	510.000	847.789	878.558
Prime LM BOA 0020 (Nimble Lightning+Pilot Training)	C/CPFF	Lockheed Martin : Ft Worth, TX	4.706	4.250	Mar 2018	4.500	Mar 2019	-		-		-	17.500	30.956	31.216
Prime LM Flight Test Asset	Various	Various : TBD	0.000	37.548	Jul 2018	139.110	Jan 2019	-		-		-	406.000	582.658	528.894
Prime LM IDIQ (ECASE)	SS/CPFF	Lockheed Martin : Ft Worth, TX	0.000	5.000	Jun 2018	-		-		-		-	168.000	173.000	253.520
Prime LM TBD DT AC Viability	C/CPFF	Lockheed Martin : Ft Worth, TX	0.000	40.000	Mar 2018	32.750	Jan 2019	-		-		-	415.000	487.750	580.305
Prime PW Propulsion	SS/CPFF	Pratt Whitney : TBD	0.000	0.000		136.000	Feb 2019	-		-		-	220.000	356.000	269.450
Prime LM Infrastructure	C/CPFF	Lockheed Martin : Ft Worth, TX	0.000	26.312	Sep 2018	75.800	Nov 2018	-		-		-	345.000	447.112	445.550
Prime LM TBD JRE	C/CPFF	Lockheed Martin : Ft Worth, TX	0.000	7.500	Sep 2018	35.000	Dec 2018	-		-		-	0.000	42.500	-
ALIS Re-Architecture/Next/ALIS Dev	C/CPFF	Lockheed Martin : Ft Worth, TX	0.000	0.000		66.411	Jan 2019	-		-		-	0.000	66.411	-
System Engineering	C/CPFF	Lockheed Martin : Ft Worth, TX	5.342	17.800	Feb 2018	31.300	Jan 2019	-		-		-	0.000	54.442	-
Prior Year no longer funded in FYDP	Various	Various : TBD	144.540	-		-		-		-		-	0.000	144.540	144.540
<b>Subtotal</b>			279.565	479.840		761.630		-		-		-	3,112.789	4,633.824	N/A

**Remarks**  
 Combined ECASE contract line into Systems Engineering line to delete duplicative line items as ECASE contract is a vehicle used for Systems Engineering efforts.  
 Block 4 Modernization on R-2A includes Phase II, Nimble Lightning, JRE, ALIS Re-arch, & Systems Engineering.  
 Flight Test assets include weapons to support Test and assets needed for flight test instrumentation.  
 Broke out Prime LM TBD JRE line & ALIS Re-arch lines separately from Block 4 Phase II contract line due to change in contracting strategy.  
 Broke out USAF UIDES requirement from systems engineering for visibility.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675346 / F-35
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
NAWC Paxutent River	WR	NAWCAD : Paxutent River, MD	16.098	8.550	Dec 2017	32.400	Dec 2018	-		-		-	Continuing	Continuing	-
NAWC China Lake	WR	NAWCWD : China Lake, CA	1.029	2.550	Dec 2017	6.275	Dec 2018	-		-		-	43.083	52.937	-
Edwards Air Force Base	Various	Edwards AFB : Various	0.986	0.500	Dec 2017	0.000		-		-		-	14.175	15.661	-
AFFTC / Eglin AFB	Various	Eglin : Various	2.265	3.450	Jan 2018	3.500	Dec 2018	-		-		-	15.268	24.483	-
AFLCMC/Wright Patterson AFB	MIPR	AFLCMC : Wright Patterson AFB, OH	1.286	1.125	Dec 2017	3.978	Dec 2018	-		-		-	13.923	20.312	-
Development Support	Various	Various : TBD	16.585	15.144	Dec 2017	22.212	Dec 2018	-		-		-	34.513	88.454	-
JRE Development Support	Various	Various : TBD	0.000	23.520	Jan 2018	18.300	Dec 2018	-		-		-	0.000	41.820	-
ALIS Development Support	Various	Various : TBD	0.000	10.739	Jan 2018	54.515	Dec 2018	-		-		-	0.000	65.254	-
USAF Seek Eagle	Various	Various : TBD	0.000	-		-		9.300	Mar 2020	-		9.300	0.000	9.300	-
USAF UIDES	Various	Various : TBD	0.000	-		-		2.550	Feb 2020	-		2.550	0.000	2.550	-
<b>Subtotal</b>			38.249	65.578		141.180		11.850		-		11.850	Continuing	Continuing	N/A

**Remarks**

Broke out JRE and ALIS Development Support from Block 4 Phase II contract line due to change in contracting strategy.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
NAWC Paxutent River	WR	Various : Paxutent River, MD	0.000	37.500	Feb 2018	54.000	Dec 2018	-		-		-	174.872	266.372	-
NAWC China Lake	WR	NAWCWD : China Lake, CA	0.000	10.350	Feb 2018	6.500	Dec 2018	-		-		-	40.470	57.320	-
Edwards/AFB	MIPR	Edwards AFB : Edwards AFB, CA	0.000	11.575	Feb 2018	26.554	Dec 2018	-		-		-	110.470	148.599	-
Developmental Test & Evaluation	Various	Various : TBD	0.000	10.250	Feb 2018	3.500	Dec 2018	-		-		-	57.087	70.837	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675346 / F-35
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	-		-		-		-		-	0.000	0.000	-
AFOTEC	MIPR	AFOTEC : Kirtland AFB, NM	2.700	1.800	Feb 2018	6.500	Dec 2018	-		-		-	72.500	83.500	-
<b>Subtotal</b>			2.700	71.475		97.054		-		-		-	455.399	626.628	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Civilian Pay	Various	AFLCMC CIV PAY : Wright Patterson AFB, OH	29.377	35.900	Oct 2017	42.885	Oct 2018	-		-		-	231.610	339.772	-
HPSI Program Sppt	Various	AFLCMC : Wright Patterson AFB, OH	0.000	10.225	Oct 2017	9.600	Oct 2018	-		-		-	0.000	19.825	-
Financial Mgmt Database Support IDS	C/CPAF	IDS : Arlington, VA	0.000	0.800	Jan 2018	1.300	Dec 2018	-		-		-	4.301	6.401	-
Earned Value/Finance/ Cost ACT-I	C/CPAF	ACT-I : Arlington, VA	0.000	4.500	Jan 2018	4.079	Dec 2018	-		-		-	23.518	32.097	-
CIO BOS	C/CPAF	Various : TBD	0.000	7.801	Jan 2018	-		-		-		-	95.066	102.867	-
Systems System High BOS	Various	Various : TBD	0.000	10.238	Jan 2018	8.532	Dec 2018	-		-		-	45.342	64.112	-
Other CIO Services	Various	Not specified. : TBD	0.000	10.629	Jan 2018	0.404	Dec 2018	-		-		-	22.579	33.612	-
Other Core Civ Pay	Various	NAWCAD/WD : TBD	0.000	20.372	Dec 2017	21.685	Dec 2018	-		-		-	0.000	42.057	-
Other Core Contractor Sppt	C/CPAF	Not specified. : TBD	0.000	5.113	Dec 2017	6.437	Dec 2018	-		-		-	0.000	11.550	-
Travel	Various	Not specified. : TBD	1.900	3.139	Oct 2017	3.576	Oct 2018	-		-		-	8.569	17.184	-
<b>Subtotal</b>			31.277	108.717		98.498		-		-		-	430.985	669.477	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.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 675346 / <i>F-35</i>
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Cost Category Subtotals</b>	351.791	725.610	1,098.362	11.850	-	11.850	Continuing	Continuing	N/A
Other Service Funding Adjustment	-	434.530	671.868	-	-	-			-
<b>Project Cost Totals</b>	351.791	291.080	426.494	11.850	-	11.850	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, C2D2 (formerly Follow-on Modernization (FoM)) Memorandum of Agreement.

Subtotals and totals may not add due to rounding.

Prior Year reflects \$124.113M USAF/\$55.327M USN/\$59.417M USMC/\$112.934M International/Total \$351.791M  
 FY 2018 reflects \$291.080M USAF/\$138.308M USN/\$139.369M USMC/\$157.042M International/Total \$725.610M  
 FY 2019 reflects \$426.494M USAF/\$227.998M USN/\$234.107M USMC/\$209.763M International/Total \$1,098.365M  
 FY20 reflects \$11.850M USAF only; remaining efforts continue in PEs 0604840F/M/N

F-35 C2D2 Includes:

- FY13-19: PE 0207142F BPAC 675346
- FY20: USAF 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

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 675346 / <i>F-35</i>
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>F-35 UIDES and Seek Eagle</i></b>	
Ongoing support activities	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 675346 / <i>F-35</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-35 UIDES and Seek Eagle</i></b>				
Ongoing support activities	1	2018	4	2024

**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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons				<b>Project (Number/Name)</b> 675349 / HPSI			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675349: HPSI	0.000	0.000	0.000	16.754	0.000	16.754	18.449	19.884	20.282	0.000	0.000	75.369
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 2018	FY 2019	FY 2020
<b>Title:</b> Hybrid Product Support Integrator (HPSI) Effort	0.000	0.000	16.754
<b>Description:</b> The F-35 Hybrid Product Support Integrator (HPSI) will 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.			
<b>FY 2019 Plans:</b> N/A			
<b>FY 2020 Plans:</b> The F-35 Hybrid Product Support Integrator (HPSI) will integrate support across the supply chain, maintenance, sustainment engineering, logistics information technology and training disciplines. AFLCMC Civilian Pay, contractor support, and travel funding support the above efforts.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding for HPSI in FY19 and prior was previously programmed in PE 27142F / BPAC 675346.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	16.754

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

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 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 Air Force.

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675349 / HPSI
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Civilian Pay	Allot	AFLCMC : TBD	0.000	-		-		10.902	Oct 2019	-		10.902	0.000	10.902	-
Other Core Contractor Support	Various	Various : TBD	0.000	-		-		5.279	Oct 2019	-		5.279	0.000	5.279	-
Travel	Various	Various : TBD	0.000	-		-		0.573	Oct 2019	-		0.573	0.000	0.573	-
<b>Subtotal</b>			0.000	-		-		16.754		-		16.754	0.000	16.754	N/A
<b>Project Cost Totals</b>			0.000	-		0.000		16.754		-		16.754	0.000	16.754	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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 675349 / HPSI
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Hybrid Product Support Integrator</i>	
Management Support Activities	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 675349 / <i>HPSI</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Hybrid Product Support Integrator</i>				
Management Support Activities	1	2019	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons				<b>Project (Number/Name)</b> 676011 / JSF DUAL CAPABLE AIRCRAFT			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676011: JSF DUAL CAPABLE AIRCRAFT	47.669	34.144	77.434	71.339	0.000	71.339	106.329	45.328	11.643	11.852	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

F-35 C2D2 Includes:

- FY13-19: USAF PE 0207142F BPAC 675346
- FY20: USAF 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

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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Dual Capable Aircraft (DCA) (F-35 JSF)	34.144	77.434	71.339
<b>Description:</b> 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 B61-12 weapon. This effort also supports follow-on risk			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 676011 / JSF DUAL CAPABLE AIRCRAFT

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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.			
<b>FY 2019 Plans:</b> Continue execution of the Phase 2 Block 4 contract executing: Early DCA Software Development and resource recovery, Development of the Preliminary EICD and MICD, continued NSAR and PDR development, IV&V Plan Development Survivability Analysis, FRIU upgrade development and production, Wiring Mods for additional Mission Select Switch and Nuclear Consent Switch, DT aircraft Mod Kits. Conduct early flight science testing of B61-12 (i.e. Environmental, Loads and separation testing and analysis). F-35A is an objective platform and maintains responsibility for integration/certification costs of the B61-12; as such, the program will continue to resource planning and execution for integration/certification of B61-12 on F-35A.			
<b>FY 2020 Plans:</b> 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. In FY20, 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 FY21.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase of \$6.095M; see above for details.			
<b>Accomplishments/Planned Programs Subtotals</b>	34.144	77.434	71.339

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 07 PE 0207142F 5346: JSF Follow on Modernization, BPAC 675346	291.080	426.494	11.850	-	11.850	7.693	4.948	4.196	3.745	Continuing	Continuing
• RDTE 07 0604840F: F-35 C2D2	-	-	694.455	-	694.455	786.513	550.100	451.734	522.023	Continuing	Continuing
• RDTE 05 PE 0604810N 2936: F-35C Follow on Modernization (CV)	138.308	-	-	-	-	-	-	-	-	0.000	138.308

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019	
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207142F / F-35 Squadrons				Project (Number/Name) 676011 / JSF DUAL CAPABLE AIRCRAFT			

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RDTE 07 PE 0604840N 2936: F-35C Follow on Modernization (CV)	-	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing
• RDTE 05 PE 0604810M 2935: F-35B Follow-on Modernization (STOVL)	139.369	-	-	-	-	-	-	-	-	0.000	139.369
• RDTE 07 PE 0604840M 3410: F-35B Follow-on Modernization (STOVL)	-	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing
• RDTE International: International FOM	157.042	209.763	281.887	-	281.887	339.139	224.501	189.728	158.811	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 Air Force.

Program Element 0604800N/M continues USN development efforts budgeted in 0603800N prior to FY2002.

The United Kingdom, Italy, Netherlands, Turkey, 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 676011 / JSF DUAL CAPABLE AIRCRAFT
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Block 4 Phase 1 - DCA Requirements Decomposition	SS/CPFF	Lockheed Martin : Ft. Worth, TX	18.072	3.500	Sep 2018	-		-		-		-	Continuing	Continuing	-
Block 4 Phase 2.1 - DCA to PDR	SS/CPFF	Lockheed Martin : Ft. Worth, TX	4.000	4.080	Aug 2018	19.990	Jan 2019	-		-		-	Continuing	Continuing	-
Block 4 Phase 2.3 - DCA to DT Complete	SS/CPFF	Lockheed Martin : Ft. Worth, TX	0.000	4.515	Oct 2018	19.730	Feb 2019	32.200	Feb 2020	-		32.200	Continuing	Continuing	-
Delta Certification	SS/CPFF	Lockheed Martin : Ft. Worth, TX	0.000	-		10.664	Jun 2019	15.839	Mar 2020	-		15.839	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	-
<b>Subtotal</b>			38.487	12.095		50.384		48.039		-		48.039	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)

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
B61-12/F-35 Certification	Various	Various : TBD	6.207	20.149	Mar 2018	21.340	Feb 2019	17.040	Feb 2020	-		17.040	Continuing	Continuing	-
Tail-kit Program Office	MIPR	TKA SPO : Eglin AFB, FL	0.000	1.900	Sep 2018	3.300	Feb 2019	4.900	Feb 2020	-		4.900	Continuing	Continuing	-
AFNWC/AFSEC Support	MIPR	Various : TBD	1.360	-		2.410	Feb 2018	1.360	Feb 2020	-		1.360	Continuing	Continuing	-
Prior Year - no longer funded in FYDP	Various	Various : TBD	0.791	-		-		-		-		-	0.000	0.791	-
<b>Subtotal</b>			8.358	22.049		27.050		23.300		-		23.300	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 676011 / JSF DUAL CAPABLE AIRCRAFT
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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Prior Year - no longer funded in FYDP	Various	Not specified. : TBD	0.824	-		-		-		-		-	0.000	0.824	-
<b>Subtotal</b>			0.824	-		-		-		-		-	0.000	0.824	N/A
<b>Project Cost Totals</b>			47.669	34.144		77.434		71.339		-		71.339	Continuing	Continuing	N/A

**Remarks**  
 F-35 C2D2 Includes:  
 USAF PE 0207142F 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

F-35 DCA Includes:  
 USAF PE 0207142F BPAC 676011

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / F-35 Squadrons	<b>Project (Number/Name)</b> 676011 / JSF DUAL CAPABLE AIRCRAFT

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>676011: JSF Dual Capable Aircraft</b>	
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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207142F / <i>F-35 Squadrons</i>	<b>Project (Number/Name)</b> 676011 / <i>JSF DUAL CAPABLE AIRCRAFT</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>676011: JSF Dual Capable Aircraft</b>				
Nuclear Certification - NNSA & TKA SPO	1	2018	4	2023
Phase 1 (Nuclear Certification Tasks) Requirements Decomposition	1	2018	2	2019
Phase 2.1 (Nuclear Certification Tasks) DCA to Preliminary Design Review (PDR)	1	2018	4	2021
Phase 2.3 (Nuclear Certification Tasks) DCA to DT Complete	3	2018	4	2023
Delta Certification of Hardware/Software Upgrades	3	2019	4	2024

**Note**

Schedule details reflect fiscal years

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	158.324	36.303	37.230	10.314	0.000	10.314	19.452	26.801	21.226	14.281	32.031	355.962
674132: <i>AIM-9 Product Improvement</i>	158.324	36.303	37.230	10.314	0.000	10.314	19.452	26.801	21.226	14.281	32.031	355.962
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 Navy's Navigation 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.

The USN & USAF require additional quantities beyond the approved APB (Change 1: 31 Aug 2015); an update is in staffing for approval.

The AIM-9X Block I concluded in FY 2011 and all funding/quantity data in the documents are associated with Block II activities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AIM-9X 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

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>
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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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	34.952	37.230	28.305	0.000	28.305
Current President's Budget	36.303	37.230	10.314	0.000	10.314
Total Adjustments	1.351	0.000	-17.991	0.000	-17.991
• 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	2.441	0.000			
• SBIR/STTR Transfer	-1.090	0.000			
• Other Adjustments	0.000	0.000	-17.991	0.000	-17.991

**Change Summary Explanation**

FY 2018 increase of \$2.411M due to Below Threshold Reprogramming to support AIM-9X Flight Termination Development.

FY 2018 reduction of \$1.09M for SBIR.

FY 2020 reduction of \$17.991M for higher Air Force priorities.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> AIM- 9X Product Development	34.469	30.687	7.254
<b>Description:</b> 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 Block II component obsolescence to ensure missile producibility and increase reliability beyond Lot 20. Incorporate anti-tamper and cyber security technology improvements, implement cost reduction initiatives, and comply with			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
the Insensitive Munitions (IM) requirements as established by Joint Requirements Oversight Council memo dated 11 February 2009.				
<p><b>FY 2019 Plans:</b> Complete v9.317 software release to resolve aircraft employment deficiencies discovered during Block II integration testing. Continue Engineering Manufacturing Development required to redesign, integrate, test and qualify components due to obsolescence and implement cost reduction initiatives. Incorporate anti-tamper and cyber security technology improvements. Continue to develop v9.4 Block II software improvements to pace the threat and fully utilize the capabilities of the missile. Continue to develop missile hardware design improvements necessary to enhance IM performance.</p> <p><b>FY 2020 Plans:</b> Complete Engineering Manufacturing Development required to redesign, integrate, test and qualify components due to obsolescence and implement cost reduction initiatives. Complete development of v9.4 Block II software improvements to pace the threat and fully utilize the capabilities of the missile. Incorporate anti-tamper and cyber security technology improvements. Continue to develop missile hardware design improvements necessary to enhance IM performance.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease in FY20 reflects the completion of the development activities associated with the obsolescence redesign of missile components and v9.4 software improvements.</p>				
<p><b>Title:</b> AIM-9X, Test and Evaluation</p> <p><b>Description:</b> Test and Evaluation (T&amp;E) and associated governmental support required to ensure the AIM-9X missile integration with threshold US Air Force aircraft platforms (F-15). Developmental and Operational testing of Operation Flight Software v9.4.</p> <p><b>FY 2019 Plans:</b> Continue Developmental Testing and Integrated Testing (DT/IT-D1) of Operational Flight Software v9.4 including improvements associated with further integrating Air Force threshold aircraft to utilize full capabilities of the Block II missile.</p> <p><b>FY 2020 Plans:</b> Complete Developmental Testing and Integrated Testing (DT/IT-D1) of Operational Flight Software v9.4 including improvements associated with further integrating the Air Force threshold aircraft to utilize the full capabilities of the Block II missile.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease in FY20 reflects planned completion of Developmental and Integrated Testing of v9.4 improvements into the missile.</p>		1.834	6.543	3.060
<b>Accomplishments/Planned Programs Subtotals</b>		36.303	37.230	10.314

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

**Appropriation/Budget Activity**  
 3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
 PE 0207161F / *Tactical AIM Missiles*

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• MPAF 02 Line Item M09HAI: <i>Sidewinder (AIM-9X)</i>	124.650	121.253	160.408	-	160.408	164.987	117.621	121.983	120.545	1,630.840	2,562.287
• MPAF 04 Line Item 000999: <i>Replen Spares, USAF</i>	11.222	11.248	11.454	-	11.454	11.644	11.796	12.064	15.914	Continuing	Continuing
• MPAF 04 Line Item 000999 <i>(2)...: Inital Spares, USAF</i>	5.720	4.255	0.490	-	0.490	1.864	13.702	13.736	1.971	24.180	65.918
• RDTE 07 PE 0207161N: <i>Tactical AIM Missile</i>	34.063	40.121	19.488	-	19.488	6.946	0.345	0.348	0.349	Continuing	Continuing
• WPN Line Item 2209: <i>Sidewinder</i>	76.915	121.481	119.456	-	119.456	127.446	114.784	99.749	101.745	312.695	1,074.271

**Remarks**

**E. Acquisition Strategy**

Milestone C decision for 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. The program plans to award FRP-5 in February 2019. The program plans to award FRP-6 in February 2020.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>	<b>Project (Number/Name)</b> 674132 / <i>AIM-9 Product Improvement</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
RMS Software/OFP Upgrade	SS/CPFF	RMS : Tucson, AZ	115.116	28.654	May 2018	24.727	Feb 2019	-		-		-	88.945	257.442	312.877
Flight Termination System	MIPR	NAWC WD : China Lake, CA	0.150	2.400	Jul 2018	2.000	Jul 2019	3.000	Jan 2020	-		3.000	4.244	11.794	-
Munitions Improvement Study (USG)	MIPR	NAWC WD : China Lake, CA	9.343	2.600	Apr 2018	3.260	Apr 2019	3.433	Apr 2020	-		3.433	0.000	18.636	-
Systems Engineering (USG)	MIPR	NAWC WD : China Lake, CA	2.623	0.665	Jul 2018	0.200	May 2019	0.321	Jul 2020	-		0.321	0.357	4.166	-
Aircraft Integration	SS/CPFF	Boeing : St. Louis, MO	0.612	0.150	Apr 2018	0.500	Apr 2019	0.500	Feb 2020	-		0.500	0.000	1.762	2.112
<b>Subtotal</b>			127.844	34.469		30.687		7.254		-		7.254	93.546	293.800	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	23.132	1.300	Feb 2018	5.733	Feb 2019	2.500	Feb 2020	-		2.500	1.493	34.158	-
IT/OT Support F-15	SS/CPAF	RMS : Tuscon, AZ	0.000	0.135	May 2018	0.457	Mar 2019	0.300	Mar 2020	-		0.300	0.000	0.892	0.994
<b>Subtotal</b>			23.132	1.435		6.190		2.800		-		2.800	1.493	35.050	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	7.348	0.399	Mar 2018	0.353	Jan 2019	0.260	Jan 2020	-		0.260	0.760	9.120	8.904
<b>Subtotal</b>			7.348	0.399		0.353		0.260		-		0.260	0.760	9.120	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			158.324	36.303	37.230	10.314	-	10.314	95.799	337.970	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force	<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>
<b>Project (Number/Name)</b> 674132 / <i>AIM-9 Product Improvement</i>	

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>AIM-9X Production Milestones</b>																												
Contract Award: Lot 18 (FRP 4)					■																							
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)																									■			
Production Deliveries: Lot 15 (FRP 1)	■																											
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)																									■			
<b>AIM-9X Block II System Improvement Program (SIP) II</b>																												
Operational Flight Software Release v9.317					■																							
<b>AIM-9X Block II Tech Refresh (SIP III): Hardware</b>																												
Controlled Actuation System (CAS) Battery Design					■																							
Program III Engineering Manufacturing Development Contract	■																											
Lot 20 Hardware (IMU, Dome & Processor)					■																							
Lot 20 Hardware Preliminary Design Review	■																											

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**Exhibit R-4, RDT&E Schedule Profile:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>	<b>Project (Number/Name)</b> 674132 / <i>AIM-9 Product Improvement</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Lot 20 Hardware Critical Design Review																												
Lot 20 Hardware Cut In: Engineering Change Proposal																												
<b>AIM-9X Block II Tech Refresh (SIP III): Software</b>																												
Software v9.4 Improvements: Development Testing (DT-D1)																												
Software v9.4 Improvements: Development Test / Integrated Testing (DT/IT-D1)																												
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																												
<b>AIM-9X Block II Tech Refresh (SIP IV)</b>																												
Hardware and Software Obsolescence																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>	<b>Project (Number/Name)</b> 674132 / <i>AIM-9 Product Improvement</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AIM-9X Production Milestones</b>				
Contract Award: Lot 18 (FRP 4)	1	2019	1	2019
Contract Award: Lot 19 (FRP 5)	2	2019	2	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
Production Deliveries: Lot 15 (FRP 1)	1	2018	2	2018
Production Deliveries: Lot 16 (FRP 2)	3	2018	2	2019
Production Deliveries: Lot 17 (FRP 3)	3	2019	2	2020
Production Deliveries: Lot 18 (FRP 4)	3	2020	2	2021
Production Deliveries: Lot 19 (FRP 5)	3	2021	2	2022
Production Deliveries : Lot 20 (FRP 6)	3	2022	2	2023
Production Deliveries: Lot 21 (FRP 7)	3	2023	2	2024
<b>AIM-9X Block II System Improvement Program (SIP) II</b>				
Operational Flight Software Release v9.317	2	2019	2	2019
<b>AIM-9X Block II Tech Refresh (SIP III): Hardware</b>				
Controlled Actuation System (CAS) Battery Design	2	2019	2	2019
Program III Engineering Manufacturing Development Contract	1	2018	1	2019
Lot 20 Hardware (IMU, Dome & Processor)	2	2019	4	2021
Lot 20 Hardware Preliminary Design Review	3	2018	3	2018
Lot 20 Hardware Critical Design Review	2	2020	2	2020

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207161F / <i>Tactical AIM Missiles</i>	<b>Project (Number/Name)</b> 674132 / <i>AIM-9 Product Improvement</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Lot 20 Hardware Cut In: Engineering Change Proposal	2	2021	2	2021
<b><i>AIM-9X Block II Tech Refresh (SIP III): Software</i></b>				
Software v9.4 Improvements: Development Testing (DT-D1)	2	2019	2	2020
Software v9.4 Improvements: Development Test / Integrated Testing (DT/IT-D1)	2	2019	2	2020
Software v9.4 Improvements: Operational Test Readiness Review (OTRR)	3	2020	3	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	2021	2	2022
Software v10.4 Rehost: Software v10.4 Release	3	2022	3	2022
<b><i>AIM-9X Block II Tech Refresh (SIP IV)</i></b>				
Hardware and Software Obsolescence	1	2021	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	555.883	51.374	57.293	55.384	0.000	55.384	52.794	65.576	46.476	71.012	145.665	1,101.457
673777: <i>AMRAAM</i>	555.883	51.374	57.293	55.384	0.000	55.384	52.794	65.576	46.476	71.012	145.665	1,101.457
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 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, 0605833F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	61.322	61.393	65.965	0.000	65.965
Current President's Budget	51.374	57.293	55.384	0.000	55.384
Total Adjustments	-9.948	-4.100	-10.581	0.000	-10.581
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-4.100			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-8.040	0.000			
• SBIR/STTR Transfer	-1.908	0.000			
• Other Adjustments	0.000	0.000	-10.581	0.000	-10.581

**Change Summary Explanation**

FY18 reduction of \$1.908M for SBIR and \$8.040M for Below Threshold Reprogramming (BTR) activities to higher Air Force priorities.

FY19 reduction of \$4.100M due to Congressional mark.

FY20 reduction of \$10.581M for higher Air Force priorities.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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<b>Title:</b> System Improvement Program (SIP) / Electronic Protection Improvement Program (EPIP)	21.238	31.329	32.137
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**Description:** Provide system and electronic protection improvements to ensure inventory effectiveness.

***FY 2019 Plans:***

1. Advanced EPIP: Support Advanced EPIP fielding recommendation.
2. AIM-120D SIP: Complete SIP-2 OT and support USAF and USN fielding decisions. Continue SIP-3 EMD to include Developmental Testing (DT) of SIP-3 incremental software builds. Begin SIP-4 Risk Reduction (RR) and conduct a System Requirements Review. Continue the AIM-120D SIP Candidate Selection Process (CSP) to analyze solutions of the warfighters' priority deficiencies and enhancements.

***FY 2020 Plans:***

1. AIM-120D SIP: Continue SIP-3 EMD, and conduct a Functional Configuration Audit and Operational Test Readiness Review (OTRR) to begin OT. Award the contract to begin SIP-3F, which is the re-host of SIP-3 software on the Form, Fit, and Function

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Refresh (F3R) missile hardware configuration. Continue SIP-4 RR and conduct a System Functional Review. Continue the AIM-120D SIP CSP to analyze solutions of the warfighters' priority deficiencies and enhancements.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 budget included one-time cost to increase program footprint/seating via relocatable, temporary equipment to support workforce and management of programs. FY20 budget increase due to SIP-3F starting.				
<b>Title:</b> Test and Evaluation  <b>Description:</b> 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.  <b>FY 2019 Plans:</b> Continue to develop new test equipment necessary to meet SIP-3 and beyond requirements. Continue to provide support personnel and test resources to complete AIM-120 DT and OT events. Continue infrastructure investments to support AIM-120D SIP, Advanced EPIP and F3R DT/OT activities.  <b>FY 2020 Plans:</b> Continue to develop new test equipment necessary to meet SIP-3 and beyond requirements. Continue to provide support personnel and test resources to complete AIM-120 DT and OT events. Continue infrastructure investments to support AIM-120D SIP and F3R DT/OT activities.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Budget decrease due to completing SIP-2 DT/OT in FY19.		28.083	23.476	18.997
<b>Title:</b> Aircraft Integration  <b>Description:</b> Supports the integration of AIM-120D on multiple aircraft platforms as AIM-120D and/or software and hardware is updated.  <b>FY 2019 Plans:</b> Continue integration and testing of AIM-120D on multiple threshold aircraft platforms.  <b>FY 2020 Plans:</b> Continue integration and testing of AIM-120D on multiple threshold aircraft platforms.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Budget increase due to training curriculum updates.		2.053	2.488	4.250
<b>Accomplishments/Planned Programs Subtotals</b>		51.374	57.293	55.384

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> 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 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 02 Line Item MAMRA0: <i>Missile Procurement, Air Force</i>	264.327	307.486	332.250	-	332.250	461.724	438.070	470.882	455.956	1,203.122	3,933.817
• MPAF 04 Line Item 000999: <i>Initial Spares/Repair Parts</i>	2.067	2.023	0.529	-	0.529	2.094	3.052	3.091	2.214	4.571	19.641
• MPAF 04 Line Item 000999 <i>Replen Spares/Repair Parts</i>	0.834	0.839	0.854	-	0.854	0.869	0.887	0.903	0.919	1.914	8.019
• MPAF 02 Line Item 2206: <i>Weapons Procurement, Navy</i>	185.285	188.441	224.502	-	224.502	354.160	359.358	367.390	374.737	0.000	2,053.873
• RDTE 07 Line Item 0981: <i>RDTE, Navy</i>	29.486	28.235	39.029	-	39.029	37.319	28.190	25.622	26.133	49.446	263.460

**Remarks**

**E. Acquisition Strategy**

The Advanced Electronic Protection Improvement Program (EPIP) program is underway to keep AIM-120C missiles capable against the growing electronic attack threat environment. This effort was awarded in Jun 12 as a Cost Plus Fixed Fee (CPFF) with performance awards. This development effort was completed in Mar 18 with IOC planned for 3QFY19.

System Improvement Program (SIP) is underway as part of the AIM-120D missile upgrade program. SIP-2 EMD, which incorporates basic EPIP in the AIM-120D is a Cost Plus Incentive Fee (CPIF) contract that was awarded in Jul 15 and completed software development in Jul 18. SIP-3 TMRR is a CPFF contract that was awarded in Sep 15 and completed in Jul 17. SIP-3 EMD is a CPIF effort that was awarded in Sep 17 and primarily incorporates Advanced EPIP software capabilities in the AIM-120D. SIP-3 EMD completion is planned for 4QFY21. SIP-4 RR is planned to award in 3QFY19.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>	<b>Project (Number/Name)</b> 673777 / AMRAAM
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Electronic Protection Improvement Program (EPIP)	Various	Raytheon : Tucson, AZ	87.736	-		-		-		-		-	0.000	87.736	87.736
System Improvement Program (SIP)	Various	Raytheon : Tucson, AZ	164.588	20.058	Jun 2018	23.128	Jun 2019	30.899	Jun 2020	-		30.899	143.510	382.183	382.183
F-22 Aircraft Integration	MIPR	Wright-Patterson AFB : Dayton, OH	114.890	-		-		-		-		-	0.000	114.890	114.890
RMS Aircraft Integration	SS/CPFF	Raytheon : Tucson, AZ	8.477	2.053	May 2018	2.488	May 2019	4.250	May 2020	-		4.250	32.570	49.838	49.838
<b>Subtotal</b>			375.691	22.111		25.616		35.149		-		35.149	176.080	634.647	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	Various : Various	69.797	5.495	Jan 2018	12.885	Jan 2019	5.968	Jan 2020	-		5.968	84.899	179.044	179.044
RMS Test	SS/CPFF	Raytheon : Various	95.700	22.588	Jan 2018	10.591	Jan 2019	13.029	Jan 2020	-		13.029	104.600	246.508	246.508
<b>Subtotal</b>			165.497	28.083		23.476		18.997		-		18.997	189.499	425.552	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	Various : Various	14.695	1.180	Jan 2018	8.201	Jan 2019	1.238	Jan 2020	-		1.238	13.510	38.824	38.824
<b>Subtotal</b>			14.695	1.180		8.201		1.238		-		1.238	13.510	38.824	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		555.883	51.374	57.293	55.384	-	55.384	379.089	1,099.023	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207163F / <i>Advanced Medium Range Air-to-Air Missile (AMRAAM)</i>	<b>Project (Number/Name)</b> 673777 / <i>AMRAAM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AMRAAM Development Program</b>				
AIM-120D SIP-2 EMD	1	2018	1	2020
AIM-120D SIP-2 IOC	1	2020	1	2020
AIM-120D SIP-3 EMD	1	2018	4	2021
AIM-120D SIP-3 CDR	4	2018	4	2018
AIM-120D SIP-3 IOC	4	2021	4	2021
AIM-120D SIP-3F	2	2020	1	2023
AIM-120D SIP-4 RR	2	2019	3	2021
AIM-120D SIP-4 EMD	3	2021	4	2024
AIM-120D SIP-4 IDR	2	2022	2	2022
EPIP Adv Tape 2 IOC	3	2019	3	2019

**Note**

Actual Dates:

SIP-2 EMD began 03 Jul 2015  
 SIP-3 EMD began 05 Sep 2017  
 SIP-4 EMD ends 3QFY25

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207227F / <i>Combat Rescue - Pararescue</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.685	0.647	0.281	0.000	0.281	0.670	0.911	0.847	0.709	Continuing	Continuing
675352: <i>Guardian Angel RDT&amp;E</i>	-	0.685	0.647	0.281	0.000	0.281	0.670	0.911	0.847	0.709	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 Battlefield Airmen 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 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F. Due to rapidly changing threat environment, the acquisition program manager has the authority to redirect funding as necessary to meet current slated and emerging requirements.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207227F / <i>Combat Rescue - Pararescue</i>			
<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.693	0.647	0.658	0.000	0.658
Current President's Budget	0.685	0.647	0.281	0.000	0.281
Total Adjustments	-0.008	0.000	-0.377	0.000	-0.377
• 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	-0.008	0.000			
• Other Adjustments	0.000	0.000	-0.377	0.000	-0.377
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>		
<b>Title:</b> Guardian Angel Family of Systems (FoS)	0.685	0.647	0.281		
<b>Description:</b> 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.					
<b>FY 2019 Plans:</b>					
-Will continue to complete studies, strategic planning, and development activities for increased capability.					
-Will continue necessary software upgrades to BAO kit(G)information management system given ACC/A5/8R decision to switch to the Android Tactical Assault Kit (ATAK).					
-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.					
<b>FY 2020 Plans:</b>					
-Will continue to complete studies, strategic planning, and development activities for increased capability.					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207227F / <i>Combat Rescue - Pararescue</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
-Will continue necessary software upgrades to BAO kit(G)information management system given ACC/A5/8R decision to switch to the Android Tactical Assault Kit (ATAK). -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.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding decreased to account for the availability of prior year execution balances.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.685	0.647	0.281

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPAF 04 Line Item 842990: <i>Items Less than \$5M (Safety)</i>	25.880	21.915	22.295	-	22.295	22.702	23.105	23.516	23.939	Continuing	Continuing
• OPAF 02 Line Item 823230: <i>Security and Tactical Vehicles</i>	0.090	0.061	0.131	-	0.131	0.205	0.281	0.287	0.292	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-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207227F / <i>Combat Rescue - Pararescue</i>
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**F. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207227F / <i>Combat Rescue - Pararescue</i>	<b>Project (Number/Name)</b> 675352 / <i>Guardian Angel RDT&amp;E</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Events By Sub Project</b>																												
BAO Kit (G) Software																												
Test Support																												
GA Equipment Upgrades																												
Human Performance Organization Support (POTFF)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207227F / <i>Combat Rescue - Pararescue</i>	<b>Project (Number/Name)</b> 675352 / <i>Guardian Angel RDT&amp;E</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Events By Sub Project</b>				
BAO Kit (G) Software	1	2018	4	2024
Test Support	1	2018	2	2024
GA Equipment Upgrades	2	2018	2	2024
Human Performance Organization Support (POTFF)	2	2018	1	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207247F / AF TENCAP
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	21.365	0.000	21.365	21.683	22.134	22.536	22.941	Continuing	Continuing
670001: <i>Air Force TENCAP</i>	-	0.000	0.000	21.365	0.000	21.365	21.683	22.134	22.536	22.941	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.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207247F / AF TENCAP
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	21.365	0.000	21.365
Total Adjustments	0.000	0.000	21.365	0.000	21.365
• 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	21.365	0.000	21.365

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Exploitation Applications	0.000	0.000	16.062	0.000	16.062
<b>Description:</b> 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.					
<b>FY 2019 Plans:</b> N/A					
<b>FY 2020 Base Plans:</b> - Will continue to rapidly prototype projects and focus warfighter support and resource allocation based on AF TENCAP mission/investment areas  - 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  - Will continue focused effort to increase Air Domain Awareness to Air Force and Joint Warfighters					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207247F / AF TENCAP
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
- Funding increased because FY 2019 funding is reflected in PE 1202247F, Air Force TENCAP					
<b>Title:</b> Talon Tactical Mobile Over-the-Horizon Radar (TACMOR)	0.000	0.000	5.303	0.000	5.303
<b>Description:</b> Talon TACMOR is a technology prototype to expand air domain awareness and maritime domain awareness over the Western Pacific region. TACMOR is an FY17 Joint Capability Technology Demonstration project.					
<b>FY 2019 Plans:</b> N/A					
<b>FY 2020 Base Plans:</b> - Will continue rapid prototype development of air and maritime domain awareness capability  - Will perform system integration testing and conduct initial operational utility assessment					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding increased because FY 2019 funding is reflected in PE 1202247F, Air Force TENCAP					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	21.365	0.000	21.365

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 07 1202247F: AF TENCAP	80.726	31.986	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
<b>Remarks</b> N/A											

**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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
PE 0207247F / 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.

**F. 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-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207247F / AF TENCAP	<b>Project (Number/Name)</b> 670001 / Air Force TENCAP
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AF TENCAP Projects</b>				
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
Talon TACMOR System Design/Software Development	1	2020	3	2020
Talon TACMOR Testing/Operational Utility Assessment	2	2020	2	2021

**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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207249F / <i>Precision Attack Systems Procurement</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	1.651	14.891	10.696	0.000	10.696	11.104	12.283	12.507	12.733	Continuing	Continuing
675347: <i>Advanced Targeting Pod</i>	-	1.651	14.891	10.696	0.000	10.696	11.104	12.283	12.507	12.733	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 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207249F / <i>Precision Attack Systems Procurement</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	1.714	14.891	10.696	0.000	10.696
Current President's Budget	1.651	14.891	10.696	0.000	10.696
Total Adjustments	-0.063	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	-0.063	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

No significant changes

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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<b>Title:</b> Advanced Targeting Pod - Sensor Enhancement (ATP-SE) Requirements	1.651	14.891	10.696
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**Description:** ATP-SE technology improvements, requirements definition (studies, analysis and assessments).

***FY 2019 Plans:***

Accomplish ATP-SE Operational Flight Program (OFP) requirements, and further technology improvements, requirements definition, studies, analysis and assessments.

As the pod fleet meets the user requirement and the updates near completion, the funding for aircraft OFP updates were redirected from 3010 to 3600 funds.

***FY 2020 Plans:***

Accomplish ATP-SE Operational Flight Program (OFP) requirements, and further technology improvements, requirements definition, studies, analysis and assessments.

As the pod fleet meets the user requirement and the updates near completion, the funding for aircraft OFP updates were redirected from 3010 to 3600 funds.

***FY 2019 to FY 2020 Increase/Decrease Statement:***

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207249F / <i>Precision Attack Systems Procurement</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Funding decreased to align with aircraft OFP requirements.			
<b>Accomplishments/Planned Programs Subtotals</b>	1.651	14.891	10.696

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 05 Line Item 057: <i>Other Aircraft, Precision Attack Systems Modifications</i>	43.857	71.689	43.482	-	43.482	44.429	15.129	15.884	52.868	Continuing	Continuing
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts</i>	2.944	3.310	3.367	-	3.367	3.428	3.497	3.560	3.624	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

N/A

**F. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207249F / <i>Precision Attack Systems Procurement</i>	<b>Project (Number/Name)</b> 675347 / <i>Advanced Targeting Pod</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>ATP</b>																												
Sniper ATP-SE Digital Video																												
Future ATP-SE Enhancements																												
FY18 OFP Integration																												
FY19 OFP Integration																												
FY20 OFP Integration																												
FY21 OFP Integration																												
FY22 OFP Integration																												
FY23 OFP Integration																												
FY24 OFP Integration																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207249F / <i>Precision Attack Systems Procurement</i>	<b>Project (Number/Name)</b> 675347 / <i>Advanced Targeting Pod</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>ATP</b>				
Sniper ATP-SE Digital Video	1	2020	3	2021
Future ATP-SE Enhancements	2	2018	4	2024
FY18 OFP Integration	2	2018	1	2020
FY19 OFP Integration	1	2019	1	2020
FY20 OFP Integration	1	2020	1	2021
FY21 OFP Integration	1	2021	1	2022
FY22 OFP Integration	1	2022	1	2023
FY23 OFP Integration	1	2023	1	2024
FY24 OFP Integration	1	2024	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207253F / <i>Compass Call</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	34.240	43.901	15.888	0.000	15.888	15.883	15.924	16.215	16.507	Continuing	Continuing
674804: <i>Compass Call</i>	-	34.240	43.901	15.888	0.000	15.888	15.883	15.924	16.215	16.507	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 Baseline 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 2020 RDT&E efforts will concentrate on Baseline 3 (BL3) and Baseline 4 (BL4) Prime Mission Equipment (PME) upgrades and integration. The programmed BL3 upgrades will advance the PME capabilities as the FY 2020 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 2020 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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> 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 program management and administrative (PMA) costs and 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	14.040	13.901	15.888	0.000	15.888
Current President's Budget	34.240	43.901	15.888	0.000	15.888
Total Adjustments	20.200	30.000	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	20.200	30.000			
• 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

**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

	<b>FY 2018</b>	<b>FY 2019</b>
	20.200	30.000
	20.200	30.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207253F / <i>Compass Call</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	<b>FY 2018</b>	<b>FY 2019</b>
	Congressional Add Totals for all Projects	
	20.200	30.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Title:</b> Baseline Upgrade Development</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> Continuing efforts for BL3 and BL4 development on upgraded platform for:</p> <ul style="list-style-type: none"> <li>• Low Band antenna concepts</li> <li>• Advanced Military &amp; Commercial Communications Offensive capabilities</li> <li>• Emerging and Modern Targets</li> <li>• Open Architecture Migration Verification</li> <li>• Platform integration for future capabilities</li> <li>• Updates to Prime Mission Equipment (PME) infrastructure</li> <li>• Platform upgrades and associated non-recurring engineering</li> <li>• Studies and analysis for current/future baseline development planning</li> </ul> <p><b>FY 2020 Base Plans:</b> Will continue efforts for BL3 and BL4 development on upgraded platform for:</p> <ul style="list-style-type: none"> <li>• Low Band antenna design</li> <li>• Advanced Military &amp; Commercial Communications Offensive capabilities</li> <li>• Emerging and Modern Targets</li> <li>• Platform integration for future capabilities</li> <li>• Updates to BL4 PME infrastructure</li> <li>• Platform upgrades and associated non-recurring engineering</li> <li>• Studies and analysis for current/future baseline development planning</li> </ul> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	14.040	13.901	15.888	0.000	15.888

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207253F / <i>Compass Call</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding increased due to continuing baseline Compass Call development to ensure capabilities remain ahead of emerging adversary tactics and technologies.					
<b>Accomplishments/Planned Programs Subtotals</b>	14.040	13.901	15.888	0.000	15.888

	FY 2018	FY 2019
<b>Congressional Add:</b> EC-37B Compass Call Re-host Congressional Add  <b>FY 2018 Accomplishments:</b> Continued efforts for BL3 and initial baseline development on upgraded platform for: <ul style="list-style-type: none"> <li>• Advance the capability for the Advanced Radar Countermeasures Subsystem (ARCS)</li> <li>• Environmental characterization testing</li> <li>• Perform future baseline development of Low Band antenna concepts</li> <li>• Advanced Military Communications Offensive capabilities</li> <li>• Software defined radios for modularity and extensibility objectives</li> <li>• Platform Self Protection concepts</li> <li>• Emerging and Modern Targets</li> <li>• Open Architecture Migration</li> <li>• Platform integration for future capabilities</li> <li>• Updates to PME infrastructure</li> <li>• Platform upgrades and associated non-recurring engineering</li> <li>• Studies and analysis for current/future baseline development planning</li> </ul>	20.200	30.000
<b>FY 2019 Plans:</b> Continue efforts for baseline acceleration to support aircraft compressed schedule. Efforts include: <ul style="list-style-type: none"> <li>• Accelerate low-band capability</li> <li>• Platform upgrades and associated non-recurring engineering (installation/mounting concepts for h/w)</li> <li>• PME Development</li> <li>• Maturation of brass-boards</li> <li>• Studies and analysis for current/future baseline development planning; thermal management studies of power amplifiers and transmit antennas</li> </ul>		
<b>Congressional Adds Subtotals</b>	20.200	30.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207253F / <i>Compass Call</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 04 Line item CALL00: <i>Compass Call Aircraft</i>	111.573	216.113	114.095	-	114.095	117.014	121.221	123.423	125.645	Continuing	Continuing
• APAF 05 Line item CALL00: <i>Compass Call Mods</i>	125.788	172.285	110.754	-	110.754	41.954	38.461	39.159	39.864	Continuing	Continuing
• APAF 06 Line item CALL00: <i>Compass Call Mod Spares</i>	10.050	10.618	10.805	-	10.805	10.999	11.219	11.424	11.630	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

COMPASS CALL capability is maintained with incremental upgrades per the baseline acquisition strategy plus Quick Reaction Capability (QRC) developments acquired through the 645th Aeronautical Systems Group (645 AESG) in accordance with their Acquisition Strategy Plan (ASP), Program Management Directive (PMD), Class Justification and Approval (J&A) document for acquisition of supplies and services using other than full and open competition criteria, and Life Cycle Management Plan (LCMP) across the full spectrum of system life cycle management ("cradle to grave" support concept). Due to the rapidly changing threat environment encountered during the EC-130H'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.

**F. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207253F / <i>Compass Call</i>	<b>Project (Number/Name)</b> 674804 / <i>Compass Call</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Compass Call</b>	
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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207253F / <i>Compass Call</i>	<b>Project (Number/Name)</b> 674804 / <i>Compass Call</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Compass Call</i></b>				
Baseline 3 Development	1	2018	3	2020
Baseline 3 Integration and Test	3	2020	3	2023
Baseline 3 Fielding	2	2023	3	2023
Baseline 4 Development	1	2019	4	2023
Baseline 4 Integration and Test	4	2023	4	2024
Future Baseline Development	3	2019	4	2024

**Note**

Baseline 3 Fielding End date: 4Q 2025  
 Baseline 4 Integration and Test Start date: 1Q 2025; End date: 3Q 2028  
 Future Baseline Development End date: 4Q 2026  
 (IDECS does not allow dates beyond 2024.)

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / <i>Aircraft Engine Component Improvement Program</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	105.664	121.203	112.505	0.000	112.505	114.617	116.996	119.126	0.000	Continuing	Continuing
671012: <i>Aircraft Engine Component Improvement Program</i>	-	74.464	88.646	79.342	0.000	79.342	80.879	82.558	84.061	0.000	Continuing	Continuing
675365: <i>F135 Aircraft Engine Component Improvement Program</i>	-	31.200	32.557	33.163	0.000	33.163	33.738	34.438	35.065	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 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / <i>Aircraft Engine Component Improvement Program</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	109.243	121.203	112.505	0.000	112.505
Current President's Budget	105.664	121.203	112.505	0.000	112.505
Total Adjustments	-3.579	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	0.300	0.000			
• SBIR/STTR Transfer	-3.879	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Change Summary Explanation**

FY18 \$0.300M was reprogrammed into Engine CIP Legacy for F107.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program				<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
671012: Aircraft Engine Component Improvement Program	-	74.464	88.646	79.342	0.000	79.342	80.879	82.558	84.061	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.

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 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> F100 Aircraft Engine Component Improvement Program	8.514	11.180	11.180
<b>Description:</b> 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), 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.			
<b>FY 2019 Plans:</b> F100-220 and F100-229: - Will execute 30+ tasks. Budget will address engine issues associated with the F-15 and F-16 aircraft.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability &amp; maintainability (R&amp;M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</li> <li>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</li> </ul> <p><b>FY 2020 Plans:</b> F100-220 and F100-229:</p> <ul style="list-style-type: none"> <li>- Will execute 30+ tasks. Budget will address engine issues associated with the F-15 and F-16 aircraft.</li> <li>- Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability &amp; maintainability (R&amp;M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</li> <li>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 budget was increased to allow for additional test requirements. The FY20 budget returned to what was originally planned.</p>				
<p><b>Title:</b> F110 Aircraft Engine Component Improvement Program</p> <p><b>Description:</b> 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 &amp; maintainability (R&amp;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><b>FY 2019 Plans:</b> F101, F110-100, F110-129, F118-100, and F118-101:</p> <ul style="list-style-type: none"> <li>- Will execute 35+ tasks. The budget will address engine issues associated with the B1, B-2, F-15, F-16, and U-2 aircraft.</li> <li>- Address safety of flight, engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability &amp; maintainability (R&amp;M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</li> </ul>		14.987	17.957	15.969

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p><b>FY 2020 Plans:</b> F101, F110-100, F110-129, F118-100, and F118-101:</p> <ul style="list-style-type: none"> <li>- Will execute 35+ tasks. The budget will address engine issues associated with the B1, B-2, F-15, F-16, and U-2 aircraft.</li> <li>- Address safety of flight, engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability &amp; maintainability (R&amp;M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</li> </ul> <p>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 budget was increased to allow for additional test requirements. The FY20 budget returned to what was originally planned.</p>				
<p><b>Title:</b> F119 Aircraft Engine Component Improvement Program</p> <p><b>Description:</b> 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 &amp; maintainability (R&amp;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><b>FY 2019 Plans:</b> F119:</p> <ul style="list-style-type: none"> <li>- Will execute 25+ tasks. The budget will address engine issues associated with the F-22 aircraft.</li> <li>- Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability &amp; maintainability (R&amp;M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</li> </ul> <p>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</p> <p><b>FY 2020 Plans:</b> F119:</p> <ul style="list-style-type: none"> <li>- Will execute 25+ tasks. The budget will address engine issues associated with the F-22 aircraft.</li> </ul>		30.282	31.597	31.597

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Address engine component redesign, repair/rework procedures, engine maturation and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain engine flight safety, address obsolescence deficiencies, improved system operational readiness (OR) and reliability &amp; maintainability (R&amp;M), reduced engine life cycle costs (LCC), and sustain engines throughout their service life.</li> <li>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 budget was increased to allow for additional test requirements. The FY20 budget returned to what was originally planned.</p> <p><b>Title:</b> Other Aircraft Engine Component Improvement Program</p> <p><b>Description:</b> 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 &amp; maintainability (R&amp;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><b>FY 2019 Plans:</b> Other Engines (e.g., T56, T700, T400, J85, APUs, F107, TF-34, TF-33): - Will execute 15+ 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 &amp; maintainability (R&amp;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><b>FY 2020 Plans:</b> Other Engines (e.g., T56, T700, T400, J85, APUs, F107, TF-34, TF-33): - Will execute 15+ 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.</p>		20.681	27.912	20.596

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
- 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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 budget was increased to allow for additional test requirements. The FY20 budget returned to what was originally planned.			
<b>Accomplishments/Planned Programs Subtotals</b>	74.464	88.646	79.342

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 07 0205633N: <i>Aviation Improvements</i>	1.301	1.326	-	-	-	-	-	-	-	-	Continuing
• RDTE 07 0203752A: <i>Army Aircraft Engine CIP</i>	0.120	0.123	-	-	-	-	-	-	-	-	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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Aircraft Engine CIP: Develop aircraft engine improvements - F110/F101/F118	SS/CPFF	GE : Evendale, OH	-	14.987	Dec 2017	17.957	Dec 2018	15.969	Dec 2019	0.000		15.969	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements-F100/F119/TF33/T400	SS/CPFF	Pratt & Whitney : Hartford, CT	-	41.828	Dec 2017	45.687	Dec 2018	44.568	Dec 2019	0.000		44.568	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements-TF34/J85/T700	SS/CPFF	GE : Lynn, MA	-	4.916	Dec 2017	4.705	Dec 2018	5.238	Dec 2019	0.000		5.238	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft engine improvements-T56	SS/CPFF	Rolls Royce : Indianapolis, IN	-	1.397	Dec 2017	2.330	Dec 2018	1.489	Dec 2019	0.000		1.489	Continuing	Continuing	-
Aircraft Engine CIP: Develop aircraft auxiliary power unit improvements/T53	SS/CPFF	Honeywell : Phoenix, AZ	-	6.492	Dec 2017	5.923	Dec 2018	6.918	Dec 2019	0.000		6.918	Continuing	Continuing	-
Aircraft Engine CIP: Develop engine improvements-F107	SS/CPFF	Teledyne : Toledo, OH	-	1.922	Dec 2017	2.901	Dec 2018	2.048	Dec 2019	0.000		2.048	Continuing	Continuing	-
<b>Subtotal</b>			-	71.542		79.503		76.230		0.000		76.230	Continuing	Continuing	N/A

**Remarks**  
FY18 increases due to inflation adjustments.

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Aircraft Engine CIP: Non-OEM CIP Tasks	Various	Various : Various	-	0.144	Oct 2017	1.250	Oct 2018	0.153	Dec 2019	0.000		0.153	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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>Subtotal</b>			-	0.144		1.250		0.153		0.000		0.153	Continuing	Continuing	N/A

**Remarks**  
Non-OEM CIP Tasks refer to work in support of Engine CIP.  
FY18 increases due to inflation adjustments.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Aircraft Engine CIP: Ground test and validate engine improvements	PO	AEDC : Arnold AFB, TN	-	0.101	Oct 2017	0.160		0.108		0.000		0.108	Continuing	Continuing	-
<b>Subtotal</b>			-	0.101		0.160		0.108		0.000		0.108	Continuing	Continuing	N/A

**Remarks**  
Fuel costs for contractor-performed T&E are included in the applicable contract.  
FY18 increases due to inflation adjustments.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Aircraft Engine CIP: PMA	Various	Various : Various	-	1.577	Oct 2017	1.945	Oct 2018	1.679	Dec 2019	0.000		1.679	Continuing	Continuing	-
Aircraft Engine CIP: In House Support/Misc	Various	Various : Various	-	1.100	Oct 2017	5.788	Oct 2018	1.172	Dec 2019	0.000		1.172	Continuing	Continuing	-
<b>Subtotal</b>			-	2.677		7.733		2.851		0.000		2.851	Continuing	Continuing	N/A

**Remarks**  
PMA Description: Program Management support, travel, and A&AS.  
FY18 increases due to inflation adjustments.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>								<b>Date:</b> February 2019					
<b>Appropriation/Budget Activity</b> 3600 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program				<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program					
	<b>Prior Years</b>	<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	74.464		88.646		79.342		0.000		79.342	Continuing	Continuing	N/A

**Remarks**  
FY18 increases due to inflation adjustments.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>CIP Legacy Activities</b>																												
F-100 Engine CIP activities																												
F-110 Engine CIP Activities																												
F-119 Engine CIP Activities																												
Other Legacy Engine CIP Activities																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 671012 / Aircraft Engine Component Improvement Program

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>CIP Legacy Activities</i></b>				
F-100 Engine CIP activities	1	2018	4	2024
F-110 Engine CIP Activities	1	2018	4	2024
F-119 Engine CIP Activities	1	2018	4	2024
Other Legacy Engine CIP Activities	1	2018	4	2024

**Note**

Traditional schedule does not lend itself to Engine CIP activities.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program				<b>Project (Number/Name)</b> 675365 / F135 Aircraft Engine Component Improvement Program			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675365: F135 Aircraft Engine Component Improvement Program	-	31.200	32.557	33.163	0.000	33.163	33.738	34.438	35.065	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 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> F135 Aircraft Engine Improvement Program	31.200	32.557	33.163
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			
- Execute approximately 25+ AF-funded F135 engine tasks supporting F-35 flying operations.			
- Conduct accelerated mission test and analytical condition inspection.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 675365 / F135 Aircraft Engine Component Improvement Program

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Address safety of flight, engine component redesign, repair/rework procedures and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain/improve engine flight safety, improve system operational readiness and reliability &amp; maintainability, reduce engine life cycle cost, and sustain engine throughout service life.</li> <li>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Execute approximately 25+ AF-funded F135 engine tasks supporting F-35 flying operations.</li> <li>- Conduct accelerated mission test and analytical condition inspection.</li> <li>- Address safety of flight, engine component redesign, repair/rework procedures and life limit/mission analysis.</li> <li>- Validate redesigned parts and new repair procedures.</li> <li>- Maintain/improve engine flight safety, improve system operational readiness and reliability &amp; maintainability, reduce engine life cycle cost, and sustain engine throughout service life.</li> <li>- Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 budget was increased to allow for additional test requirements. The FY20 budget returned to what was originally planned.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	31.200	32.557	33.163

<b>C. Other Program Funding Summary (\$ in Millions)</b>										
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u> <u>Total Cost</u>
• RDTE 07 0205633N: Aviation Improvements	-	-	-	-	-	-	-	-	-	-

**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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / <i>Aircraft Engine Component Improvement Program</i>	<b>Project (Number/Name)</b> 675365 / <i>F135 Aircraft Engine Component Improvement Program</i>

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 675365 / F135 Aircraft Engine Component Improvement Program
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Aircraft Engine CIP: Develop F135 engine improvements	SS/CPFF	Pratt & Whitney : Hartford, CT	-	29.330	Jan 2018	27.210	Jan 2019	27.770	Jan 2020	0.000		27.770	Continuing	Continuing	-
<b>Subtotal</b>			-	29.330		27.210		27.770		0.000		27.770	Continuing	Continuing	N/A

**Remarks**  
FY18 Cost increase (\$93K) due to adjustment for inflation

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Aircraft Engine CIP: Ground test and validate engine improvements	PO	AEDC : Arnold AFB, TN	-	1.570	Oct 2017	5.044	Oct 2018	5.088	Oct 2019	0.000		5.088	Continuing	Continuing	-
<b>Subtotal</b>			-	1.570		5.044		5.088		0.000		5.088	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Aircraft Engine CIP: PMA	Various	Various : Various	-	0.300	Oct 2017	0.303	Oct 2018	0.305	Oct 2019	0.000		0.305	Continuing	Continuing	-
<b>Subtotal</b>			-	0.300		0.303		0.305		0.000		0.305	Continuing	Continuing	N/A

**Remarks**  
PMA Description: Program Management support, travel, and A&AS.

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	31.200	32.557	33.163	0.000	33.163	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 675365 / F135 Aircraft Engine Component Improvement Program

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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

[Redacted Data]																											
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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207268F / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 675365 / F135 Aircraft Engine Component Improvement Program

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>CIP JSF Activities</i></b>				
F-135 Engine CIP Tasks	1	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207325F <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	236.641	29.436	42.472	78.498	0.000	78.498	36.210	19.868	20.230	20.594	130.700	614.649
675356: <i>JASSM Extended Range (JASSM-ER)</i>	236.641	29.436	42.472	78.498	0.000	78.498	36.210	19.868	20.230	20.594	130.700	614.649
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 555

**A. Mission Description and Budget Item Justification**

The Joint Air-to-Surface Standoff Missile Extended Range (JASSM-ER), AGM-158B, continues the evolution of the JASSM Family of missiles. JASSM-ER provides a long range (over twice the range of JASSM Baseline/AGM-158A), conventional air-to-surface, autonomous, precision-guided, low observable, standoff cruise missile compatible with fighter and bomber aircraft. The requirement is in the JASSM-ER Capability Production Document (CPD), dated 16 Apr 2010. Aircraft integration of JASSM-ER is complete on the B-1, F-15, and B-52. Objective aircraft are B-52, F-16, B-2, and F-15. 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 Baseline (BL), minimizing the threat to launch aircraft. The Air Force developed JASSM-ER based on a contractor-developed, government-approved System Performance Specification (SPS). The program continues development/integration efforts on the Intelligent Telemetry Instrumentation Kit (ITIK), the Electronic Safe and Arm Fuze (ESAF), the Military Code (M-Code) receiver, and Flight Termination System Telemetry Integration Kit (FTS-ITIK) batteries. FY16/17 studies led to modifying JASSM-ER to include survivability improvements that enhance lethality and distance via Wing Replacement/Chine Development/Integration and Warfighting Capability Enhancement (Software) to improve performance against emerging threats. The 2018 National Defense Strategy (NDS) increased the JASSM Inventory Objective by 48% which resulted in the monitoring of 13 subsystems for obsolescence. The program is also evaluating Diminishing Manufacturing Sources Material Shortages (DMSMS). Potential future efforts include Anti-Radiation Homing System (ARHS), improved Data Link capability for relocatable target attack, alternate payloads, improved Guidance Navigation Control (GNC), alternative FTS-ITIK power source evaluations, advanced JASSM survivability, and a smaller warhead.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605833F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0207325F I Joint Air-to-Surface Standoff Missile (JASSM)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	29.932	60.062	79.198	0.000	79.198
Current President's Budget	29.436	42.472	78.498	0.000	78.498
Total Adjustments	-0.496	-17.590	-0.700	0.000	-0.700
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-17.590			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.589	0.000			
• SBIR/STTR Transfer	-1.085	0.000			
• Other Adjustments	0.000	0.000	-0.700	0.000	-0.700

**Change Summary Explanation**

FY2019: AF requested transfer of \$17.590M to Common M-Code PEC 0604201F (Line 38)

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Title:</b> Warfighting Capability Enhancement</p> <p><b>Description:</b> Design, development and preparation for a primary contract for software and mission planning changes to enable the missile to maintain operational effectiveness in classified scenarios.</p> <p><b>FY 2019 Plans:</b> Continue design and development of classified software and mission planning changes to enable the missile to maintain operational effectiveness in classified scenarios.</p> <p><b>FY 2020 Base Plans:</b> 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.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase due to flight test start, Missile Operational Flight Program (MOFP) updates and continued C++ support.</p>	4.427	10.800	12.270	-	12.270
<p><b>Title:</b> Wing Replacement/Chine Development, survivability enhancement, and Integration</p> <p><b>Description:</b> Provides increased standoff range, survivability, and improved vehicle stability/control.</p>	13.284	22.811	49.758	-	49.758

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207325F <i>I Joint Air-to-Surface Standoff Missile (JASSM)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b><i>FY 2019 Plans:</i></b> Continue design and development efforts for wing sub-systems.</p> <p><b><i>FY 2020 Base Plans:</i></b> Continue design and development efforts for wing sub-systems to include B-1 Integration. Increase program office footprint and seating via relocatable, temporary equipment to support workforce and management of programs and security infrastructure upgrades to ensure program schedules are maintained.</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding increase due to ramp up of wing EMD effort to include B-1 flight test and procurement of development and qualification hardware.</p>					
<p><b><i>Title:</i></b> Electronic Safe and Arm Fuze (ESAF)</p> <p><b><i>Description:</i></b> ESAF will resolve FMU-156 obsolescence and reliability issues, improve yield, and potentially lower costs.</p> <p><b><i>FY 2019 Plans:</i></b> Continue ESAF environmental, safety, and qualification testing.</p> <p><b><i>FY 2020 Base Plans:</i></b> Continue ESAF environmental, safety, and qualification testing to include Sled Flight Test.</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Funding increase due to ITIK purchase/install and Sled/Flight test start.</p>	4.272	6.365	10.882	-	10.882
<p><b><i>Title:</i></b> M-Code and Related Development Efforts</p> <p><b><i>Description:</i></b> Development and integration of a GPS receiver capable of receiving M-Code</p> <p><b><i>FY 2019 Plans:</i></b> Realignment of funds to Common M-Code PEC 0604201F.</p> <p>The M-Code software slip under the MGUE program has slipped the entire program right by eleven months. Funding may be required for interim solution to bridge gap of receiver. Pre-EMD and EMD additional scope necessary.</p> <p><b><i>FY 2020 Base Plans:</i></b></p>	6.361	0.000	0.000	-	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207325F <i>I Joint Air-to-Surface Standoff Missile (JASSM)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Realignment of funds to Common M-Code PEC 0604201F.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> Other Development/Safety/Survivability	1.092	2.496	5.588	-	5.588
<b>Description:</b> 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 Data Link, ARHS, improved GNC, alternate payloads, and obsolescence issues.					
<b>FY 2019 Plans:</b> Continue development/evaluations activities addressing JASSM's obsolescence plan directed activities: Improved GNC, anti-jam/anti-spoofing system, and survivability enhancements, evaluate smaller warhead. Support ground and flight test activity required to verify changed hardware before cutting into production. Continue evaluation for long-term FTS-TIK alternate power source.					
<b>FY 2020 Base Plans:</b> Continue evaluation activity addressing JASSM's obsolescence plan directed activities to include Non-GPS Nav Joint Capability Technology Demonstration (JCTD).					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase due to Non-GPS Nav JCTD.					
<b>Accomplishments/Planned Programs Subtotals</b>	29.436	42.472	78.498	-	78.498

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• MPAF 02 0207325F: JASSM	433.117	602.828	482.525	20.900	503.425	417.450	438.335	450.234	440.337	2,967.785	6,253.511
<b>Remarks</b>											

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207325F / <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>	
<b>E. Acquisition Strategy</b> 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. AGM-158D is a modification to the existing JASSM-ER that enhances lethality and range while replacing obsolete subsystems that incorporates multiple initiatives into a single, system level update. All current development contracts use a Cost Plus type contract.		
<b>F. Performance Metrics</b> 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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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>											<b>Date:</b> February 2019				
<b>Appropriation/Budget Activity</b> 3600 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0207325F / Joint Air-to-Surface Standoff Missile (JASSM)				<b>Project (Number/Name)</b> 675356 / JASSM Extended Range (JASSM-ER)							

<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Warfighting Capability Enhancement	SS/CPAF	Lockheed Martin : Orlando, FL	0.000	4.427	May 2018	10.800	Nov 2018	12.270	Nov 2019	-		12.270	31.470	58.967	67.724
Wing Replacement/Chine Development, survivability enhancements, and Integration	SS/CPFF	Lockheed Martin : Orlando, FL	0.000	7.431	Jan 2018	22.811	Jan 2019	49.758	Nov 2019	-		49.758	62.200	142.200	136.000
ESAF	SS/CPFF	Lockheed Martin : Orlando, FL	12.332	3.835	Nov 2017	6.365	Nov 2018	10.882	Nov 2019	-		10.882	0.000	33.414	18.872
M-code and Related Development Efforts	SS/CPFF	Lockheed Martin : Orlando, FL	1.105	6.361	Nov 2017	0.000		-		-		-	36.974	44.440	74.610
JASSM-ER Phase ,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	157.248	1.018	Mar 2018	2.396	Mar 2018	5.488	Nov 2019	-		5.488	95.358	261.508	192.109
<b>Subtotal</b>			170.685	23.072		42.372		78.398		-		78.398	226.002	540.529	N/A

**Remarks**

- Intelligent Telemetry Instrumentation Kit (ITIK)
- Legacy Telemetry Instrumentation Kits (L-TIK)
- Electronic Safe and Arm Fuze (ESAF)

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Government Test Support. Includes flight test equipment, targets, 96th Test Wing and Range support, AEDC	Various	96 TW : Eglin AFB, FL	26.703	6.290	Feb 2018	-		-		-		-	1.100	34.093	31.644

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207325F / Joint Air-to-Surface Standoff Missile (JASSM)	<b>Project (Number/Name)</b> 675356 / JASSM Extended Range (JASSM-ER)
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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, 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
<b>Subtotal</b>			64.078	6.290		-		-		-		-	1.100	71.468	N/A

**Remarks**  
Test and Evaluation in FY19 and out will be incorporated into each separate development effort rather than broken out into its own category

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	1.878	0.074	Mar 2018	0.100	Mar 2019	0.100	Mar 2020	-		0.100	0.500	2.652	3.771
<b>Subtotal</b>			1.878	0.074		0.100		0.100		-		0.100	0.500	2.652	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		236.641	29.436	42.472	78.498	-	78.498	227.602	614.649	N/A

**Remarks**  
Test and Evaluation is now incorporated within the respective RDT&E categories rather than being broken out as a separate cost.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207325F / Joint Air-to-Surface Standoff Missile (JASSM)	<b>Project (Number/Name)</b> 675356 / JASSM Extended Range (JASSM-ER)

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>RDT&amp;E Schedule Details</b>																												
Warfighting Capability Enhancement																												
Wing Replacement/Chine Development, survivability enhancements, and Integration																												
ITIK Battery Development and Qualification (Phase 1,2, and 3)																												
ITIK Integration with JASSM and Test Equipment Development																												
ITIK Flight Testing (LRASM)																												
ESAF Prototyping																												
ESAF Critical Design Review (CDR)																												
ESAF Sled Testing																												
ESAF Qualification Testing																												
ESAF Flight Testing																												
ESAF Production Readiness Review (PRR)																												
M-Code Pre-EMD																												
M-Code Engineering and Manufacturing Development (EMD)																												
Diminishing Manufacture Sources and Obsolescence Evaluation/Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207325F / <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>	<b>Project (Number/Name)</b> 675356 / <i>JASSM Extended Range (JASSM-ER)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>RDT&amp;E Schedule Details</i></b>				
Warfighting Capability Enhancement	3	2018	4	2022
Wing Replacement/Chine Development, survivability enhancements, and Integration	1	2018	3	2022
ITIK Battery Development and Qualification (Phase 1,2, and 3)	1	2018	1	2020
ITIK Integration with JASSM and Test Equipment Development	1	2018	3	2018
ITIK Flight Testing (LRASM)	1	2018	4	2018
ESAF Prototyping	1	2018	3	2019
ESAF Critical Design Review (CDR)	2	2019	2	2019
ESAF Sled Testing	1	2019	3	2021
ESAF Qualification Testing	3	2019	2	2020
ESAF Flight Testing	1	2021	4	2021
ESAF Production Readiness Review (PRR)	3	2020	3	2020
M-Code Pre-EMD	1	2018	4	2019
M-Code Engineering and Manufacturing Development (EMD)	4	2018	4	2019
Diminishing Manufacture Sources and Obsolescence Evaluation/Development	1	2018	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / <i>Air &amp; Space Operations Center (AOC)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	86.456	104.954	114.864	0.000	114.864	116.000	113.343	113.095	104.146	Continuing	Continuing
674596: <i>AOC WS Modifications</i>	0.000	67.200	104.954	114.863	0.000	114.863	116.000	113.343	113.095	104.146	Continuing	Continuing
675218: <i>Applications Development</i>	0.000	15.429	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	15.430
675220: <i>Unit Level</i>	0.000	3.827	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.827

**Note**

In FY 2020, PE 0207410F, Air & Space Operations Center (AOC), Project Number 674596, AOC WS Modifications, effort Multi Domain Command and Control, was transferred to PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, Multi Domain Command and Control (MDC2), in order to improve transparency of development programs.

**A. Mission Description and Budget Item Justification**

The Air and Space Operations Center Weapon System (AOC WS) program element provides development of Command and Control (C2) capabilities across the entire spectrum of air and space operations from the strategic to the tactical level. There are three funded projects within the AOC WS program element:

**AOC WS Modifications:** Allows for the consolidation to a single baseline across the AOC WS enterprise utilizing FY16 NDAA, Section 804, Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding, as a rapid fielding effort to provide required modifications for the AOC WS to remain interoperable, certified, supportable, and compliant through the development, integration, testing, fielding, and sustainment of new capabilities and upgrades. This includes utilization of Agile software development methodologies and managed cloud infrastructure and platform services. Modifications are required for the AOC WS to keep pace with evolving Government Off the Shelf (GOTS) components, integrated Commercial Off the Shelf (COTS) components, Department of Defense (DoD) directives, changes in the underlying Information Technology (IT) environment, as well as to deliver effective operational capabilities for the user.

**Applications Development:** Provides worldwide operational level C2 capabilities, which include: air battle planning, management, and execution; operational level C2 of Integrated Air and Missile Defense (C2 of IAMD); in support of DoD, Coalition Partners, and other government agencies.

**Unit Level:** Provides both scheduling and mission preparation activities at the wing and squadron level, and the capabilities to report and track the success of each mission and influence decisions of future Air Battle Planning.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AOC WS, Applications Development, and Unit Level 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / <i>Air &amp; Space Operations Center (AOC)</i>
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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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	26.956	106.102	113.050	0.000	113.050
Current President's Budget	86.456	104.954	114.864	0.000	114.864
Total Adjustments	59.500	-1.148	1.814	0.000	1.814
• Congressional General Reductions	-0.384	-1.148			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	61.800	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.032	0.000			
• SBIR/STTR Transfer	-1.884	0.000			
• Other Adjustments	0.000	0.000	1.814	0.000	1.814

**Change Summary Explanation**

FY 2018: Increase of \$61.800M due to Air Force requested transfer from PE 0605458F, AOC 10.2 RDT&E, for the purpose of software production and sustainment activities for rapid incremental improvements to the AOC WS.

FY 2020: Increase of \$1.814M is a result of increasing AOC WS Modifications program \$8.551M; funding request was reduced by 6.737M to account for the availability of prior year execution balances.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 674596 / AOC WS Modifications
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
674596: AOC WS Modifications	0.000	67.200	104.954	114.863	0.000	114.863	116.000	113.343	113.095	104.146	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2020, PE 0207410F, Air & Space Operations Center (AOC), Project Number 674596, AOC WS Modifications, effort Multi Domain Command and Control, was transferred to PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, Multi Domain Command and Control (MDC2), in order to improve transparency of development programs.

**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 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 2020, funding increased to support additional development capacity required for AOC WS Modifications and to enable the retirement of Theater Battle Management Core System - Force Level (TBMCS FL) and the legacy AOC 10.1 system while enabling an extensible cloud-based Infrastructure and Platform as a Service (IaaS/PaaS) hosting platform. Also, 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 the development, integration, testing, fielding, training, and sustainment of new capabilities and upgrades to the AOC WS. This includes utilization managed cloud infrastructure and platform services. Additionally, in FY 2020 AOC WS Modifications activities evolve the AOC utilizing Agile Methodologies, including Extreme Programming (XP) models, and embracing DevOps relationships to foster 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 WS 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.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> AOC WS Modifications Development	56.755	64.444	83.952	0.000	83.952

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 674596 / AOC WS Modifications

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Description:</b> Conduct AOC WS infrastructure development and mission capability development/integration as an FY16 NDAA, Section 804, Middle Tier of Acquisition for Rapid Prototyping/Rapid Fielding effort. Leverage agile software development methodologies to develop, integrate, and test modification updates to the AOC WS leveraging test-driven development. Develop, test, and deliver effective operational capabilities utilizing continuous integration and continuous delivery (CI/CD) processes.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Modify the 10.1 legacy system to achieve cloud-enabled operations; develop applications to perform in the cloud environment</li> <li>- Evolve the AOC through Agile DevOps development, integration, and test of progressively improving capabilities in support of mission requirements</li> </ul> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>- 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)</li> <li>- Continue development and establishment of an enterprise infrastructure baseline to support hosting a virtual private cloud</li> </ul> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to scaling of product teams.</p>					
<p><b>Title:</b> AOC WS Modifications Direct Mission Support</p> <p><b>Description:</b> 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).</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Develop virtual private cloud architecture and execute platform scaling strategy to AOC enterprise</li> <li>- Enable scaling software product teams and provide the necessary competencies to adopt commercial best practices for agile software development</li> </ul> <p><b>FY 2020 Base Plans:</b></p>	10.445	25.622	30.911	0.000	30.911

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 674596 / AOC WS Modifications

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p>- Continue to provide the competencies necessary to scale software development capacity and enable retirement of Theater Battle Management Core System - Force Level (TBMCS FL)</p> <p>- Continue to enable development and establishment of extensible cloud-based IaaS/PaaS hosting platform/ enterprise architecture baseline environment</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to option years of contracts.</p>					
<p><b>Title:</b> Multi-Domain Command and Control (MDC2) Development</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> - Begin to evolve the MDC2 capability through Agile DevOps development, integration, and test of progressively improving capabilities in support of mission requirements</p> <p><b>FY 2020 Base Plans:</b> See PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased due to transfer to PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.</p>	0.000	14.888	0.000	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	67.200	104.954	114.863	0.000	114.863

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 674596 / AOC WS Modifications

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• OPAF 03 Line Item 834520: <i>Theater Battle Mgt C2 System</i>	4.976	2.923	5.514	-	5.514	5.284	4.739	0.000	0.000	0.000	23.436
• OPAF 03 Line Item 834530: <i>Air and Space Operations Ctr-WPN SYS</i>	25.498	38.589	33.243	-	33.243	26.021	14.606	19.208	18.336	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy builds on agile development 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 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 Theater Battle Management Core System - Force Level (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 for 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 674596 / AOC WS Modifications
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
AOC WS Modifications Development	C/CPFF	Raytheon : Waltham, MA	0.000	36.600	Oct 2017	42.703	Dec 2018	45.130	Dec 2019	0.000		45.130	Continuing	Continuing	-
AOC WS Modifications Other Transaction	Various	Pivotal : Multiple	0.000	14.642	Nov 2017	12.148	Dec 2018	28.365	Dec 2019	0.000		28.365	Continuing	Continuing	-
Multi-Domain Command and Control (MDC2)	MIPR	Various : Multiple	0.000	0.000		14.888	Apr 2019	0.000		0.000		0.000	0.000	14.888	-
<b>Subtotal</b>			0.000	51.242		69.739		73.495		0.000		73.495	Continuing	Continuing	N/A

**Remarks**  
MDC2 funding transferred to PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
AOC WS Modifications Direct Mission Support	C/TBD	Various : Various	0.000	10.445	Oct 2017	25.622	Oct 2018	30.911	Oct 2019	0.000		30.911	Continuing	Continuing	-
<b>Subtotal</b>			0.000	10.445		25.622		30.911		0.000		30.911	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
AOC WS Modifications Engineering Services	Various	Various : Various	0.000	1.056	Oct 2017	2.308	Oct 2018	2.377	Oct 2019	0.000		2.377	Continuing	Continuing	-
AOC WS Modifications Program Management Administration	C/Various	Various : Various	0.000	4.457	Nov 2017	7.285	Nov 2018	8.080	Nov 2019	0.000		8.080	Continuing	Continuing	-
<b>Subtotal</b>			0.000	5.513		9.593		10.457		0.000		10.457	Continuing	Continuing	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / <i>Air &amp; Space Operations Center (AOC)</i>	<b>Project (Number/Name)</b> 674596 / <i>AOC WS Modifications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AOC WS Modifications</b>				
AOC WS Modifications Pathfinder	1	2018	4	2018
AOC WS Modifications Development	4	2018	4	2024
<b>Multi-Domain Command and Control (MDC2)</b>				
MDC2 Development	3	2019	4	2019

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)				<b>Project (Number/Name)</b> 675218 / Applications Development			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675218: Applications Development	0.000	15.429	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	15.430
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**  
FY 2020: The \$0.001M amount will be executed in Project 674596, AOC WS Modifications

**A. Mission Description and Budget Item Justification**

This project funds operational development necessary to acquire and modify segments of Air Force's (AF) Command and Control (C2) capabilities and services. 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). These activities include C2 Air Operations Suite - C2 Information Services (C2AOS-C2IS) needs identified in the Capability Definition Package (CDP) (2012). C2AOS-C2IS creates web-enabled information services to expose air operations data using standardized schemas, such as those developed by the Air Operations Community of Interest. C2AOS-C2IS also develops and matures modular net-centric C2 applications for air battle planning, execution, and management functions. These applications include Network Enabled Weapons (NEW); the remainder of the CDP and Theater Battle Management Core Systems - Force Level (TBMCS FL) functionality; services to support air mission and Friendly Order of Battle execution, Alerting, Publish and Subscribe, Content Management and Reporting; and integration with a JC2 Reference Architecture (RA) host infrastructure environment.

Activities also include studies and analysis to support both current and future program planning and execution.

No FY 2020 funding requested; FY 2020 project efforts are detailed in PE 0305015F, C2AOS-C2IS.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Applications Development 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.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> C2AOS-C2IS Development	13.363	0.000	0.001	0.000	0.001
<b>Description:</b> C2AOS-C2IS Development effort develops modular net-centric C2 applications for air battle planning, execution and management functions and creates web-enabled information services to expose					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675218 / Applications Development

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p>air operations data in Theater Battle Management Core System (TBMCS) applications and systems using standardized schemas including Capability Packages (CP) 1, 2, &amp; 3.</p> <ul style="list-style-type: none"> <li>- CP 1: Air Tasking Order Management System (ATOMS), Request Information Services for Command and Control (RISC2) and Network Enabled Weapons (NEW)</li> <li>- CP 2: C2 of Integrated Air Missile Defense (IAMD) Planner and Airspace Management Application - Airspace Information Service (ASMA-ASIS)</li> <li>- CP 3: Air Execution Information System (AXIS)</li> </ul> <p><b>FY 2019 Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675218, Applications Development.</p> <p><b>FY 2020 Base Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675218, Applications Development.</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased \$0.001M due to database error; will be executed in Project 674596, AOC WS Modifications.</p>					
<p><b>Title:</b> C2AOS-C2IS Test and Evaluation</p> <p><b>Description:</b> Test and Evaluation</p> <p><b>FY 2019 Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675218, Applications Development.</p> <p><b>FY 2020 Base Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675218, Applications Development.</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>	2.066	0.000	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / <i>Air &amp; Space Operations Center (AOC)</i>	<b>Project (Number/Name)</b> 675218 / <i>Applications Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	15.429	0.000	0.001	0.000	0.001

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

N/A

**Remarks**

**D. Acquisition Strategy**

Projects will be awarded following full and open competition and will use an evolutionary acquisition strategy based on incremental development leveraging the C2 Applications and Information Services Development Indefinite Delivery/Indefinite Quantity contract. The Air Force Life Cycle Management Center, Operations C2 Division manages the integration of C2AOS-C2IS efforts into the AOC WS.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675218 / Applications Development
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
C2AOS-C2IS Test and Integration 1	C/T&M	Leidos, Inc. : Reston, VA	0.000	2.366	Jan 2018	0.000		0.000		0.000		0.000	0.000	2.366	-
C2AOS-C2IS Test and Integration 2	C/T&M	Lockheed Martin : Colorado Springs, CO	0.000	6.261	Nov 2017	0.000		0.000		0.000		0.000	0.000	6.261	-
<b>Subtotal</b>			0.000	8.627		0.000		0.000		0.000		0.000	0.000	8.627	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
C2AOS-C2IS Test Support (Joint)	MIPR	Joint Interoperability Test Command : Fort Huachuca, AZ	0.000	0.058	Jan 2018	0.000		0.000		0.000		0.000	0.000	0.058	-
C2AOS-C2IS Lead Developmental Test and Evaluation Organization	PO	96th Test Wing : Eglin AFB, FL	0.000	2.008	Feb 2018	0.000		0.000		0.000		0.000	0.000	2.008	-
<b>Subtotal</b>			0.000	2.066		0.000		0.000		0.000		0.000	0.000	2.066	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
C2AOS-C2IS Systems Engineering	SS/ Various	MITRE : Bedford, MA	0.000	3.003	Oct 2017	0.000		0.000		0.000		0.000	0.000	3.003	-
C2AOS-C2IS Program Management Administration	C/Various	Various : Hanscom AFB, MA	0.000	1.666	Oct 2017	0.000		0.001	Oct 2019	0.000		0.001	0.000	1.667	-
C2AOS-C2IS Cyber Support	MIPR	Various : Hanscom AFB, MA	0.000	0.067	Jan 2018	0.000		0.000		0.000		0.000	0.000	0.067	-
<b>Subtotal</b>			0.000	4.736		0.000		0.001		0.000		0.001	0.000	4.737	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>								<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)				<b>Project (Number/Name)</b> 675218 / Applications Development			
	<b>Prior Years</b>	<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	0.000	15.429		0.000		0.001	0.000	0.001	0.000	15.430	N/A

**Remarks**  
 FY 2020: The \$0.001M amount will be executed in Project 674596, AOC WS Modifications



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / <i>Air &amp; Space Operations Center (AOC)</i>	<b>Project (Number/Name)</b> 675218 / <i>Applications Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Applications Development</i></b>				
C2AOS-C2IS Test and Integration 1 (T11) - Leidos	1	2018	4	2018
C2AOS-C2IS Test and Integration 2 (T12) - Lockheed Martin	1	2018	4	2018

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675220 / Unit Level
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675220: Unit Level	0.000	3.827	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.827
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project funds are used to develop and integrate Command and Control, Incident Management, Emergency Response Application (C2IMERA; formerly Unit Command and Control [UC2]) as an evolving sequence of increasing software capabilities that support the execution of the air battle plan and the air tasking order message received from the AOC. C2IMERA operations software systems meet needs identified in the TBMCS Operational Requirements Document (ORD) (2001), the UC2 Baseline System Requirements Document (SRD), and AF Form 1067, Modification Proposal, by providing both the scheduling and mission preparation activities at the wing, group and squadron level, and the capabilities to report and track the success of each mission and influence decisions on future air battle planning. C2IMERA is fielded to the Wing Operations Center (WOC), the Maintenance Operations Center (MOC), the Emergency Operations Center (EOC), Crisis Action Team (CAT), and many other work-centers.

Activities also include studies and analysis to support both current and future program planning and execution.

No FY 2020 funding requested; FY 2020 project efforts are detailed in PE 0305015F, C2AOS-C2IS.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Unit Level 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.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> UC2/C2IMERA Software Development	3.309	0.000	0.000	0.000	0.000
<b>Description:</b> C2IMERA capabilities development/integration.					
<b>FY 2019 Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675220, Unit Level.					
<b>FY 2020 Base Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675220, Unit Level.					
<b>FY 2020 OCO Plans:</b>					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675220 / Unit Level
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> UC2/C2IMERA Testing and Test Support <b>Description:</b> C2IMERA testing and test support activities.	0.518	0.000	0.000	0.000	0.000
<b>FY 2019 Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675220, Unit Level.					
<b>FY 2020 Base Plans:</b> See PE 0305015F, C2 Air Operations Suite - C2 Info Services, Project Number 675220, Unit Level.					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	3.827	0.000	0.000	0.000	0.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
<ul style="list-style-type: none"> <li>• OPAF 03 Line Item</li> <li>834520: Theater Battle Management C2 System</li> </ul>	3.384	0.967	0.500	-	0.500	0.000	0.000	0.000	0.000	0.000	4.851

**Remarks**

**D. Acquisition Strategy**  
Projects will be awarded following full and open competition and will use an evolutionary acquisition strategy based on incremental development while incorporating agile development and testing principals. The contracting strategy is Cost Plus Fixed Fee. The acquisition and contracting strategies were approved by Program Executive Officer, Digital, on 20 March 2014.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / <i>Air &amp; Space Operations Center (AOC)</i>	<b>Project (Number/Name)</b> 675220 / <i>Unit Level</i>

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675220 / Unit Level
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
UC2/C2IMERA Development	C/CPFF	Leidos Inc. : Reston, VA	0.000	2.263	Jan 2018	0.000		0.000		0.000		0.000	0.000	2.263	-
<b>Subtotal</b>			0.000	2.263		0.000		0.000		0.000		0.000	0.000	2.263	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
UC2/C2IMERA Test Support	PO	96th Test Wing : Eglin AFB, FL	0.000	0.518	Dec 2017	0.000		0.000		0.000		0.000	0.000	0.518	-
<b>Subtotal</b>			0.000	0.518		0.000		0.000		0.000		0.000	0.000	0.518	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
UC2/C2IMERA Systems Engineering	SS/ Various	MITRE : Bedford, MA	0.000	0.327	Oct 2017	0.000		0.000		0.000		0.000	0.000	0.327	-
UC2/C2IMERA Program Management Administration	Various	Various : Hanscom AFB, MA	0.000	0.537	Nov 2017	0.000		0.000		0.000		0.000	0.000	0.537	-
UC2/C2IMERA Cyber Support	MIPR	Various : Hanscom AFB, MA	0.000	0.182	Dec 2017	0.000		0.000		0.000		0.000	0.000	0.182	-
<b>Subtotal</b>			0.000	1.046		0.000		0.000		0.000		0.000	0.000	1.046	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		0.000	3.827	0.000	0.000	0.000	0.000	3.827	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675220 / Unit Level

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>UC2/C2IMERA</b>																												
C2IMERA Rel 1.2 Testing	■																											
C2IMERA Rel 1.2 Fielding		■	■	■																								
C2IMERA Rel 1.2.2 (formerly 1.3) Development	■	■	■																									
C2IMERA Rel 1.2.2 (formerly 1.3) Testing		■	■	■																								
C2IMERA Rel 1.2.2 (formerly 1.3) Fielding					■																							
C2IMERA Rel 1.2.3 Development & Testing (formerly 1.3.1)					■																							
C2IMERA Rel 1.2.3 Fielding						■																						

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207410F / Air & Space Operations Center (AOC)	<b>Project (Number/Name)</b> 675220 / Unit Level

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>UC2/C2IMERA</b>				
C2IMERA Rel 1.2 Testing	1	2018	1	2018
C2IMERA Rel 1.2 Fielding	2	2018	4	2018
C2IMERA Rel 1.2.2 (formerly 1.3) Development	1	2018	3	2018
C2IMERA Rel 1.2.2 (formerly 1.3) Testing	2	2018	4	2018
C2IMERA Rel 1.2.2 (formerly 1.3) Fielding	1	2019	1	2019
C2IMERA Rel 1.2.3 Development & Testing (formerly 1.3.1)	1	2019	1	2019
C2IMERA Rel 1.2.3 Fielding	2	2019	2	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207412F <i>I Control and Reporting Center (CRC)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	2.374	6.413	8.109	0.000	8.109	16.070	10.562	10.478	17.152	Continuing	Continuing
67485L: <i>Theater Air Control System Imp (TACSI)</i>	-	2.374	6.413	8.109	0.000	8.109	16.070	10.562	10.478	17.152	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 an ABMS initiative to give capability to ingest GMTI data. CRC FY20 development efforts that will support ABMS efforts include an AN/TRC-213/214 RRSVS radio modernization upgrade, a Multiple Source Correlator Tracker (MSCT) software upgrade, and incorporation of a Ground Moving Target Indicator (GMTI) tracker into the CRC. In FY19, these efforts fell under one thrust known as Phase 2. For FY20 and out, these efforts will be broken out with individual AML names and, therefore, the efforts will no longer collectively be referred to as Phase 2.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

The FY2020 funding request was reduced by \$1.305M to account for the availability of prior year execution balances.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207412F I <i>Control and Reporting Center (CRC)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	2.450	6.413	9.414	0.000	9.414
Current President's Budget	2.374	6.413	8.109	0.000	8.109
Total Adjustments	-0.076	0.000	-1.305	0.000	-1.305
• 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	-0.076	0.000			
• Other Adjustments	0.000	0.000	-1.305	0.000	-1.305

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> CRC Modernization Phase 1	2.374	0.000	0.000	0.000	0.000
<b>Description:</b> CRC Modernization Phase 1 efforts: MSCT software upgrades, 3 Dimensional Expeditionary Long Range Radar(3DELRR) Integration, Secret Internet Protocol Network (SIPR integration), and Multi Functional Information Distribution System Joint Tactical Radio System (MIDS JTRS Link 16 Upgrade) is completed.					
<b>FY 2019 Plans:</b> N/A					
<b>FY 2020 Base Plans:</b> N/A					
<b>FY 2020 OCO Plans:</b> None					
<b>Title:</b> CRC AN/TRC-213/214 RRSVS Radio Modernization Upgrade	0.000	3.103	5.000	0.000	5.000
<b>Description:</b> RRSVS radio modernization upgrade includes, but is not limited to: Software located in AN/TRC-213 (V) 3 to be upgraded 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					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019	
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207412F <i>I Control and Reporting Center (CRC)</i>			
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					
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.					
<b>FY 2019 Plans:</b> Begin development of AN/TRC-213/214 RRSVS radio upgrade to include design and materials acquisition for the prototype.					
<b>FY 2020 Base Plans:</b> Continue development of AN/TRC-214 RRSVS radio prototypes and begin testing process. Begin AN/TRC-213 RRSVS radio software upgrade development.					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to continuing efforts in the AN/TRC-213/214 RRSVS radio modernization upgrades that include, but is not limited to, the build of the prototypes for the AN/TRC 214 radio upgrade, testing, and development of software upgrades to the AN/TRC 213 radios.					
<b>Title:</b> Multiple Source Correlator Tracker (MSCT) 5.9 Software Upgrade					
<b>Description:</b> The MSCT 5.9 software upgrade will 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.					
<b>FY 2019 Plans:</b> Develop and test MSCT 5.9 software.					
<b>FY 2020 Base Plans:</b> Integrate, test and field MSCT 5.9 software.					
<b>FY 2020 OCO Plans:</b> None					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased because cost of integration, test and fielding MSCT 5.9 software is less than development.					
<b>Title:</b> Ground Moving Target Indicator (GMTI) Tracker					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	-	3.300	0.500	0.000	0.500
	-	0.010	2.609	0.000	2.609

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207412F <i>I Control and Reporting Center (CRC)</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b>Description:</b> The GMTI tracker will allow Battle Managers in the CRC TOC to follow ground vehicles in the same manner current Battle Managers track aircraft and an entire site picture of the battle space.</p> <p><b>FY 2019 Plans:</b> Preliminary research and estimates on cost</p> <p><b>FY 2020 Base Plans:</b> Award contract, begin development of the incorporation of the GMTI tracker into the CRC.</p> <p><b>FY 2020 OCO Plans:</b> None</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased because the program is moving from preliminary research to development of how the tracker will incorporate into the CRC.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	2.374	6.413	8.109	0.000	8.109

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPAF 03 Line Item 833040: <i>Theater Air Control Sys Improvements</i>	23.233	19.424	0.000	-	0.000	13.393	18.879	20.431	8.734	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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207412F / <i>Control and Reporting Center (CRC)</i>	<b>Project (Number/Name)</b> 67485L / <i>Theater Air Control System Imp (TACSI)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
CRC Modernization Phase 1	C/Variou	Various : Various, UT	-	1.372	Sep 2018	-		-		-		-	Continuing	Continuing	-
AN/TRC-213/214 RRSVS Radio Modernization Upgrade	C/Variou	Various : Various, MD	-	-		2.641	Mar 2019	3.487	Nov 2019	-		3.487	Continuing	Continuing	-
Multiple Source Correlator Tracker (MSCT) 5.9 Software Upgrade	C/Variou	Various : Various, UT	-	-		2.899	Mar 2019	-		-		-	Continuing	Continuing	-
a Ground Moving Target Indicator (GMTI) Tracker	C/Variou	Various : Various, UT	-	-		-		2.609	Nov 2019	-		2.609	Continuing	Continuing	-
<b>Subtotal</b>			-	1.372		5.540		6.096		-		6.096	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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-Radio Modernization	PO	Various : Various, FL	-	0.057	Sep 2018	-		0.640	Aug 2020	-		0.640	Continuing	Continuing	-
Test Support-MSCT 5.9	PO	Various : Various, UT	-	-		-		0.500	Feb 2020	-		0.500	Continuing	Continuing	-
<b>Subtotal</b>			-	0.057		-		1.140		-		1.140	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 - Hill AFB	Variou	Hill AFB : Hill AFB, UT	-	0.945	Aug 2018	0.873	Jun 2019	0.873	Jun 2020	-		0.873	Continuing	Continuing	-
<b>Subtotal</b>			-	0.945		0.873		0.873		-		0.873	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207412F / <i>Control and Reporting Center (CRC)</i>	<b>Project (Number/Name)</b> 67485L / <i>Theater Air Control System Imp (TACSI)</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>AN/TRC-213/214 RRSVS Radio Modernization Upgrade</i></b>																												
ASP																												
Design & Development																												
Integration & Testing																												
<b><i>Multiple Source Correlator Tracker(MSCT) 5.9 Software Upgrade</i></b>																												
Design & Development																												
Integration & Testing																												
<b><i>Ground Moving Target Indicator (GMTI) Tracker</i></b>																												
Research and contract award																												
Design & Development																												
Integration & Testing																												
<b><i>Future CRC Modernization Efforts</i></b>																												
Development & Integration																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207412F / <i>Control and Reporting Center (CRC)</i>	<b>Project (Number/Name)</b> 67485L / <i>Theater Air Control System Imp (TACSI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>AN/TRC-213/214 RRSVS Radio Modernization Upgrade</i></b>				
ASP	1	2019	2	2019
Design & Development	2	2019	4	2020
Integration & Testing	4	2020	1	2022
<b><i>Multiple Source Correlator Tracker(MSCT) 5.9 Software Upgrade</i></b>				
Design & Development	2	2019	2	2020
Integration & Testing	2	2020	4	2020
<b><i>Ground Moving Target Indicator (GMTI) Tracker</i></b>				
Research and contract award	2	2019	2	2020
Design & Development	3	2020	2	2021
Integration & Testing	3	2021	1	2022
<b><i>Future CRC Modernization Efforts</i></b>				
Development & Integration	3	2021	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	118.702	112.280	67.996	0.000	67.996	169.636	143.321	103.406	117.608	Continuing	Continuing
67411L: <i>Airborne Warning &amp; Control System (AWACS)</i>	-	118.702	112.280	67.996	0.000	67.996	169.636	143.321	103.406	117.608	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0207417F, project 67411L, E-3 AWACS Communications Integration Program (ACIP), is a new start.  
 This program, BA 7, PE 0207417F, project 67411L, E-3 AWACS GPS Upgrade (M-Code), is a new start.

**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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>	
<p>3. E-3 Training, Support, and Infrastructure (TSI): TSI provides continuing management support for AWACS modernization and enhancement. These activities include managing the AWACS Development Test and Evaluation (DT&amp;E) and Production infrastructure and tracking and monitoring the AWACS vendor's core mission and aircrew training, support equipment and program Government Furnished Property. The overall DT&amp;E test infrastructure supports development, production, and sustainment projects and maintains facilities to support AWACS aircraft during system and sub-system testing at Boeing Field, WA, Baltimore, MD, and Oklahoma City, OK. The TSI assets also support multiple international Airborne Early Warning and Control (AEW&amp;C) projects on a maintenance fee basis, not limited to projects for France, Saudi Arabia, United Kingdom, Japan, and North Atlantic Treaty (NATO) AEW&amp;C 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, Foreign Military Sales (FMS), and international customers with a configured development and qualification system and subsystem environment supporting all AWACS system and radar development and sustainment. 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.</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 &amp; 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. IPEC was originally planned for accomplishment as a traditional acquisition program, but due to warfighter demand, the effort has been re-classified as an Urgent Operational Need (UON).</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 Indication (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 issues and does not support mandated Crypto Mod (CM) &amp; Freq. Remap (FR). CNU resolves DMS issues, provides CM &amp; FR, Link 16 enhancements &amp; growth for Next Gen Tactical Data Link (TDL). Risk reduction activities are being executed in cooperation with foreign partners.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>	
<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 2020/FOC 2027 does not meet the Mode 5 mandate. This subset accelerates the Mode 5 transponder FOC independent of DRAGON. In previous budget cycles, this effort was referred to as E-3 Automatic Dependent Surveillance Broadcast (ADS-B) Out Acceleration, which included both ADSB Out and Mode 5 Acceleration.</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 &amp; BMC2 to COCOMs for Joint, Allied &amp; Coalition ops by maintaining compatibility with CAF / Sister service C2 nodes and theater assets.</p> <p>10. E-3 AWACS GPS Upgrade (M-Code): The GPS M-code upgrade provides E-3G AWACS with robust capability to operate in evolving GPS jamming environment. Incorporates GPS M-Code capability into E-3G. As well as provides continued capabilities in GPS jamming environment in support of airborne AMTI &amp; BMC2 to COCOMs for Joint, Allied &amp; Coalition ops. We are compliant with OSD/NII mandate (2006), Public Law 111-383 and FY11 National Defense Authorization Act. In FY20 we will be using the AWACS software integration facility to inform the GPS M-code with the DRAGON upgrade.</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 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.</p> <p>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 2018 Air Force penalty total is \$14.373M. 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.</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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>				
<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	
Previous President's Budget	151.726	120.664	153.600	0.000	153.600	
Current President's Budget	118.702	112.280	67.996	0.000	67.996	
Total Adjustments	-33.024	-8.384	-85.604	0.000	-85.604	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	-8.384				
• Congressional Rescissions	-0.475	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	-27.718	0.000				
• SBIR/STTR Transfer	-4.831	0.000				
• Other Adjustments	0.000	0.000	-85.604	0.000	-85.604	
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>				<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> E-3 DMS Replacement of Avionics for Global Operations and Navigation (DRAGON)				7.763	9.400	2.000
<b>Description:</b> 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.						
<b>FY 2019 Plans:</b> - Continue Development of Motion Trainer Simulator - IOT&E						
<b>FY 2020 Plans:</b> - Continue Development of Motion Trainer Simulator - Complete IOT&E						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Development efforts reduced from prior year						
<b>Title:</b> E-3 Electronic Protection (EP)				4.749	5.909	6.787
<b>Description:</b> 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.						

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>FY 2019 Plans:</b> - Select multiple contractors for rapid prototyping.</p> <p><b>FY 2020 Plans:</b> - Will award rapid prototyping development contracts</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to projected award of prototyping contracts</p>				
<p><b>Title:</b> E-3 Training, Support and Infrastructure (TSI)</p> <p><b>Description:</b> Training, Support, and Infrastructure (TSI): Provides continuing management support for AWACS modernization and enhancement to include managing the AWACS Development Test and Evaluation (DT&amp;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><b>FY 2019 Plans:</b> - Continues to maintain and provide DT&amp;E labs to AWACS programs - Supports AWACS development and production programs lab integration &amp; test efforts - Provides system lab support, integration, and test to current AWACS programs. - Supports AWACS and other OSD mandated interoperability testing and support mandatory E-3 Operational, Safety, and Suitability and Effectiveness program</p> <p><b>FY 2020 Plans:</b> - Will continue to maintain and provide DT&amp;E labs to AWACS programs - Will support AWACS development and production programs lab integration &amp; 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> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease in funding</p>		14.115	10.131	9.100
<p><b>Title:</b> E-3 Command and Control, Intelligence, Surveillance and Reconnaissance (C2ISR)</p> <p><b>Description:</b> Command and Control, Intelligence, Surveillance, and Reconnaissance (C2ISR):</p>		34.495	23.576	2.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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.				
<b>FY 2019 Plans:</b> - Continues to conduct engineering / integration studies to determine required modifications and associated costs to upgrade and support risk reduction activities for program planning - Continues to execute cooperative Independent Research and Development				
<b>FY 2020 Plans:</b> 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				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease in risk reduction study requirements				
<b>Title:</b> E-3 Internet Protocol Enabled Communication (IPEC) <b>Description:</b> 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.		9.359	1.000	0.500
<b>FY 2019 Plans:</b> - Continue FCA/PCA activities				
<b>FY 2020 Plans:</b> - Complete EMD effort				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Decrease due to closure of EMD				
<b>Title:</b> E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) <b>Description:</b> 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.		12.700	22.000	5.689

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>FY 2019 Plans:</b> - Will continue Phase II Risk Reduction activities including Risk Reduction for system-level integration, AWACS-specific modifications to the SEU, AWACS-specific antenna solutions, and integration prototyping.</p> <p><b>FY 2020 Plans:</b> - Continue risk reduction efforts</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Phase II Risk Reduction contracts ending in FY20, prepping for EMD RFP release in FY20 with a planned FY21 award timeframe.</p>				
<p><b>Title:</b> E-3 Communication Network Upgrade (CNU)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> - Awarding rapid prototyping development contracts</p> <p><b>FY 2020 Plans:</b> - Continue rapid prototyping and development effort</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease due to stabilization of prototyping contract</p>		32.676	28.937	24.333
<p><b>Title:</b> Mode 5 Acceleration</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> - Awarding rapid prototyping development contracts</p> <p><b>FY 2020 Plans:</b> - Continue rapid prototyping and development effort</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>		2.845	11.327	15.587

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
- Increase in prototyping and development			
<b>Title:</b> E-3 AWACS Communications Integration Program (ACIP) <b>Description:</b> 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.  <b>FY 2019 Plans:</b> - N/A  <b>FY 2020 Plans:</b> - Begin risk reduction effort  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Increase due to new start in FY20	0.000	0.000	1.000
<b>Title:</b> E-3 AWACS GPS Upgrade (M-Code) <b>Description:</b> 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.  <b>FY 2019 Plans:</b> - N/A  <b>FY 2020 Plans:</b> - Begin risk reduction effort  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to new start in FY20	0.000	0.000	1.000
<b>Accomplishments/Planned Programs Subtotals</b>	118.702	112.280	67.996

<b>D. Other Program Funding Summary (\$ in Millions)</b>									<b>Cost To</b>		
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Complete</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>						
• APAF 05 Line Item E00300: E-3	166.552	133.199	164.273	-	164.273	153.454	189.547	242.996	302.566	Continuing	Continuing

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / <i>Airborne Warning and Control System (AWACS)</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item E34045: <i>Airborne Warning and Control System</i>	142.886	59.665	34.240	-	34.240	25.604	28.758	0.000	0.000	0.000	291.153
• APAF 06 Line Item 000999: <i>Initial Spares/Repair Parts</i>	21.139	13.563	24.175	-	24.175	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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / Airborne Warning and Control System (AWACS)	<b>Project (Number/Name)</b> 67411L / Airborne Warning & Control System (AWACS)
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
E-3 DMS Replacement of Avionics for Global Operations and Navigation (DRAGON)	SS/FPIF	L3 : Arlington, TX	-	7.763	Jan 2018	8.600	Jan 2019	2.000	Jan 2020	-		2.000	Continuing	Continuing	-
E-3 Electronic Protection (EP)	SS/CPFF	GTRI : Atlanta, GA	-	0.800	Jan 2018	1.123	Jan 2019	6.787	Jan 2020	-		6.787	Continuing	Continuing	-
E-3 Command and Control, Intelligence, Surveillance, and Reconnaissance	SS/ Various	BAH & Various : Washington, DC	-	25.719	Jan 2018	23.376	Jan 2019	1.000	Jan 2020	-		1.000	Continuing	Continuing	-
E-3 Command and Control, Intelligence, Surveillance, and Reconnaissance GTRI Study	SS/CPFF	GTRI : Atlanta, GA	-	4.388	Aug 2018	0.600	Feb 2019	0.500	Feb 2020	-		0.500	Continuing	Continuing	-
E-3 Internet Protocol Enabled Communication (IPEC)	SS/ Various	Boeing : Oklahoma City, OK	-	9.330	Mar 2019	1.000	Nov 2019	0.500	Nov 2020	-		0.500	Continuing	Continuing	-
E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) Risk Reduction	SS/CPFF	Raytheon : Fort Wayne, IN	-	5.612	Sep 2018	8.460	Apr 2019	-		-		-	Continuing	Continuing	14.412
E-3 Combat Identification (CID) Diminishing Manufacturing Sources (DMS) Prototype Development	MIPR	DMEA : McClellan, CA	-	4.000	Mar 2019	10.000	Jun 2019	-		-		-	Continuing	Continuing	14.000
E-3 Communication Network Upgrade (CNU)	Various	Space & Naval Warfare Sys : San Diego, CA	-	29.218	Jan 2018	14.553	Jan 2019	7.858	Jan 2020	-		7.858	Continuing	Continuing	-
E-3 Communication Network Upgrade (CNU) GTRI	MIPR	GTRI : Atlanta, GA	-	-		7.192	Feb 2019	12.295	Feb 2020	-		12.295	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0207417F / Airborne Warning and Control System (AWACS)				67411L / Airborne Warning & Control System (AWACS)							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Mode 5 Acceleration	MIPR	Raytheon : Aberdeen Prov. Grnds, MD	-	0.391	Jan 2018	8.836	Jan 2019	15.587	Jan 2020	-		15.587	Continuing	Continuing	-
ACIP	TBD	TBD : TBD	-	0.000	Jan 2018	0.000	Jan 2019	1.000	Jan 2020	-		1.000	Continuing	Continuing	-
AWACS GPS Upgrade (M-Code)	TBD	TBD : TBD	-	0.000	Jan 2018	0.000	Jan 2019	1.000	Jan 2020	-		1.000	Continuing	Continuing	-
<b>Subtotal</b>			-	87.221		83.740		48.527		-		48.527	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Training, Support & Infrastructure (TSI)	SS/ Various	Boeing : Oklahoma City, OK	-	14.115	Jan 2018	10.131	Jan 2019	9.100	Jan 2020	-		9.100	Continuing	Continuing	-
<b>Subtotal</b>			-	14.115		10.131		9.100		-		9.100	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
(U) Program Management Administration (PMA)	Various	AWACS Program Office : Hanscom AFB, MA	-	17.366	Jan 2018	18.409	Jan 2019	10.369	Jan 2020	-		10.369	Continuing	Continuing	-
<b>Subtotal</b>			-	17.366		18.409		10.369		-		10.369	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	118.702		112.280		67.996		-		67.996	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / Airborne Warning and Control System (AWACS)	<b>Project (Number/Name)</b> 67411L / Airborne Warning & Control System (AWACS)

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>AWACS PE 0207417F</b>	
DRAGON EMD	[Redacted]
DRAGON IOT&E	[Redacted]
EP Development	[Redacted]
EP DT/OT	[Redacted]
TSI	[Redacted]
C2ISR	[Redacted]
IPEC EMD	[Redacted]
CID DMS TD	[Redacted]
CID DMS Milestone B (Feb 2021)	[Redacted]
CID DMS EMD	[Redacted]
CID DT/OT	[Redacted]
CID DMS Milestone C (Oct 2024)	[Redacted]
CNU Risk Reduction	[Redacted]
CNU Beta Decision (Feb 2019)	[Redacted]
CNU Development	[Redacted]
Mode 5 Development	[Redacted]
Mode 5 Beta Decision (Oct 2021)	[Redacted]
ACIP Risk Reduction	[Redacted]
ACIP SOTR	[Redacted]
GPS Upgrade (M-Code) Risk Reduction	[Redacted]

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207417F / Airborne Warning and Control System (AWACS)	<b>Project (Number/Name)</b> 67411L / Airborne Warning & Control System (AWACS)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AWACS PE 0207417F</b>				
DRAGON EMD	1	2018	4	2019
DRAGON IOT&E	3	2019	2	2020
EP Development	4	2019	3	2024
EP DT/OT	2	2023	4	2024
TSI	1	2018	4	2024
C2ISR	1	2018	4	2024
IPEC EMD	1	2018	2	2020
CID DMS TD	4	2018	2	2020
CID DMS Milestone B (Feb 2021)	2	2021	2	2021
CID DMS EMD	2	2021	3	2023
CID DT/OT	1	2023	2	2023
CID DMS Milestone C (Oct 2024)	1	2024	1	2024
CNU Risk Reduction	1	2018	2	2019
CNU Beta Decision (Feb 2019)	2	2019	2	2019
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

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	3.522	2.659	2.462	0.000	2.462	4.231	5.048	4.735	4.041	Continuing	Continuing
675234: <i>TACP Support</i>	-	3.522	2.659	2.462	0.000	2.462	4.231	5.048	4.735	4.041	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) Air Traffic Control (ATC), Assault Zone operations, 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. Future JTC TRS development 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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>
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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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	3.656	2.659	4.374	0.000	4.374
Current President's Budget	3.522	2.659	2.462	0.000	2.462
Total Adjustments	-0.134	0.000	-1.912	0.000	-1.912
• 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	-0.134	0.000	-1.912	0.000	-1.912

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> JTC TRS Trainer Development	2.522	0.319	0.000
<b>Description:</b> Development and test of Engineering Change Proposals (ECPs) for TACP-Close Air Support System (CASS).			
<b>FY 2019 Plans:</b> Development of air traffic control ECP.			
<b>FY 2020 Plans:</b> No development effort required.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>			

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Development effort complete			
<b>Title:</b> JTAGSS Trainer Development	1.000	2.340	2.462
<b>Description:</b> 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			
<b>FY 2019 Plans:</b> Continue JTAGSS 3.0. Integrate TACP Close Air Support System 1.4.4. and internal agents.			
<b>FY 2020 Plans:</b> Continue JTAGSS 3.0. Integrate TACP Close Air Support System 1.4.4. and internal agents.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Development effort will complete mid 2020			
<b>Accomplishments/Planned Programs Subtotals</b>	3.522	2.659	2.462

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 837100: <i>Tactical C-E Equipment</i>	1.181	13.023	3.891	-	3.891	3.961	-	-	-	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 and an Air Traffic Control upgrade. 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, Air Traffic Control (ATC), TACP-Close Air Support System (TACP-CASS) and Small Diameter Bomb II (SDB II).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>
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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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>	<b>Project (Number/Name)</b> 675234 / <i>TACP Support</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
JTC TRS Trainer Development	C/FFP	AFLCMC/WNS, AFMC : Wright Patterson AFB, OH	-	1.200	Apr 2018	0.319	Jan 2019	0.000	Jan 2020	-		0.000	Continuing	Continuing	-
JTAGSS Development	C/CPFF	AFRL, AFMC : Wright Patterson AFB, OH	-	2.322	Dec 2017	2.340	Jan 2019	2.462	Jan 2020	-		2.462	Continuing	Continuing	-
<b>Subtotal</b>			-	3.522		2.659		2.462		-		2.462	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	3.522	2.659	2.462	-	2.462	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>	<b>Project (Number/Name)</b> 675234 / <i>TACP Support</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Tactical Simulators</i></b>																												
JTC TRS RFP - for DACAS	■	■																										
JTC TRS Contract Award for DACAS	■	■																										
JTC TRS Study Options and Engineering Change Proposals (ECPs)					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
JTC TRS Contract Award for ATC								■																				
JTAGSS Development	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
JTAGSS Production					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207418F / <i>Tactical Airborne Control Systems</i>	<b>Project (Number/Name)</b> 675234 / <i>TACP Support</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Tactical Simulators</i></b>				
JTC TRS RFP - for DACAS	1	2018	2	2018
JTC TRS Contract Award for DACAS	1	2018	2	2018
JTC TRS Study Options and Engineering Change Proposals (ECPs)	2	2018	3	2020
JTC TRS Contract Award for ATC	2	2019	2	2019
JTAGSS Development	1	2018	4	2020
JTAGSS Production	4	2018	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	15.821	10.316	13.668	0.000	13.668	15.257	17.283	17.781	14.479	Continuing	Continuing
675306: <i>Analysis Enterprise</i>	-	3.404	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
675307: <i>TARGETING ENTERPRISE RESEARCH</i>	-	11.717	9.451	12.922	0.000	12.922	14.497	16.507	16.991	13.675	Continuing	Continuing
675309: <i>GEO Info &amp; Serv Software</i>	-	0.700	0.865	0.746	0.000	0.746	0.760	0.776	0.790	0.804	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 prototyping/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 methodologies and cloud environment providers with hosting equipment provided by the program. Modernizations are required 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	13.420	10.316	10.368	0.000	10.368
Current President's Budget	15.821	10.316	13.668	0.000	13.668
Total Adjustments	2.401	0.000	3.300	0.000	3.300
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	2.401	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	3.300	0.000	3.300

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675306 / <i>Analysis Enterprise</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675306: <i>Analysis Enterprise</i>	-	3.404	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**

Supports increase in System Threat Assessment Reports (STARs) production. The Validated Online Lifecycle Threat (VOLT) supports acquisition of weapons systems that are tailored to defeat future threats. This Project meets DoD 5000.02-mandated requirement for increase in STAR.

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

	FY 2018	FY 2019	FY 2020
<b>Title:</b> Fund Acq/Intel STAR VOLT	3.404	-	-
<b>Description:</b> DoD 5000.02 mandated a 100% increase in System Threat Assessment Reports (STARs) production. The Validated Online Lifecycle Threat (VOLT), STAR replacement, supports acquisition of weapon systems that are more effective against future threats.			
<b>Accomplishments/Planned Programs Subtotals</b>	3.404	-	-

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 832070: <i>Intelligence Comm Equipment</i>	6.549	6.286	4.396	-	4.396	4.475	4.557	4.639	-	Continuing	Continuing
• RDTE 07 PE 0207431F: <i>Combat Air Intelligence Systems</i>	13.420	10.393	10.446	-	10.446	10.637	10.862	11.059	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

N/A

**E. 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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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675306 / <i>Analysis Enterprise</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>STAR VOLT</b>				
Begin VOLT Software upgrade	1	2018	4	2018

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>				<b>Project (Number/Name)</b> 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675307: <i>TARGETING ENTERPRISE RESEARCH</i>	-	11.717	9.451	12.922	0.000	12.922	14.497	16.507	16.991	13.675	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, 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Targeting Enterprise Research	11.717	9.451	12.922
<b>Description:</b> Conduct Targeting Enterprise research and advancement for projects such as Information for Operational and Tactical Analysis (IOTA), 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.			
<b>FY 2019 Plans:</b> Continue the phased modernization of capabilities within the T&G portfolio and migrate to a Continuous Integration/DevOps environment utilizing Agile methodologies, including Extreme Programming (XP) models, and enabling an extensible cloud-based Infrastructure and Platform as a Service (IaaS/PaaS) hosting platform.			
<b>FY 2020 Plans:</b> 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.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase reflects rising costs of software services			
<b>Accomplishments/Planned Programs Subtotals</b>	11.717	9.451	12.922

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 832070: <i>Intelligence Comm Equipment</i>	6.534	6.273	4.384	-	4.384	4.464	-	-	-	Continuing	Continuing

**Remarks**

Combat Air Intelligence System (CAIS) procurement funds.

**D. Acquisition Strategy**

The acquisition strategy builds on agile 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.

**E. 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 2020 Air Force												Date: February 2019				
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207431F / Combat Air Intelligence System Activities				Project (Number/Name) 675307 / TARGETING ENTERPRISE RESEARCH								
<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	9.539	Dec 2017	7.426		11.093		-		11.093	Continuing	Continuing	-	
<b>Subtotal</b>			-	9.539		7.426		11.093		-		11.093	Continuing	Continuing	N/A	
<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.425	Dec 2017	0.270	Dec 2018	0.270	Dec 2019	-		0.270	Continuing	Continuing	-	
DMS, MilCloud	Various	Various : TBD	-	0.098		0.098		0.098		-		0.098	Continuing	Continuing	-	
<b>Subtotal</b>			-	0.523		0.368		0.368		-		0.368	Continuing	Continuing	N/A	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.137	Dec 2017	0.337	Dec 2018	0.344	Dec 2019	-		0.344	Continuing	Continuing	-	
<b>Subtotal</b>			-	0.137		0.337		0.344		-		0.344	Continuing	Continuing	N/A	
<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	1.518	Dec 2017	1.320	Nov 2018	1.117	Nov 2019	-		1.117	Continuing	Continuing	-	
<b>Subtotal</b>			-	1.518		1.320		1.117		-		1.117	Continuing	Continuing	N/A	



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Targeting</b>	
Software/Hardware Development	
Test and Evaluation	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675307 / <i>TARGETING ENTERPRISE RESEARCH</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Targeting</b>				
Software/Hardware Development	1	2018	4	2024
Test and Evaluation	1	2018	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>				<b>Project (Number/Name)</b> 675309 / <i>GEO Info &amp; Serv Software</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675309: <i>GEO Info &amp; Serv Software</i>	-	0.700	0.865	0.746	0.000	0.746	0.760	0.776	0.790	0.804	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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Enhanced Geospatial Product Library (EGPL)	0.700	0.865	0.746
<b>Description:</b> Provide continuing support for EGPL software and storage to meet future and evolving IT and GEOINT standards and support.			
<b>FY 2019 Plans:</b> Continue to develop EGPL software and continue modernization efforts using Agile Methodologies.			
<b>FY 2020 Plans:</b> Continue to develop EGPL software and continue modernization efforts utilizing Agile Methodologies.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Decrease costs reflect return to baseline level after modernization efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.700	0.865	0.746

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675309 / <i>GEO Info &amp; Serv Software</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 832070: <i>Intelligence Comm Equipment</i>	6.534	6.273	4.384	-	4.384	4.464	-	-	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy builds on agile 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675309 / <i>GEO Info &amp; Serv Software</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Enhanced Geospatial Product Library	MIPR	ARL : Research Triangle, NC	-	0.470	Jan 2018	0.865	Dec 2018	0.746	Dec 2019	-		0.746	Continuing	Continuing	-
Arc GIS	Reqn	Multiple : Multiple	-	0.000		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.470		0.865		0.746		-		0.746	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-
<b>Subtotal</b>			-	-		-		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
45 Test Squadron	PO	45th Test Squadron : Eglin, FL	-	0.000		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		-		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Office Support	Reqn	Not Specified : Hanscom, MA	-	0.230		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.230		-		-		-		-	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675309 / <i>GEO Info &amp; Serv Software</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Geoint</b>	
Software Development	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207431F / <i>Combat Air Intelligence System Activities</i>	<b>Project (Number/Name)</b> 675309 / <i>GEO Info &amp; Serv Software</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Geoint</b>				
Software Development	1	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.623	6.149	6.217	0.000	6.217	12.931	13.997	13.317	11.751	Continuing	Continuing
676013: <i>Equipment Modernization</i>	-	10.623	6.149	6.217	0.000	6.217	12.931	13.997	13.317	11.751	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

TACPs 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 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 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 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 through the use of 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 closely with the Battlefield Airmen Office (BAO) program to procure dismounted equipment. 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 operations centers), (2) Vehicle Mounted Systems (used in TACP tactical vehicles), (3) Dismounted Systems (used by JTACs during dismounted infantry operations), and (4) Close Air Support System (CASS) software.

CASS software provides advanced communication, advanced targeting capability, and significant interoperability improvements for mobile computing devices used by Dismounted JTACs, for vehicle-mounted systems, and for stationary systems used in operations centers. TACP CASS software enables digital data communications with joint Command and Control (C2) nodes, other TACPs, attack aircraft, and Army C2 and Fire Support systems. It includes interfaces with TOC, ASOC, and JTAC radios, and targeting devices. 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 Message Format (VMF), Link 16, Situational Awareness Data Link (SADL), Marine Tactical System (MTS), and U.S. Message Text Format (USMTF).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>
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The software is in two versions: Dismounted and ASOC/TOC/Mounted (ATM). Both software support 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. CASS 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 external devices (such as laser range finders and radios) and rapid development, testing and fielding of new mission capability modules to meet future requirements

Funding increases include support for Dismount and ATM software to address interfaces with new android dismount software, changes to Army fires support systems, changes to Theater Battle Management Core Systems (TBMCS), updates for fielded versions, new joint Digitally-Aided CAS (DACAS) standards, and technical support to operators employing the software.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	10.623	6.149	13.652	0.000	13.652
Current President's Budget	10.623	6.149	6.217	0.000	6.217
Total Adjustments	0.000	0.000	-7.435	0.000	-7.435
• 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	-7.435	0.000	-7.435

**Change Summary Explanation**

FY2020 funding decreased due to Air Force rephasing reimbursement

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>				<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernizaton</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
676013: <i>Equipment Modernizaton</i>	-	10.623	6.149	6.217	0.000	6.217	12.931	13.997	13.317	11.751	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

TACPs 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 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 Tactical Operations Centers (TOC), mobile operations in tactical vehicles, and dismounted (on foot) operations with Army infantry patrols.

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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 closely with the Battlefield Airmen Office (BAO) program to procure dismounted equipment. 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 operations centers), (2) Vehicle Mounted Systems (used in TACP tactical vehicles), (3) Dismounted Systems (used by JTACs during dismounted infantry operations), and (4) Close Air Support System (CASS) software

CASS software provides advanced communication, advanced targeting capability, and significant interoperability improvements for mobile computing devices used by Dismounted JTACs, for vehicle-mounted systems, and for stationary systems used in operations centers. TACP CASS software enables digital data communications with joint Command and Control (C2) nodes, other TACPs, attack aircraft, and Army C2 and Fire Support systems. It includes interfaces with TOC, ASOC, and JTAC radios, and targeting devices. 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 Message Format (VMF), Link 16, Situational Awareness Data Link (SADL), Marine Tactical System (MTS), and U.S. Message Text Format (USMTF).

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernization</i>
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The software is in two versions: Dismounted and ASOC/TOC/Mounted (ATM). Both software support 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. CASS 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 external devices (such as laser range finders and radios) and rapid development, testing and fielding of new mission capability modules to meet future requirements.

Funding increases include support for Dismount and ATM software to address interfaces with new android dismount software, changes to Army fires support systems, changes to Theater Battle Management Core Systems (TBMCS), updates for fielded versions, new joint Digitally-Aided CAS (DACAS) standards, and technical support to operators employing the software.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b>Title:</b> Close Air Support System (CASS)</p> <p><b>Description:</b> Title: Close Air Support System (CASS) Description: The CASS 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- This includes, but is not limited to:</li> <li>- Supports development of BAO Program's BA-TAK Dismount Android software.</li> <li>- Continues to develop and update interface with TBMCS..</li> <li>- Continues to complete update of CASS software for new and emerging mobile TACP vehicles.</li> <li>- Establish TACP common software architecture for further development to meet other battlefield airman operational needs.</li> <li>- Completes upgrades and fixes to Dismounted CASS v1.4.5 software.</li> <li>- Conducts source selection activities to provide additional feature (capabilities) for the CASS software.</li> <li>- Continues with risk reduction, design and development of CASS software v2.0 architecture and software in preparation for government testing.</li> <li>- Continues to integrate, and test CASS data communications interfaces with C2 Nodes, CAS aircraft, ATN, SRW networks, and MUOS SATCOM networks to enhance interoperability between TACPs, and other joint warfighters.</li> </ul>	10.623	6.149	6.217	0.000	6.217

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernization</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p>- Completes development of training and simulation capabilities to integrate and test CASS data communications interfaces.</p> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>-This includes, but is not limited to:</li> <li>-Will continue to support development of BAO Program's Battlefield Airmen Tactical Assault Kit (BA-TAK) Dismount Android software.</li> <li>-Will continue to develop and update interface with TBMCS.</li> <li>-Will continue to complete update of CASS software for new and emerging mobile TACP vehicles.</li> <li>-Will establish TACP common software architecture for further development to meet other battlefield airman operational needs.</li> <li>-Will conduct investigations to provide additional feature (capabilities) for the CASS software -Will continue with risk reduction, design and development of CASS ATM software v2.0 architecture and software in preparation for government testing</li> <li>-Will complete risk reduction of CASS software v2.0 architecture and software; complete government testing of risk reduction software.</li> <li>-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.</li> <li>-Will complete development of training and simulation capabilities to integrate and test CASS data communications interfaces.</li> </ul> <p><b>FY 2020 OCO Plans:</b> 0.00</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase due to rephasing reimbursement from FY19</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	10.623	6.149	6.217	0.000	6.217

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernization</i>

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• OPAF 03 Line item 837100: <i>Tactical C-E Equipment</i>	43.084	42.846	35.967	-	35.967	54.473	52.820	52.986	36.388	Continuing	Continuing

**Remarks**

**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 use of Other Transactional Authority (OTA) for ATM software; and coordinating with the BAO program office on developing the next Dismount solution. CASS ATM Software v2.0 strategy is to build of the results v1A OTA (Defense Innovation Unit Experimental (DIUx)) to develop continue risk reduction with v1B. The results of v1B will be used form the v2.0 Acquisition Strategy Panel (ASP) and start of source selection are planned for the 1st Qtr. of FY20 with contract award in the 2nd Qtr. of FY20. CASS v2.0 contract will provide new open-system, modular software to support Android and/or Windows Operating System platforms, with additional capabilities interfacing with the ATN as well.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernization</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
CASS 2.0 System Software Dev. Dismounted	Various	GDIT : WP, OH	-	0.983	Jun 2018	-		-		-		-	Continuing	Continuing	-
CASS 2.0 System Software Dev. Mounted	TBD	TBD : TBD	-	-		2.823		3.048	Jan 2020	-		3.048	Continuing	Continuing	-
MDAP Penalty and SBIR assessment	C/CPAF	Not specified. : TBD	-	-		0.027		-		-		-	Continuing	Continuing	-
CASS 2.0 Risk Reduction Phase 1	SS/CPAF	GDIT : WP, OH	-	0.300	Dec 2018	-		-		-		-	Continuing	Continuing	-
CASS 2.0 Risk Reduction Phase 2	SS/CPAF	GDIT : WP, OH	-	7.286	Mar 2019	-		-		-		-	Continuing	Continuing	-
CASS 1.4.5 NSWC Crane (Naval Surface Warfare Center)	MIPR	NSWC Crane : Crane, IN	-	0.500	Jan 2018	-		-		-		-	Continuing	Continuing	-
CASS 2.0 NSWC Crane (Naval Surface Warfare Center)	MIPR	NSWC Crane : Crane, MA	-	-		1.120	Jan 2019	0.984	Jan 2020	-		0.984	Continuing	Continuing	-
CASS 2.0 JTAGGS TTP Development	MIPR	AFRL : WPAFB, IN	-	0.500	Dec 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	9.569		3.970		4.032		-		4.032	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Agency Support	MIPR	Various : Multiple, NV	-	0.415	Jan 2018	0.670	Jan 2019	0.801	Apr 2020	-		0.801	Continuing	Continuing	-
<b>Subtotal</b>			-	0.415		0.670		0.801		-		0.801	Continuing	Continuing	N/A

**Remarks**  
Development, operational and interoperability testing

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernizaton</i>
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/CPFF	PMO : Bedford, MA	-	0.639	Oct 2017	1.509	Oct 2018	1.384	Oct 2020	-		1.384	Continuing	Continuing	-
<b>Subtotal</b>			-	0.639		1.509		1.384		-		1.384	Continuing	Continuing	N/A

**Remarks**  
PMA funds MITRE, ETASS, PASS, SCS, all multiple contractors.

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	10.623	6.149	6.217	-	6.217	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernizat</i> on

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Close Air Support System(CASS)</b>	
Close Air Support System (CASS) Dismount Software (v1.0) Design and Development (BA-TAK)	██████████
Close Air Support System (CASS) Dismount Software (v1.1) Design and Development (BA-TAK)	██████████
Close Air Support System (CASS) Dismount Software (v1.2) Design and Development (BA-TAK)	██████████
Close Air Support System (CASS) Dismount Software (v1.3) Design and Development (BA-TAK)	██████████
Close Air Support System (CASS) Dismount Software Design and Development(BA-TAK)	██████████
Future Close Air Support System (CASS) Dismount Software(v1.5) Design and Development (BA-TAK)	██████████
Close Air Support System (CASS) ATM Software Risk Reduction (1A) -Architure	██████████
Close Air Support System (CASS) ATM Software Risk Reduction (1B)-capabilities, modem and apps	██████████
Close Air Support System (CASS) ATM Software (v2.0.0) Design and Developmentnt	██████████
Close Air Support System (CASS) ATM Software (v2.0.1 Design and Development	██████████

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernization</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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 (v2.0.2) Design and Development																												
Close Air Support System (CASS) ATM Software (v2.0.3) Design and Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207444F / <i>Tactical Air Control Party-Mod</i>	<b>Project (Number/Name)</b> 676013 / <i>Equipment Modernizat</i> on

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Close Air Support System(CASS)</b>				
Close Air Support System (CASS) Dismount Software (v1.0) Design and Development (BA-TAK)	2	2018	1	2019
Close Air Support System (CASS) Dismount Software (v1.1) Design and Development (BA-TAK)	2	2019	1	2020
Close Air Support System (CASS) Dismount Software (v1.2) Design and Development (BA-TAK)	2	2020	1	2021
Close Air Support System (CASS) Dismount Software (v1.3) Design and Development (BA-TAK)	2	2021	1	2022
Close Air Support System (CASS) Dismount Software Design and Development(BA-TAK)	2	2022	1	2023
Future Close Air Support System (CASS) Dismount Software(v1.5) Design and Development (BA-TAK)	2	2023	1	2024
Close Air Support System (CASS) ATM Software Risk Reduction (1A) -Architure	1	2018	1	2019
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 (v2.0.0) Design and Developmentnt	3	2020	2	2021
Close Air Support System (CASS) ATM Software (v2.0.1 Design and Development	3	2021	2	2022
Close Air Support System (CASS) ATM Software (v2.0.2) Design and Development	3	2022	2	2023
Close Air Support System (CASS) ATM Software (v2.0.3) Design and Development	3	2023	2	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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207448F / <i>C2ISR Tactical Data Link</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	1.754	0.538	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
675045: <i>C2ISR Tactical Data Link</i>	-	1.754	0.538	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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	1.754	1.738	1.770	0.000	1.770
Current President's Budget	1.754	0.538	0.000	0.000	0.000
Total Adjustments	0.000	-1.200	-1.770	0.000	-1.770
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.200			
• 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	-1.770	0.000	-1.770

**Change Summary Explanation**

FY19 Congressional Reduction for under execution.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> MIL-STD- 6016F Link 16 Enhancements	0.930	0.000	0.000
<b>Description:</b> Improve Link 16 interoperability and compatibility by incorporating key changes to communications software baseline.			
<b>FY 2019 Plans:</b> - Will continue to integrate a more advanced MIDS terminal.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207448F / <i>C2ISR Tactical Data Link</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>-- This will include required Human/Computer Interface (HCI) changes and advanced terminal capabilities such as Concurrent Multinetting (CMN4) for ground and C2 platforms including but not limited to AWACS, JSTARS, the AOC, Global Hawk, Predator, Reaper and Rivet Joint.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program reduction</p>				
<p><b>Title:</b> Aerial Network Engineering Lab</p> <p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue performing C2-focused airborne networking studies to support data link enhancements.</li> <li>- Will continue lab demonstrations to better understand impacts of advanced Link-16 radio terminal modernization.</li> </ul> <p>-- This will include strengthening the network against jamming.</p> <ul style="list-style-type: none"> <li>- Will continue to provide reports that highlight most promising Link 16 anti-jam technologies to pursue for further operational development.</li> </ul> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program reduction</p>		0.332	0.332	0.000
<p><b>Title:</b> User Identified Critical Interface Change Proposals (ICPs)</p> <p><b>Description:</b> User-identified critical ICP implementation includes time slot reallocation, strength track reporting and correlation, Global Area Reference System (GARS), and MIL-STD updates.</p> <p>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.</p> <p><b>FY 2019 Plans:</b></p>		0.492	0.206	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207448F / <i>C2ISR Tactical Data Link</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
- Will continue to implement user-identified critical ICPs and MIL-STD updates.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program reduction			
<b>Accomplishments/Planned Programs Subtotals</b>	1.754	0.538	0.000

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 PE 0604281F: <i>TDN Enterprise</i>	38.250	207.746	261.742	-	261.742	202.483	202.505	192.550	-	Continuing	Continuing
• APAF 05 Line Item F01500: <i>F-15</i>	0.000	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	0.000	-	Continuing	Continuing
• APAF 05 Line Item B00200: <i>B-2A</i>	1.718	2.296	0.200	-	0.200	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	0.000	-	Continuing	Continuing
• OPAF 03 Line Item 834010: <i>General Information Technology</i>	0.312	0.176	0.179	-	0.179	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-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

**Appropriation/Budget Activity**

3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**

PE 0207448F / *C2ISR Tactical Data Link*

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207448F / C2ISR Tactical Data Link	<b>Project (Number/Name)</b> 675045 / C2ISR Tactical Data Link
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
C2ISR Tactical Data Link Software Enhancements	Various	AFLCMC Hanscom AFB : Bedford, MA	-	1.000	Mar 2018	0.171	Mar 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.000		0.171		-		-		-	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
C2ISR Tactical Data Link Aerial Network Engineering Lab	SS/ Various	AFLCMC Hanscom AFB : Bedford, MA	-	0.337	Oct 2017	0.137	Oct 2018	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.337		0.137		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
C2ISR Tactical Data Link PMA - Program Office and Contractor Support	Various	AFLCMC : Bedford, MA	-	0.238	Dec 2017	0.230	Dec 2018	-		-		-	Continuing	Continuing	-
C2ISR Tactical Data Link FFRDC Support	SS/ Various	MITRE : Bedford, MA	-	0.179	Oct 2017	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.417		0.230		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	1.754	0.538	-	-	-	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207448F / <i>C2ISR Tactical Data Link</i>	<b>Project (Number/Name)</b> 675045 / <i>C2ISR Tactical Data Link</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>C2ISR Tactical Data Link</i></b>	
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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207448F / <i>C2ISR Tactical Data Link</i>	<b>Project (Number/Name)</b> 675045 / <i>C2ISR Tactical Data Link</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>C2ISR Tactical Data Link</i></b>				
Mode 5 Link 16 Software Enhancements	1	2018	4	2019
Aerial Network Engineering Lab	1	2018	4	2019
User Identified Critical ICPs	1	2018	4	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	211.181	12.423	13.248	19.910	0.000	19.910	17.260	4.377	7.914	8.056	22.150	316.519
674801: <i>DCAPES INC 2B</i>	0.000	0.000	0.000	19.910	0.000	19.910	17.260	4.377	7.914	8.056	22.150	79.667
674802: <i>DCAPES Increment 2A</i>	211.181	12.423	13.248	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	236.852

**Program MDAP/MAIS Code:** 500

**A. Mission Description and Budget Item Justification**

RDT&E funding for DCAPES is misaligned at the BPAC level for Fiscal Year's (FY) 2018 and 2019. Funding is reflecting in the DCAPES Increment 2A BPAC, but it will be executed against the DCAPES Increment 2B program. The DCAPES Increment 2A program will not execute any RDT&E dollars in FY2018 or FY2019.

Deliberate and Crisis Action Planning and Execution Segments (DCAPES) is the USAF system used to project air expeditionary forces. 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 incremental deliveries 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605833F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	17.382	13.297	21.910	0.000	21.910
Current President's Budget	12.423	13.248	19.910	0.000	19.910
Total Adjustments	-4.959	-0.049	-2.000	0.000	-2.000
• Congressional General Reductions	-0.031	-0.049			
• 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	-4.305	0.000			
• SBIR/STTR Transfer	-0.623	0.000			
• Other Adjustments	0.000	0.000	-2.000	0.000	-2.000

**Change Summary Explanation**

- FY2018 FFRDC reduction \$0.031M
- FY2018 Reprogrammings BTR OUT \$3.106M & ATR OUT \$1.2M
  
- FY2019 FFRDC reduction \$0.049M
  
- FY2020 funding request was reduced by \$2M due to higher USAF requirements.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES				<b>Project (Number/Name)</b> 674801 / DCAPES INC 2B			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674801: DCAPES INC 2B	0.000	0.000	0.000	19.910	0.000	19.910	17.260	4.377	7.914	8.056	22.150	79.667
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

RDT&E funding for DCAPES is misaligned at the BPAC level for Fiscal Year's (FY) 2018 and 2019. Funding is reflecting in the DCAPES Increment 2A BPAC, but it will be executed against the DCAPES Increment 2B program. The DCAPES Increment 2A program will not execute any RDT&E dollars in FY2018 or FY2019.

Deliberate and Crisis Action Planning and Execution Segments (DCAPES) is the USAF system used to project air expeditionary forces. 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.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605833F, and 0605898F.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> DCAPES INCREMENT 2B	0.000	0.000	19.910	0.000	19.910
<b>Description:</b> DCAPES Increment 2B includes Infrastructure Support, Business Intelligence, and the development of multiple War Fighter Capabilities; the Program continued execution of War Fighter Capabilities 1-3 during the FY18 President's Budget, War Fighter Capabilities 1-3 & 6 during the FY19 President's Budget, and War Fighter Capabilities 1,2,4,5,6 during the FY20 President's Budget.					
<b>FY 2019 Plans:</b> - Continue the development of War Fighter Capabilities 1-3 & 6					
<b>FY 2020 Base Plans:</b> - Continue the development of War Fighter Capabilities 1,2,4,5,6					
<b>FY 2020 OCO Plans:</b> No OCO					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPEs	<b>Project (Number/Name)</b> 674801 / DCAPEs INC 2B
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Funding increased due to development requirements.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	19.910	0.000	19.910

**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 ends on 5 April 2020, given all option years are exercised.

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 will transition from a waterfall approach used in Increment 2A to 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) will utilize 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 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 smaller increments. Each capability will be developed using several builds and with one or more fieldings to satisfy the approved requirements within each package.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674801 / DCAPES INC 2B
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 2B/ Prime Contract	C/Various	Array Information Technology, Inc. : Greenbelt, MD	0.000	0.000	Apr 2018	0.000	Dec 2018	10.189	Dec 2019	-		10.189	17.481	27.670	40.991
DCAPES Infrastructure/ Integration	C/CPFF	DATUM Software Inc. : John Creek, GA	0.000	0.000	Feb 2018	0.000	Feb 2019	1.101	Feb 2020	-		1.101	6.606	7.707	5.152
DCAPES Architecture Documentation Development	C/FFP	Copper River IT : Anchorage, AK	0.000	0.000	Aug 2018	0.000	Aug 2019	0.654	Aug 2020	-		0.654	2.100	2.754	13.756
DCAPES DCOI Migration	MIPR	DISA : Pensacola, FL	0.000	0.000	Jan 2018	0.000	Oct 2018	1.552	Oct 2019	-		1.552	9.312	10.864	15.166
<b>Subtotal</b>			0.000	0.000		0.000		13.496		-		13.496	35.499	48.995	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	MacaLogic, LLC : Dayton, OH	0.000	0.000	Apr 2018	0.000	Apr 2019	0.726	Apr 2020	-		0.726	4.356	5.082	3.225
DCAPES Cost Analysis Contract Support	C/CPFF	BTAS, Inc. : Beavercreek, OH	0.000	0.000	May 2018	0.000	May 2019	0.333	May 2020	-		0.333	1.998	2.331	1.908
DCAPES Engineering Contract Support	C/CPFF	Oasis Systems, LLC : Lexington, MA	0.000	0.000	Apr 2018	0.000	Apr 2019	3.458	Dec 2019	-		3.458	7.500	10.958	5.392
DCAPES Contract System Integration/Tech Support	MIPR	AFLCMC/HNIZ CIE : MAFB-Gunter Annex, AL	0.000	0.000	Mar 2018	0.000	Mar 2019	0.688	Mar 2020	-		0.688	4.128	4.816	7.390
DCAPES Development Environment HW	C/Various	Various : Various	0.000	0.000	Aug 2018	0.000	Aug 2019	0.107	Aug 2020	-		0.107	0.642	0.749	1.730
DCAPES Licenses (Software/Hardware)	C/Various	Various : Various	0.000	0.000	Feb 2018	0.000	Feb 2019	0.133	Feb 2020	-		0.133	0.798	0.931	1.573
DCAPES Oracle Licenses	C/FFP	Mythics : Vienna, VA	0.000	0.000	Aug 2018	0.000	Aug 2019	0.253	Aug 2020	-		0.253	1.518	1.771	4.560
DCAPES Government Purchase Card	Reqn	Various : Various	0.000	0.000	Oct 2017	0.000	Oct 2018	0.020	Oct 2019	-		0.020	0.120	0.140	0.209

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674801 / DCAPES INC 2B
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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>Subtotal</b>			0.000	0.000		0.000		5.718		-		5.718	21.060	26.778	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	45/46 Test Sqdn : Eglin AFB, FL	0.000	0.000	Dec 2017	0.000	Dec 2018	0.498	Dec 2019	-		0.498	2.000	2.498	3.519
DCAPES Interoperability Testing and Evaluation	MIPR	DISA JITC : Huachuca, AZ	0.000	0.000	Mar 2018	0.000	Oct 2018	0.133	Oct 2019	-		0.133	0.798	0.931	1.278
<b>Subtotal</b>			0.000	0.000		0.000		0.631		-		0.631	2.798	3.429	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Travel	Reqn	Various : Various	0.000	0.000	Oct 2017	0.000	Oct 2018	0.030	Oct 2019	-		0.030	0.180	0.210	0.330
DCAPES Business Integration Support	Various	Various : Various	0.000	0.000	Oct 2017	0.000	Oct 2018	0.035	Oct 2019	-		0.035	0.210	0.245	0.385
<b>Subtotal</b>			0.000	0.000		0.000		0.065		-		0.065	0.390	0.455	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			0.000	0.000	0.000	19.910	-	19.910	59.747	79.657	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674801 / DCAPES INC 2B
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024											
	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>DCAPES Increment 2B</b>																																				
DCAPES Increment 2B																																				
-- Increment 2B FDD																																				
-- Increment 2B FD																																				
-- Joint Information Environment (JIE) Migration (Infrastructure Re-host)																																				
--- 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 Continuous Capability Deliveries (CCD)																																				

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**Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674801 / DCAPES INC 2B
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>DCAPES Increment 2B</b>				
DCAPES Increment 2B	1	2018	3	2022
-- Increment 2B FDD	3	2022	3	2022
-- Increment 2B FD	4	2022	4	2022
-- Joint Information Environment (JIE) Migration (Infrastructure Re-host)	1	2018	4	2018
--- Capability 1 Electronic Data Interface Personnel Identifier (EDIPI)	1	2018	2	2020
--- Capability 2 Global Force Management Interoperability (GFM-DI)	1	2018	2	2020
--- Capability 3 Enhanced Contingency-Rotational Air Expeditionary Force Scheduling Tool Interface (ECAST)	1	2018	2	2019
--- Capability 4 Manpower & Equipment Force Packaging (MEFPAK)	3	2020	4	2021
--- Capability 5 Logistics Factor File	3	2020	4	2020
--- Capability 6 Force Availability Analysis	2	2019	1	2022
DCAPES Continuous Capability Deliveries (CCD)	1	2022	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES				<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674802: DCAPES Increment 2A	211.181	12.423	13.248	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	236.852
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

RDT&E funding for DCAPES is misaligned at the BPAC level for Fiscal Year's (FY) 2018 and 2019. Funding is reflecting in the DCAPES Increment 2A BPAC, but it will be executed against the DCAPES Increment 2B program. The DCAPES Increment 2A program will not execute any RDT&E dollars in FY2018 or FY2019.

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 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605833F, and 0605898F.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> DCAPES Increment 2A (Loose Coupling) / FY16 to FY19 Increment 2B	12.423	13.248	0.000	0.000	0.000
<b>Description:</b> DCAPES Increment 2A includes 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 includes requirements definition, prototyping, development, testing, interoperability, sustainment, and service oriented architecture transition.					
DCAPES Increment 2B includes Infrastructure Support, Business Intelligence, and the development of multiple War Fighter Capabilities; the Program continued execution of War Fighter Capabilities 1-3 during the FY18 President's Budget, War Fighter Capabilities 1-3 & 6 during the FY19 President's Budget, and War Fighter Capabilities 1,2,4,5,6 during the FY20 President's Budget.					
<b>FY 2019 Plans:</b> - Inc 2B Continue the development of War Fighter Capabilities 1-3 & 6					
<b>FY 2020 Base Plans:</b> - Inc 2B Continue the development of War Fighter Capabilities 1,2,4,5,6					
<b>FY 2020 OCO Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
No OCO					
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Inc 2B Funding increased due to development requirements.					
<b>Accomplishments/Planned Programs Subtotals</b>	12.423	13.248	0.000	0.000	0.000

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

N/A

**Remarks**

**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.

The DCAPES Increment 2B program successfully awarded the DCAPES 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 ends on 5 April 2020, given all option years are exercised.

DCAPES Increment 2B 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 will transition from a waterfall approach used in Increment 2A to 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) for Increment 2B will utilize 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 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 smaller increments. Each capability will be developed using several builds and with one or more fieldings to satisfy the approved requirements within each package.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / <i>DCAPES</i>	<b>Project (Number/Name)</b> 674802 / <i>DCAPES Increment 2A</i>

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
DCAPES Increment 2A SW DEV/FOE	SS/ Various	Computer Science Corp. : Falls Church, VA	91.707	-		-		-		-		-	0.000	91.707	91.707
DCAPES SW DEV New Prime Contract (Increment 2A)	C/Various	Array Information Technology, Inc. : Greenbelt, MD	9.325	5.802	Apr 2018	5.535	Apr 2019	-		-		-	0.000	20.662	40.991
DCAPES Risk Reduction	Various	Various : Various	1.613	-		-		-		-		-	0.000	1.613	0.895
DCAPES Infrastructure / Integration	C/CPFF	DATUM Software Inc. : John Creek, GA	4.599	0.853	Feb 2018	0.977	Feb 2019	-		-		-	0.000	6.429	3.000
DCAPES BI Tools / Tech Refresh	C/CPFF	Array IT : Greenbelt, MD	7.581	-		-		-		-		-	0.000	7.581	7.581
DCAPES Architecture Documentation Development	C/FFP	Copper River IT : Anchorage, AK	4.852	0.308	Aug 2018	0.641	Aug 2019	-		-		-	0.000	5.801	4.148
LOGFAC S/W Development	C/FFP	Harris IT services Corp. : Dulles, VA	18.374	-		-		-		-		-	0.000	18.374	18.374
LOGFAC Architecture Documentation Development	C/FFP	Cooper River IT : Anchorage, AK	1.035	-		-		-		-		-	0.000	1.035	1.035
DCAPES DCOI Migration	MIPR	DISA : Pensacola, FL	1.520	1.147	Jan 2018	1.635	Oct 2018	-		-		-	0.000	4.302	15.166
<b>Subtotal</b>			140.606	8.110		8.788		-		-		-	0.000	157.504	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
DCAPES Contract Acquisition /Logistic Functional Support	C/CPFF	OASIS Systems Inc : Lexington, MA	8.130	0.680	Apr 2018	1.695	Apr 2019	-		-		-	0.000	10.505	6.462
DCAPES Cost Analysis Contract Support	C/CPFF	BTAS : Beavercreek, OH	0.621	0.320	May 2018	0.326	May 2019	-		-		-	0.000	1.267	1.908

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 System Integration/Tech Support	MIPR	AFLCMC/HNIZ CIE : MAFB-Gunter Anx, AL	0.699	1.336	Mar 2018	0.539	Mar 2019	-		-		-	0.000	2.574	7.390
DCAPES Development Environment HW	C/Various	Various : Various, AL	0.853	0.023	Aug 2018	0.105	Aug 2019	-		-		-	0.000	0.981	1.730
DCAPES Oracle Licenses	C/FFP	Mythics : Vienna, VA	2.298	0.243	Aug 2018	0.248	Aug 2019	-		-		-	0.000	2.789	4.560
DCAPES HIB Integration Contract Support	C/Various	TM Capture Services, LLC : Dayton, OH	9.122	0.872	Apr 2018	0.711	Apr 2019	-		-		-	0.000	10.705	10.765
DCAPES Contract Cost Analysis Support	C/CPFF	Tecolote Research, Inc. : Goleta, CA	3.577	-		-		-		-		-	0.000	3.577	3.577
DCAPES Contract Engineering Support	C/CPFF	Jacobs Technology, Inc : Lincoln, MA	3.798	-		-		-		-		-	0.000	3.798	3.798
DCAPES FFRDC Engineering	SS/CPFF	Mitre : Bedford, MA	6.249	-		-		-		-		-	0.000	6.249	6.249
DCAPES Contract Requirement Elaboration Support	C/FFP	Certified Tech. Expert : Montgomery, AL	3.192	-		-		-		-		-	0.000	3.192	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	1.352	0.338	Feb 2018	0.131	Feb 2019	-		-		-	0.000	1.821	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	0.029	0.035	Oct 2017	0.020	Oct 2018	-		-		-	0.000	0.084	0.015
LOGFAC Contract Acquisition / Logistics Support	C/CPFF	Oasis Systems Inc. : Lexington, KY	0.343	-		-		-		-		-	0.000	0.343	0.343

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A
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<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
LOGFAC Contract Cost Analysis Support	C/CPFF	Tecolote Research Inc : Goleta, CA	0.396	-		-		-		-		-	0.000	0.396	0.396
LOGFAC Contract Engineering Support	C/CPFF	Jacobs Technology Inc : Lincoln, MA	0.419	-		-		-		-		-	0.000	0.419	0.419
LOGFAC Contract Requirement Elaboration Support	C/FFP	Certified Technical Experts : Montgomery, AL	0.335	-		-		-		-		-	0.000	0.335	0.335
LOGFAC Contract Systems Security / IA Support	C/CPFF	Centech Group Inc : Falls Church, VA	0.426	-		-		-		-		-	0.000	0.426	0.426
LOGFAC FFRDC	SS/CPFF	MITRE : Bedford, MA	0.685	-		-		-		-		-	0.000	0.685	0.685
<b>Subtotal</b>			52.091	3.847		3.775		-		-		-	0.000	59.713	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	6.950	0.317	Dec 2017	0.490	Dec 2018	-		-		-	0.000	7.757	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 Haachuca, AZ	3.802	0.084	Mar 2018	0.130	Oct 2018	-		-		-	0.000	4.016	3.669
DCAPES User Test Support	Various	Various : Various	2.438	-		-		-		-		-	0.000	2.438	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 Haachuca, AZ	0.837	-		-		-		-		-	0.000	0.837	0.837
LOGFAC User Test Support	Various	Various : Various	0.335	-		-		-		-		-	0.000	0.335	0.335



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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>DCAPES Increment 2B</b>	
DCAPES Increment 2B	
--- Increment 2B FDD	
--- Increment 2B FD	
--- Joint Information Environment (JIE) Migration (Infrastructure Re-host)	
--- Capability 1 Electronic Data Interface Personnel Identifier Part 1 (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 (LFF)	
--- Capability 6 Force Availability Analysis (FAA)	
DCAPES Continuous Capability Deliveries (CCD)	

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**Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207452F / DCAPES	<b>Project (Number/Name)</b> 674802 / DCAPES Increment 2A
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>DCAPES Increment 2B</b>				
DCAPES Increment 2B	1	2018	3	2022
--- Increment 2B FDD	3	2022	3	2022
--- Increment 2B FD	1	2022	4	2022
--- Joint Information Environment (JIE) Migration (Infrastructure Re-host)	1	2018	4	2018
--- Capability 1 Electronic Data Interface Personnel Identifier Part 1 (EDIPI)	1	2018	2	2020
--- Capability 2 Global Force Management Interoperability (GFM-DI)	1	2018	2	2020
--- Capability 3 Enhanced Contingency-Rotational Air Expeditionary Force Scheduling Tool Interface (ECAST)	1	2018	2	2019
--- Capability 4 Manpower & Equipment Force Packaging (MEFPAK)	3	2020	4	2021
--- Capability 5 Logistics Factor File (LFF)	3	2020	4	2020
--- Capability 6 Force Availability Analysis (FAA)	2	2019	1	2022
DCAPES Continuous Capability Deliveries (CCD)	1	2022	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207573F / <i>National Technical Nuclear Forensics</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	2.307	1.788	1.788	0.000	1.788	0.397	0.000	0.000	0.000	0.000	6.280
674881: <i>Prompt Diagnostics</i>	-	2.307	1.788	1.788	0.000	1.788	0.397	0.000	0.000	0.000	0.000	6.280
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. 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	2.307	1.788	1.788	0.000	1.788
Current President's Budget	2.307	1.788	1.788	0.000	1.788
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**

FY 2019 funds include \$0.004 million withhold pending final determination of Penalty for Cost Overruns in accordance with PL 114-92 as amended by PL 115-91 section 825(a).

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207573F / <i>National Technical Nuclear Forensics</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Nuclear Forensics - Prompt Diagnostics  <b>Description:</b> 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 elements with radiochemical analysis enables analysts to distinguish between wide ranges of nuclear weapon designs and origin, supporting the national attribution assessment process.  <b>FY 2019 Plans:</b> 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.  <b>FY 2020 Plans:</b> 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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No change from FY19 to FY20	2.307	1.788	1.788
<b>Accomplishments/Planned Programs Subtotals</b>	2.307	1.788	1.788

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

<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• OPAF 03 Line Item 834320: <i>National Technical Nuclear Forensics</i>	5.711	6.070	4.581	-	4.581	7.163	7.291	8.707	7.554	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 1 and 2 are 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-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
PE 0207573F / *National Technical Nuclear Forensics*

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207573F / National Technical Nuclear Forensics	<b>Project (Number/Name)</b> 674881 / Prompt Diagnostics
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	2.307	Feb 2018	1.538	Jan 2019	1.538	Dec 2019	-		1.538	Continuing	Continuing	-
<b>Subtotal</b>			-	2.307		1.538		1.538		-		1.538	Continuing	Continuing	N/A

**Remarks**  
Multiple nuclear related organizations throughout the nation receive funds to work towards the completion of the prompt diagnostics system.

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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: Other Govt Cost	Various	Not specified. : Dayton, OH	-	-		0.250	May 2019	0.250	May 2020	-		0.250	Continuing	Continuing	-
<b>Subtotal</b>			-	-		0.250		0.250		-		0.250	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	2.307	1.788	1.788	1.788	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207573F / <i>National Technical Nuclear Forensics</i>	<b>Project (Number/Name)</b> 674881 / <i>Prompt Diagnostics</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Unites States Prompt Diagnostics System</i></b>	
Nuclear Forensics - Prompt Diagnostics	
- Phase 1: Developmental Technical Data Package	
- Phase 2: Complete Technical Data Package, Configuration Status Accounting, and Product Support Analysis/Logistics Product Data	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207573F / <i>National Technical Nuclear Forensics</i>	<b>Project (Number/Name)</b> 674881 / <i>Prompt Diagnostics</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Unites States Prompt Diagnostics System</i></b>				
Nuclear Forensics - Prompt Diagnostics	1	2018	4	2021
- Phase 1: Developmental Technical Data Package	1	2018	4	2018
- Phase 2: Complete Technical Data Package, Configuration Status Accounting, and Product Support Analysis/Logistics Product Data	1	2018	1	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	25.304	24.699	28.237	0.000	28.237	29.734	31.045	32.299	33.427	Continuing	Continuing
674037: <i>SEEK EAGLE Certifications</i>	-	25.304	24.699	28.237	0.000	28.237	29.734	31.045	32.299	33.427	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 stores combinations 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, Loads, 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 & 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 bomb 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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	25.397	24.699	25.160	0.000	25.160
Current President's Budget	25.304	24.699	28.237	0.000	28.237
Total Adjustments	-0.093	0.000	3.077	0.000	3.077
• 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	-0.093	0.000			
• Other Adjustments	0.000	0.000	3.077	0.000	3.077

**Change Summary Explanation**

FY 2020 \$3.077M increase funds critical F-35A weapons integration test support to achieve Full Operational Capability (FOC) for F-35A.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> AFSEO Warfighter Mission	13.815	16.416	19.144
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>Support urgent warfighter needs such as Joint Urgent Operation Needs (JUONs) and Quick Reaction Capabilities (QRCs) as well as all disciplines, to include mission planning, loads, flutter, separations, safe escape, engineering analysis, information assurance, Combat Weapons Delivery Software (CWDS), and weapon program support to include B61-12 &amp; APKWS.</p> <p><b>FY 2020 Plans:</b> Continue to support urgent warfighter needs such as JUONs and QRCs as well as all disciplines, to include mission planning, loads, flutter, separations, safe escape, engineering analysis, information assurance, CWDS, and weapon program support to include B61-12 &amp; APKWS. Validate F-35 capability development. Execute F-35 store compatibility using ground and flight tests, computer modeling, data analysis, and delivery of increased capability to the F-35 user.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase due to additional manpower support for F-35A mission requirements.</p>				
<p><b>Title:</b> 5th Generation Capability Development and Support</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b> Maintain F-35A, F-22A, and B-21 capability development and certification efforts.</p> <p><b>FY 2020 Plans:</b> Continue to maintain F-35A, F-22A, and B-21 capability development and certification efforts.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase is minimal.</p>		5.232	2.987	3.166
<p><b>Title:</b> Advanced Next Generation Weapon Capability Development and Support</p> <p><b>Description:</b> 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 AOR.</p> <p><b>FY 2019 Plans:</b> Increase security posture and tool development for next-generation weapons certification.</p> <p><b>FY 2020 Plans:</b></p>		2.820	2.412	2.642

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Continue to increase security posture and tool development for next-generation weapons certification. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase is minimal.				
<b>Title:</b> Modeling and Simulation Capability <b>Description:</b> 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. <b>FY 2019 Plans:</b> Support development and sustainment of state-of-the-art engineering & business tools to support SEEK EAGLE enterprise. <b>FY 2020 Plans:</b> Continue to support development and sustainment of state-of-the-art engineering & business tools to support SEEK EAGLE enterprise. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase is minimal.		2.272	1.561	1.700
<b>Title:</b> Aircraft-Store Compatibility Analysis <b>Description:</b> Evaluates aircraft/store compatibility through analysis, M&S, and flight and ground test. Provides flight recommendations to airworthiness authorities. <b>FY 2019 Plans:</b> Provide for USAF Air-to-Air and Air-to-Ground Munitions certification efforts such as towed decoys, Electronic Countermeasures (ECM) pods, and chaff/flare countermeasures certification efforts, and Airborne Instrumentation Systems pods, fuel tanks, and travel pod certification efforts. <b>FY 2020 Plans:</b> 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. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increase is minimal.		1.165	1.323	1.585
<b>Accomplishments/Planned Programs Subtotals</b>		25.304	24.699	28.237

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>	
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>E. Acquisition Strategy</b> 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.		
<b>F. Performance Metrics</b> 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>	<b>Project (Number/Name)</b> 674037 / <i>SEEK EAGLE Certifications</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Raytheon	C/CPFF	Raytheon : Waltham, MA	-	0.754	Mar 2018	-		-		-		-	Continuing	Continuing	-
AFSEO Mission and Planning Support (SEMATS)	C/CPFF	ERC : Ft. Walton Beach, FL	-	7.014	Mar 2018	11.980	Mar 2019	12.563	Mar 2020	-		12.563	Continuing	Continuing	-
F-35 Capabilities	C/CPFF	Lockheed Martin : Marietta, GA	-	1.048	Nov 2017	1.170	Nov 2018	2.340	Nov 2019	-		2.340	Continuing	Continuing	-
F-22 Capabilities Lockheed Martin	C/CPFF	Lockheed Martin : Marietta, GA	-	-		0.415	Mar 2019	0.261	Mar 2020	-		0.261	Continuing	Continuing	-
Multiple Fighter and Weapon Capability Support	C/CPFF	Multiple : Multiple	-	4.642	Nov 2017	0.155	Mar 2019	0.109	Mar 2020	-		0.109	Continuing	Continuing	-
F-16 Aero Sustainment	C/CPFF	Lockheed Martin : Marietta, GA	-	0.150	Feb 2018	0.120	Feb 2019	0.100	Feb 2020	-		0.100	Continuing	Continuing	-
<b>Subtotal</b>			-	13.608		13.840		15.373		-		15.373	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	RO	Eglin AFB : Eglin AFB, FL	-	8.579	Oct 2017	8.107	Oct 2018	8.024	Oct 2019	-		8.024	Continuing	Continuing	-
AEDC	PO	Arnold Engineering Dev Complex : Arnold AFB, TN	-	1.937	Jan 2018	1.531	Jan 2019	3.463	Jan 2020	-		3.463	Continuing	Continuing	-
<b>Subtotal</b>			-	10.516		9.638		11.487		-		11.487	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Eglin AFB : Eglin AFB, FL	-	0.457	Oct 2017	0.450	Oct 2018	0.472	Oct 2019	-		0.472	Continuing	Continuing	-



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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>	<b>Project (Number/Name)</b> 674037 / <i>SEEK EAGLE Certifications</i>
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>SEEK EAGLE</b>	
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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207590F / <i>Seek Eagle</i>	<b>Project (Number/Name)</b> 674037 / <i>SEEK EAGLE Certifications</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>SEEK EAGLE</b>				
AFSEO Warfighter Mission	1	2018	4	2024
5th Generation Capability Development and Support	1	2018	4	2024
Advanced Next Generation Weapon Capability Development and Support	1	2018	4	2024
Modeling and Simulation Capability	1	2018	4	2024
Aircraft Store Capability Analysis	1	2018	4	2024

**Note**

Note: The SEEK EAGLE program does not execute in accordance with established acquisition program milestones. Rather, user requirements trigger the SEEK EAGLE process for requested aircraft-store configurations for flight clearances. Air Force SEEK EAGLE Office (AFSEO) work is completed in accordance with the designated user priority established through the SEEK EAGLE Prioritization List process.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / <i>USAF Modeling and Simulation</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	9.803	17.078	15.725	0.000	15.725	17.699	19.071	19.065	18.727	Continuing	Continuing
674567: <i>M&amp;S Foundations</i>	-	0.000	6.814	6.943	0.000	6.943	7.063	7.210	7.341	7.473	Continuing	Continuing
675135: <i>Warfighter Readiness</i>	-	9.803	10.264	8.782	0.000	8.782	10.636	11.861	11.724	11.254	Continuing	Continuing

**Note**

This program, BA 7, PE 0207601F, project 675135, Command & Control Simulation Environment for Training (C2SET), is a new start.

**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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / <i>USAF Modeling and Simulation</i>
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The FY2020 funding request was reduced by \$1.672 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 AFMSTT and ACE-IOS 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	10.175	17.078	17.397	0.000	17.397
Current President's Budget	9.803	17.078	15.725	0.000	15.725
Total Adjustments	-0.372	0.000	-1.672	0.000	-1.672
• 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	-0.372	0.000			
• Other Adjustments	0.000	0.000	-1.672	0.000	-1.672

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 674567 / M&S Foundations
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
674567: M&S Foundations	-	0.000	6.814	6.943	0.000	6.943	7.063	7.210	7.341	7.473	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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 674567 / M&S Foundations
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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<p><b>Title:</b> Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Commence and complete ACE-IOS version 5.0.20</li> <li>- Complete model Graphical User Interfaces (GUIs) for model and scenario control, orders entry, and all map displays</li> <li>- Complete the implementation of Supervisory Control and Data Acquisition (SCADA) and cascading battlefield effects</li> <li>- Complete database and data file build and populate tools for template and scenario development</li> <li>- Complete track database, the store and playback capability requested by AOC and the Intel Schoolhouse</li> <li>- Move to new Windows operating system for cross domain solution</li> <li>- Commence migration to latest version of Red Hat Enterprise Linux (RHEL) operating system for ACE-IOS</li> <li>- Commence to acquire Certification to Field awards (separate but parallel to A&amp;A effort)</li> </ul> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>- Will commence and complete ACE-IOS version 5.0.21</li> <li>- Will commence and complete model transformation to open architecture</li> <li>- Will commence and complete model certification and entry onto Air force Approved Product Lists for appropriate networks</li> <li>- Will commence and complete the common ASCCE database</li> <li>- Will commence and complete the Joint Data Translator as a service</li> <li>- Will commence and complete the new design infrastructure database as a service</li> <li>- Will commence and complete the migration of all graphics into a single we-based graphics system</li> <li>- Will develop database population tools for all parametric data</li> <li>- Will develop JNETS scenario builder</li> <li>- Will commence and complete the sensor and reporting capability for 5th generation aircraft</li> </ul>	0.000	6.814	6.943	-	6.943
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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 674567 / M&S Foundations

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
- Will commence and complete the development of tools for the model execution situational awareness and execution control					
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> Increase in FY20 funding due to inflation adjustment.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	6.814	6.943	-	6.943

**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.

**E. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 674567 / M&S Foundations

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS)</b>																												
- 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																									██████████			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 674567 / M&S Foundations

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Air, Space and Cyberspace Constructive Environment - Information Operations Suite (ACE-IOS)</i></b>				
- 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

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation				<b>Project (Number/Name)</b> 675135 / Warfighter Readiness			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675135: Warfighter Readiness	-	9.803	10.264	8.782	0.000	8.782	10.636	11.861	11.724	11.254	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0207601F, project 675135, Command & Control Simulation Environment for Training (C2SET), is a new start.

**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 C2SET 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Air, Space, and Cyberspace Constructive Environment (ASCCE)/Air Force Modeling & Simulation Training Toolkit (AFMSTT)	9.803	10.264	8.282	0.000	8.282

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 675135 / Warfighter Readiness

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Complete the development, test, and fielding of AFMSTT Version 6.1</li> <li>- Commence AFMSTT Version 6.2 (formerly Version 6.3) development</li> <li>- Continue Risk Management Framework (RMF) accreditation; Java Message System (JMS) broker and distribution</li> <li>- Complete the transition to the AFMSTT Graphical Input Aggregate Control (GIAC) replacement mission control functionality and internal architecture</li> <li>- Address User Change Requests (CRs)</li> <li>- Commence integration with spiral Joint Live Virtual Constructive (JLVC) developments and new core Command &amp; Control (C2) system interfaces associated with AOC Pathfinder</li> <li>- Complete long lead prototyping to thin client interfaces</li> </ul> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>- Complete development, test, and fielding of AFMSTT Version 6.2 (formerly Version 6.3)</li> <li>- Continue integration with spiral JLVC developments</li> <li>- Continue new joint requirements and model interface changes to the Joint Federate Object Models (FOMs)</li> <li>- Continue modeling of real world environments and new C2 systems' interfaces to ensure continued accurate and realistic training</li> <li>- Initiate development and testing of AFMSTT Version 6.3 (Formerly Version 6.5)</li> </ul> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased due to transfer of funding to initiate work being formed for C2SET.</p>					
<p><b>Title:</b> Command &amp; Control Simulation Environment for Training (C2SET)</p> <p><b>Description:</b> 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><b>FY 2019 Plans:</b></p>	0.000	0.000	0.500	0.000	0.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 675135 / Warfighter Readiness

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
N/A					
<b>FY 2020 Base Plans:</b> - Prepare documentation for request for quotes release					
<b>FY 2020 OCO Plans:</b> N/A					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased to initiate work being performed for C2SET.					
<b>Accomplishments/Planned Programs Subtotals</b>	9.803	10.264	8.782	0.000	8.782

**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 through modernization approach. All major contracts are awarded using full and open competition.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 675135 / Warfighter Readiness
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/AWSIM	C/CPFF	Cole Engineering Services, Inc : Orlando, FL	-	7.881	Feb 2018	8.710	Feb 2019	7.109	Feb 2020	-		7.109	Continuing	Continuing	-
<b>Subtotal</b>			-	7.881		8.710		7.109		-		7.109	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/Various	AFLCMC : Hanscom AFB, MA	-	0.365	Oct 2017	0.180	Oct 2018	0.261	Oct 2019	-		0.261	Continuing	Continuing	-
<b>Subtotal</b>			-	0.365		0.180		0.261		-		0.261	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	AFLCMC : Hanscom AFB, MA	-	1.557	Oct 2017	1.022	Oct 2018	0.560	Oct 2019	-		0.560	Continuing	Continuing	-
AFMSTT Systems Engineering	SS/ Various	MITRE : Bedford, MA	-	-		0.352		0.352	Oct 2019	-		0.352	Continuing	Continuing	-
Program Management Administration C2SET	C/Various	AFLCMC : Hanscom AFB, MA	-	-		-		0.500	Oct 2019	-		0.500	Continuing	Continuing	-
<b>Subtotal</b>			-	1.557		1.374		1.412		-		1.412	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	9.803	10.264	8.782	-	8.782	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 675135 / Warfighter Readiness

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Air, Space, and Cyberspace Constructive Environment (ASCCE)</b>	
- AFMSTT v6.1	
- AFMSTT v6.2 (formerly v6.3)	
- AFMSTT v6.3 (formerly v6.5)	
- C2SET 1.0	
- C2SET 2.0	
- C2SET 3.0	
- C2SET 4.0	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207601F / USAF Modeling and Simulation	<b>Project (Number/Name)</b> 675135 / Warfighter Readiness

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Air, Space, and Cyberspace Constructive Environment (ASCCE)</i></b>				
- AFMSTT v6.1	2	2018	2	2019
- AFMSTT v6.2 (formerly v6.3)	2	2019	2	2020
- AFMSTT v6.3 (formerly v6.5)	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	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	12.369	6.141	4.316	0.000	4.316	6.365	7.660	7.391	6.734	Continuing	Continuing
672888: <i>Distributed Mission Operations Center (DMOC)</i>	-	12.369	6.141	4.316	0.000	4.316	6.365	7.660	7.391	6.734	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Distributed Mission Operations Center (DMOC) - The 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 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>
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3. Distributed Training Sites & Systems Integration: DMOC integrates up to 30 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	12.839	6.141	6.256	0.000	6.256
Current President's Budget	12.369	6.141	4.316	0.000	4.316
Total Adjustments	-0.470	0.000	-1.940	0.000	-1.940
• 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	-0.470	0.000	-1.940	0.000	-1.940

**Change Summary Explanation**

The FY 2020 funding request was reduced by \$1.940 million to account for the availability of prior year execution balances due to under-execution.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Distributed Mission Operations (DMO) Capability / Battlespace Systems Development	4.548	4.589	2.931	0.000	2.931
<b>Description:</b> Simulation software/hardware development in support of users conducting RDT&E, mission rehearsal, and concepts of operation development.					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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**FY 2019 Plans:**

- Continue DMO tool enhancements
- Continue DMOC/NAWCAD Partnership: Enhance NGTS source code to implement future Air Force DMO requirements, Develop/Install DMOC customized NGTS 3.2.1
- Continue to explore, improve, and execute the plan for battlespace virtualization
- Provide support to Virtual Test and Training Center (VTTC) at Nellis AFB as needed to provide interoperability, integration, and testing of high end advanced training and tactics capabilities
- Fully complete Win 10/RHEL 6 conversion and necessary software/DMO tool testing.

**FY 2020 Base 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 provide support to Virtual Test and Training Center (VTTC) at Nellis AFB as needed to provide interoperability, integration, and testing of high end advanced training and tactics capabilities
- Will prepare readiness posture for emerging technologies and cybersecurity measures.

**FY 2020 OCO Plans:**  
None

**FY 2019 to FY 2020 Increase/Decrease Statement:**  
Normal contract inflation

<b>Title:</b> Assessment and Authorization (A&A)/Software Certification	0.505	0.514	0.328	0.000	0.328
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**Description:** Support requirements definition, integration test support, scenario development, analysis, systems engineering support, and Certification and Accreditation (C&A) and Networkiness of core systems. Implement requirements of Cybersecurity, Risk Management Framework, and Continuous Monitoring.

**FY 2019 Plans:**

- Continue testing for the following Assessment and Authorization activities:
- Obtain final ATO from HAF/A3 for Battlespace

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-- 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 - Continue support of CVF and RED KITE with CDIS ruleset development, testing, and implementation  <b>FY 2020 Base Plans:</b> - Will continue testing for the following Assessment and Authorization activities: -- 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.  <b>FY 2020 OCO Plans:</b> None					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Normal Contract Inflation					

<b>Title:</b> Distributed Training Sites and Systems Integration  <b>Description:</b> Establish distributed training site system integration and interoperability between DMOC, operational units, and modeling & simulation facilities.  <b>FY 2019 Plans:</b> - Continue the development of LVC concepts in support of VF/CVF/RF integration efforts - Continue to support/leverage/collaborate DMOC efforts with Virtual Test and Training Center at Nellis to enable a high end advanced testing and tactics (HEAT2) capability - 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 - Expand current practice of distributed training to include White Force personnel at the DTOC - Integrate two additional MSAT (RPA) systems into the Battlespace - Upgrade MJAT/MSAT software to allow coalition participation - Integrate 2 PUMST (Army RPA) into the Battlespace for valuable joint RPA training	1.018	1.038	1.057	0.000	1.057
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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Add additional site connections to Joint RPA sites  <b>FY 2020 Base Plans:</b> - Will continue the development of LVC concepts in support of VF/CVF/RF integration efforts - Will continue to support/leverage/collaborate DMOC efforts with Virtual Test and Training Center at Nellis to enable a high end advanced testing and tactics (HEAT2) capability - 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 establish NMON connection for use in joint training exercises  <b>FY 2020 OCO Plans:</b> None  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Normal Contract Inflation					
<b>Title:</b> Air, Space and Cyberspace Collaborative Environment - Information Operations Suite (ACE-IOS)  <b>Description:</b> Air, Space and Cyberspace Collaborative Environment - Information Operations Suite (ACE-IOS) 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's battle staffs during Joint and Service exercises and experimentations.  <b>FY 2019 Plans:</b> N/A  <b>FY 2020 Base Plans:</b> N/A  <b>FY 2020 OCO Plans:</b> N/A  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased due to under-execution in FY 2019	6.298	0.000	0.000	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	12.369	6.141	4.316	0.000	4.316

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>	
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b> N/A		
<b>E. Acquisition Strategy</b> Distributed Mission Operations Center (DMOC):  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.  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. The current C2TSC is scheduled to end on 25 Mar 19 with a follow-on contract scheduled to start on 26 Mar 19.		
<b>F. Performance Metrics</b> 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / Wargaming and Simulation Centers	<b>Project (Number/Name)</b> 672888 / Distributed Mission Operations Center (DMOC)
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
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	-	4.201	Jan 2018	3.643	Jan 2019	2.640	Jan 2020	-		2.640	Continuing	Continuing	17.662
NAWCAD NGTS Development	MIPR	NAWCAD : Patuxent River, MD	-	0.375	Nov 2017	0.375	Nov 2018	0.375	Nov 2019	-		0.375	Continuing	Continuing	-
ACE-IOS	C/T&M	CACI, Inc : Lackland AFB, TX	-	5.723	Dec 2017	-		-		-		-	Continuing	Continuing	50.665
<b>Subtotal</b>			-	10.299		4.018		3.015		-		3.015	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Technical requirements development, integration/ acceptance testing, and engineering support	C/FFP	Alpha-Omega : Kirtland AFB, NM	-	1.020	Jul 2018	-		-		-		-	Continuing	Continuing	8.442
Follow-on requirements development, integration/ acceptance testing, and engineering support	C/FFP	TBD : Kirtland AFB, NM	-	0.000		1.866	Mar 2019	1.040	Mar 2020	-		1.040	Continuing	Continuing	9.614
<b>Subtotal</b>			-	1.020		1.866		1.040		-		1.040	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>	<b>Project (Number/Name)</b> 672888 / <i>Distributed Mission Operations Center (DMOC)</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>DMO</b>	
DMO Capability / Battlespace Systems Development	
<b>Virtual Flag (VF)</b>	
Virtual Flag / Coalition Virtual Flag exercises	
<b>ACE-IOS</b>	
ACE-IOS Version 5.0.19	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207605F / <i>Wargaming and Simulation Centers</i>	<b>Project (Number/Name)</b> 672888 / <i>Distributed Mission Operations Center (DMOC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>DMO</b>				
DMO Capability / Battlespace Systems Development	1	2018	4	2024
<b>Virtual Flag (VF)</b>				
Virtual Flag / Coalition Virtual Flag exercises	1	2018	4	2024
<b>ACE-IOS</b>				
ACE-IOS Version 5.0.19	1	2018	4	2018

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	42.349	26.946	0.000	26.946	14.781	29.487	0.000	0.000	Continuing	Continuing
671201: <i>E-11 Development</i>	-	0.000	0.000	26.946	0.000	26.946	14.781	29.487	0.000	0.000	Continuing	Continuing
675383: <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>	-	0.000	42.349	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

**Note**  
This program, BA 7, PE 0207610F, project 671201, BACN Simulators/Trainers, is a new start.

**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. This effort will include an Engineering Change Proposal (ECP) that will develop and integrate Military GPS on the E-11A BACN platform. 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, the development of simulators/trainers, development of training materials, and technical publications.

Execute the acquisition and sustainment of two (2) complete Battlefield Airborne Communications Node (BACN) Payload systems operation and maintenance training simulators and two (2) Payload Control Element (PCE) operations and maintenance training simulators. The BACN Payload simulators are designed for replication of both the E-11A and the EQ-4B platforms with platform-dependent payload configurations; one simulator for each platform. The PCE simulators will be specifically designed for both the PCE-Launch (L) configuration and the PCE-Mission (M) configuration. This effort would include design of all trainers (E-11A payload, EQ-4B payload, PCE-L, and PCE-M), training materials, operations and maintenance technical manuals for the assigned trainers.

Execute risk reduction activities for development of future capabilities on BACN payload/aircraft efforts.  
This effort will including developing the data and publications needed for a Program of Record  
This effort will include Acquisition Support Contractors

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BACN 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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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>
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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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	42.349	0.000	0.000	0.000
Current President's Budget	0.000	42.349	26.946	0.000	26.946
Total Adjustments	0.000	0.000	26.946	0.000	26.946
• 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	26.946	0.000	26.946

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 671201 / <i>E-11 Development</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
671201: <i>E-11 Development</i>	-	0.000	0.000	26.946	0.000	26.946	14.781	29.487	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
This program, BA 7, PE 0207610F, project 671201, BACN Simulators/Trainers, is a new start.

**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. This effort will include an Engineering Change Proposal (ECP) that will develop and integrate Military GPS on the E-11A BACN platform. 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, 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.

Execute the acquisition and sustainment of two (2) complete Battlefield Airborne Communications Node (BACN) Payload systems operation and maintenance training simulators and two (2) Payload Control Element (PCE) operations and maintenance training simulators. The BACN Payload simulators are designed for replication of both the E-11A and the EQ-4B platforms with platform-dependent payload configurations; one simulator for each platform. The PCE simulators will be specifically designed for both the PCE-Launch (L) configuration and the PCE-Mission (M) configuration. This effort would include design of all trainers (E-11A payload, EQ-4B payload, PCE-L, and PCE-M), training materials, operations and maintenance technical manuals for the assigned trainers.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BACN 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> BACN Simulators/Trainers	0.000	0.000	15.600	-	15.600
<b>Description:</b> This effort will be used to develop payload simulator trainers.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 671201 / <i>E-11 Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>FY 2019 Plans:</b> New Start in FY20</p> <p><b>FY 2020 Base Plans:</b> Procure training systems and begin training BACN payload operators in an environment conducive for learning</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to new start</p>					
<p><b>Title:</b> BACN PoR</p> <p><b>Description:</b> Development of Training materials, technical publications, and manuals. Performs Human Machine Interface (HMI) studies.</p> <p><b>FY 2019 Plans:</b> Conversion from JUON to a Program of Record</p> <p><b>FY 2020 Base Plans:</b> Continue establishment of BACN PoR</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to switching from OCO to Base funding</p>	0.000	0.000	11.346	-	11.346
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	26.946	-	26.946

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

N/A

**Remarks**

**D. Acquisition Strategy**

The BACN Branch 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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 671201 / <i>E-11 Development</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Mission Product Hardware	SS/CPAF	Northrup Grumman : San Diego, CA	-	-		-		17.132		-		17.132	Continuing	Continuing	-
Payload Data	Various	Northrup Grumman : Various	-	-		-		3.584		-		3.584	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		20.716		-		20.716	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	-		-		5.871	Dec 2019	-		5.871	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		5.871		-		5.871	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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		-		0.192	Continuing	Continuing	-
MITRE	Various	MITRE : Bedford, MA	-	-		-		0.167		-		0.167	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.359		-		0.359	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	-	0.000	26.946	-	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 671201 / <i>E-11 Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Battlefield Airborne Communication Node (BACN)</i></b>				
Program of Record Publication and Data	2	2020	3	2022
Payload Trainer	3	2020	4	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>				<b>Project (Number/Name)</b> 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675383: <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>	-	0.000	42.349	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 an Engineering Change Proposal (ECP) that will develop and integrate Military GPS on the E-11A BACN platform.

Execute the acquisition and sustainment of two (2) complete Battlefield Airborne Communications Node (BACN) Payload systems operation and maintenance training simulators and two (2) Payload Control Element (PCE) operations and maintenance training simulators. The BACN Payload simulators are designed for replication of both the E-11A and the EQ-4B platforms with platform-dependent payload configurations; one simulator for each platform. The PCE simulators will be specifically designed for both the PCE-Launch (L) configuration and the PCE-Mission (M) configuration. This effort would include design of all trainers (E-11A payload, EQ-4B payload, PCE-L, and PCE-M), training materials, operations and maintenance technical manuals for the assigned trainers.

This effort will include an Engineering Change Proposal (ECP) that will develop a Deployable PCE.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver BACN 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Military GPS, E-11A & Deployable Program Control Element (PCE)	0.000	42.349	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Description:</b> 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.</p> <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 an Engineering Change Proposal (ECP) that will develop and integrate Military GPS on the E-11A BACN platform.</p> <p>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 an Engineering Change Proposal (ECP) that will develop a Deployable PCE.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p>Will conduct an Engineering Change Proposal (ECP) that will develop and integrate Military GPS on the E-11A BACN platform.</p> <p>Conducted an Engineering Change Proposal (ECP) that will develop a Deployable PCE.</p> <p><b>FY 2020 Base Plans:</b> Continue efforts started in FY19.</p> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> new start in FY19, decrease due to funding switching to procurement</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	42.349	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>

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

N/A

**Remarks**

**D. Acquisition Strategy**

The BACN Branch 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.

**E. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Battlefield Airborne Comm Node (BACN)</b>																												
Military GPS, E-11A																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207610F / <i>Battlefield Abn Comm Node (BACN)</i>	<b>Project (Number/Name)</b> 675383 / <i>BATTLEFIELD AIRBORNE COMM NODE (BACN)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Battlefield Airborne Comm Node (BACN)</i></b>				
Military GPS, E-11A	1	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207697F / <i>Distributed Training and Exercises</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	4.046	3.825	4.303	0.000	4.303	4.377	4.467	4.549	4.631	Continuing	Continuing
675190: <i>JFCOM Wargaming</i>	-	4.046	3.825	4.303	0.000	4.303	4.377	4.467	4.549	4.631	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/A5/8, 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207697F / <i>Distributed Training and Exercises</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	4.190	4.225	4.303	0.000	4.303
Current President's Budget	4.046	3.825	4.303	0.000	4.303
Total Adjustments	-0.144	-0.400	0.000	0.000	0.000
• Congressional General Reductions	-0.144	-0.400			
• 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

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<p><b>Title:</b> Develop/ Upgrade M&amp;S Tools for WIE</p> <p><b>Description:</b> 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</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Extend the WIE to include either the Lemay Center Wargaming Institute BubbleNet or Air Force Space Command Schriever Wargame System in support of an Air Force Title 10 Game event.</li> <li>- Integrate tools to capture implications of force structures and capabilities employed in wargames to influence budgeting and programming choices.</li> <li>- Continue to expand and develop the WIE, incorporating latest technology and tools, in support of a more flexible 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.</li> </ul> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue the integration of tools to capture consequences of force structures, capabilities employed in wargames to effect budgeting and programming choices.</li> <li>- 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</li> </ul>	1.391	1.290	1.502	-	1.502

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207697F / <i>Distributed Training and Exercises</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase from FY19 to FY20 accounts for inflation.					
<b>Title:</b> Joint Concept Development & Experimentation (JCD&E) Tools  <b>Description:</b> Develop scenarios and data for future synthetic environment that grounded in truth to support several wargames and mini-wargames.  <b>FY 2019 Plans:</b> HAF Wargaming will conclude Global Engagement 18 post-game analysis and report writing, as well as, execute Futures Game 18, along with post-game analysis and report writing. HAF Wargaming will design, develop models, research concepts, and conduct workshops for Global Engagement 20 (USAF Foundation wargame). HAF Wargaming will conduct quick-turn wargames in support of senior leaders (Agile, ECCT) as directed.  <b>FY 2020 Base Plans:</b> 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.  <b>FY 2020 OCO Plans:</b> No OCO funds programmed nor executed.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase from FY19 to FY20 accounts for inflation.	2.655	2.535	2.801	0.000	2.801
<b>Accomplishments/Planned Programs Subtotals</b>	4.046	3.825	4.303	0.000	4.303

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

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207697F / <i>Distributed Training and Exercises</i>	
<b>D. Other Program Funding Summary (\$ in Millions)</b>		
<b>Remarks</b>		
<b>E. Acquisition Strategy</b> 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.		
<b>F. Performance Metrics</b> 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207697F / <i>Distributed Training and Exercises</i>	<b>Project (Number/Name)</b> 675190 / <i>JFCOM Wargaming</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Wargaming Information Environment</i></b>	
Develop and Integrate M&S Tools	
Enhance ViewPoint	
Improve GamePoint	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207697F / <i>Distributed Training and Exercises</i>	<b>Project (Number/Name)</b> 675190 / <i>JFCOM Wargaming</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Wargaming Information Environment</i></b>				
Develop and Integrate M&S Tools	1	2018	4	2021
Enhance ViewPoint	1	2018	4	2021
Improve GamePoint	1	2018	4	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	82.054	63.074	71.465	0.000	71.465	91.934	94.093	97.542	97.586	Continuing	Continuing
675302: <i>Precision Aerial Delivery Systems (PADS)</i>	0.000	8.072	8.845	7.021	0.000	7.021	3.090	1.896	1.931	1.965	Continuing	Continuing
675380: <i>Mission Planning Systems (MPS) Modernization</i>	0.000	73.188	54.229	64.444	0.000	64.444	88.844	92.197	95.611	95.621	Continuing	Continuing
675385: <i>MPS Increment 5</i>	0.000	0.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.794

**Program MDAP/MAIS Code:** 509

**Note**

- Increment 5 will be complete in 2019 with the final release recommendation for AMC platforms. The remaining test events are paid with FY18 funds on contract. The majority of work for Increment 5 was conducted in the MPS Modernization BPAC. The Increment 5 BPAC was established for FY17 and FY18 only, in order to meet MAIS reporting requirements. The majority of the work for increment 5 was conducted in the MPS Modernization BPAC.

- 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 (OPF) development programs. In FY20, will continue FW effort but will establish it as a independent program. This tracks with the Navy and affords greater insight into the framework cost elements. The FY20 R-Doc will list FW as a separate program in the MPS Modernization BPAC.

**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-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

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>
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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.

FY20 funding will allow continuation of the MPS Modernization project. MPS will develop pre-, post-, and in-flight mission planning capabilities for Air Force aircraft Global Positioning System (GPS) and weapons migrating from legacy mission planning systems to the Joint Mission Planning System (JMPS), in addition to continuing support for new capabilities and updates for Air Force platforms/weapon systems that have already migrated to JMPS. These platforms/weapon systems include, but are not limited to, the B-1, EC-130, E-3, E-8, F-15, F-16, F-22A, RC-135, and their associated weapons (e.g., Small Diameter Bomb (SDB), Joint Direct Attack Munitions (JDAM), Joint Air-to-Surface Standoff Munitions (JASSM), and Network Enabled Weapons (NEW). JMPS will support the development of follow on modernization efforts for MAFPS, SMACC CSAR (HC/MC-130, HH-60) and Global Mobility (C-5, C-17, C-130, KC-10, KC-135, KC-46) to be delivered with the final MPS Inc 5 software releases.

In addition, FY20 funding will be utilized to continue the development of the Joint Precision Airdrop System- Mission Planning (JPADS-MP) system in conjunction with the Army. This program includes the JPADS-MP airdrop software (and other system components) to provide a precision airdrop capability for the C-17, C-130 and other selected platforms as necessary and deliver 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. JPADS-MP enables high-altitude, precise airdrop delivery to forward ground forces, mitigating surface-to-air threats, reducing risk of Improvised Explosive Device (IED) 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 keep the warfighter supplied and in the fight.

Finally, for MPS Increment 5, there is no FY20 development required as the final software delivery is planned for FY19.

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 in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	85.531	63.653	81.131	0.000	81.131
Current President's Budget	82.054	63.074	71.465	0.000	71.465
Total Adjustments	-3.477	-0.579	-9.666	0.000	-9.666
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-0.579			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	-2.598	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.879	0.000			
• Other Adjustments	0.000	0.000	-9.666	0.000	-9.666

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>				<b>Project (Number/Name)</b> 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675302: <i>Precision Aerial Delivery Systems (PADS)</i>	0.000	8.072	8.845	7.021	0.000	7.021	3.090	1.896	1.931	1.965	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 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 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> JPADS-MP Phase I	8.072	8.845	7.021
<b>Description:</b> Continues development of a JPADS capability for precise, high altitude delivery of material to forward ground forces.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b><i>FY 2019 Plans:</i></b></p> <ul style="list-style-type: none"> <li>- Will complete operational testing of CAT v6.x for fielding in FY19</li> <li>- Will continue development and testing of CAT to address capabilities of Visual Navigation and GPS Coverage, Software User Notifications, HUD/SCNS Display/Workflow, Wind Transfer to the AGU, Dry Pass, LT-ADE Integration, Initial table capabilities, Ensemble Weather, and Kalman Filter Implementation.</li> <li>- Will begin development of CAT v8.x. All development is being conducted for these versions via agile development with multiple Program Increments (PIs). Each of the PIs provides an interim capability available to the using command supporting the rapid fielding of warfighter capabilities. Projected capabilities are not limited to, but include HALO for JPADS, Hazard Avoidance, and terrain effects.</li> </ul> <p><b><i>FY 2020 Plans:</i></b></p> <ul style="list-style-type: none"> <li>- Continue agile development of increased JPADS capability, primarily with CAT v8.x. This version will 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.</li> <li>- Continue development of CAT v9.0 (incorporating capabilities from MAJCOM prioritization requirements)</li> </ul> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b></p> <p>-The substantial increase is due to the higher development cost of the all complex CAT v9.0 capabilities plus the beginning of development for CAT v9.0. FY20, JPADS budget decreased by \$1.6 Million to support the Framework platform.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	8.072	8.845	7.021

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 833170: <i>Mission Planning Systems</i>	6.083	3.801	5.208	-	5.208	5.216	5.109	5.129	7.848	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**  
The MPS PADS efforts are developed and fielded using a variety of contracting instruments. Efforts to accomplish activities such as software development, systems engineering and integration, training, and support are completed using competitively awarded contracts (e.g. Cost Plus Award Fee (CPAF), Fixed Price (FP)).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>
<p>Program Management Administration (PMA) contracts are awarded competitively and consist of various types of contracts at various locations.</p> <p>MITRE, a Federally Funded Research and Development Center (FFRDC) contractor, provides technical support via a no fee for service contract.</p> <p>Other efforts are accomplished using Purchase Orders (PO) and Military Interdepartmental Purchase Requests (MIPR).</p> <p>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.</p> <p>Air Force Program Executive Officer (PEO) for Battle Management (AFPEO/BM) is the PEO and Milestone Decision Authority (MDA) for the PADS program.</p> <p><b>E. Performance Metrics</b></p> <p>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.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019				
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0208006F / Mission Planning Systems				Project (Number/Name) 675302 / Precision Aerial Delivery Systems (PADS)								
<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	
Software Development	MIPR	Various : Various	0.000	5.998	Nov 2017	7.051	Nov 2018	5.166	Nov 2019	-		5.166	Continuing	Continuing	-	
Systems Engineering and Integration	C/CPAF	Leidos, Inc. : Reston, VA	0.000	1.213	Jan 2018	0.925	Jan 2019	0.944	Jan 2020	-		0.944	Continuing	Continuing	-	
<b>Subtotal</b>			0.000	7.211		7.976		6.110		-		6.110	Continuing	Continuing	N/A	
<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	
Cost Estimating	C/T&M	Quantech Services : Lexington, MA	0.000	0.014	Nov 2017	0.015	Nov 2018	0.028	Nov 2019	-		0.028	0.000	0.057	0.181	
<b>Subtotal</b>			0.000	0.014		0.015		0.028		-		0.028	0.000	0.057	N/A	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	
Type I Training	C/FP	Spiral Solutions & Technologies : Bellevue, NE	0.000	-		-		-		-		-	0.000	0.000	2.172	
<b>Subtotal</b>			0.000	-		-		-		-		-	0.000	0.000	N/A	
<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	0.847	Nov 2017	0.854	Nov 2018	0.883	Nov 2019	-		0.883	Continuing	Continuing	-	
<b>Subtotal</b>			0.000	0.847		0.854		0.883		-		0.883	Continuing	Continuing	N/A	



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024							
	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>Precision Aerial Delivery Systems (PADS)</b>																																
JPADS-MP CAT v6.x Development and Testing Completion																																
JPADS-MP CAT v6.x Fielding																																
JPADS-MP CAT v7.x Development and Testing																																
JPADS-MP CAT v7.x Fielding																																
JPADS-MP CAT v8.x Development and Testing																																
JPADS-MP CAT v8.x Fielding																																
JPADS-MP CAT v9.x Development and Testing																																
JPADS-MP CAT v9.x Fielding																																
JPADS-MP CAT Continued Integration, Test, and Fielding																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675302 / <i>Precision Aerial Delivery Systems (PADS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Precision Aerial Delivery Systems (PADS)</i></b>				
JPADS-MP CAT v6.x Development and Testing Completion	1	2019	1	2019
JPADS-MP CAT v6.x Fielding	1	2019	1	2019
JPADS-MP CAT v7.x Development and Testing	4	2018	3	2019
JPADS-MP CAT v7.x Fielding	3	2019	4	2019
JPADS-MP CAT v8.x Development and Testing	4	2019	3	2020
JPADS-MP CAT v8.x Fielding	2	2020	4	2020
JPADS-MP CAT v9.x Development and Testing	2	2020	2	2021
JPADS-MP CAT v9.x Fielding	2	2021	2	2021
JPADS-MP CAT Continued Integration, Test, and Fielding	3	2020	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>				<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675380: <i>Mission Planning Systems (MPS) Modernization</i>	0.000	73.188	54.229	64.444	0.000	64.444	88.844	92.197	95.611	95.621	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-16, 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 and 10) and F-22 Increments 3.2B, 3.2M 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.

b. F-16 Block 40/50 Modernization Phases I&II: The F-16 Block 40/50 modernization completed fielding and transitioned to full sustainment the 2Q of FY17.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>

c. 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.

d. 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.

e. 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 unique funding line.

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.

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-60 and MC/HC aircraft. The follow-on versions continue that development.

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 to modernization via agile development with CSAR Rel 2.0 or with Milestone Decision Authority Approval, extension of the CSAR 1.1 program for the new requirements.

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.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>
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6) Beginning in FY20 the MPS Framework will be established as an independent Program of Record (anticipated as an ACAT III). The Framework represents the basic fundamental layer 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 Framework architecture. The Navy utilizes the same basic core Framework software. The funding for the Framework has historically been accomplished through a "tax" 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 Framework for future oversight. Framework will be an agile development effort based on services developed in a common development environment.

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 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 2018	FY 2019	FY 2020
<p><b>Title:</b> F-15 Modernization Phase II and III</p> <p><b>Description:</b> 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).</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Complete DT/OT on v5.0</li> <li>- FQT v6.0</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Begin development of v6.1</li> <li>- Field v5.0</li> <li>- Field v6.0</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p> <p>-Increase due to beginning of development of 6.1 in FY20.</p>	14.147	10.686	11.066
<p><b>Title:</b> F-22 Modernization Phase I and II</p>	7.013	9.148	11.752

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Description:</b> Continues the modernization of previously fielded F-22 MPEs to enable efficient use of new and improved capabilities being developed in the OFPs.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Field v13.1</li> <li>- Complete FQT of v14.0</li> <li>- Complete DT of v14.0</li> <li>- Begin development for v14.1</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- FQT/Field v14.1</li> <li>- Begin development of v14.2</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p> <ul style="list-style-type: none"> <li>- There is a very slight increase from FY19 to FY20 budgets</li> </ul>			
<p><b>Title:</b> B-1 Modernization Phase I and II</p> <p><b>Description:</b> Continues the modernization of previously fielded B-1 MPEs to enable efficient use of new and improved capabilities being developed in the OFPs.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Begin development of B-1 Rel 11.0 in support of B-1 SB18 OFP requirements.</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Finish development and complete FQT of B-1 Rel 11.0 in support of B-1 SB18 OFP requirements.</li> <li>- Begin development of B-1 Rel 12.0 in support of B-1 SB19 OFP requirements.</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p> <p>Decreased due to start of Release 12.0</p>	14.177	12.083	5.361
<p><b>Title:</b> MAF Modernization</p> <p><b>Description:</b> Develops the KC-46 JMPS Mission Planning Environment (MPE). In addition, develop, test, and field the follow on modernization of the Global Mobility (GM) 100 series MPE to account for changes in aircraft operational flight profiles account for changes in aircraft operational flight profiles (OFPs) and Global Command and Control Changes.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will complete both operational testing and fielding for the GM 1.4 (KC-46) MPE.</li> </ul>	10.179	5.974	20.374

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>- Begin development of the Agile Global Mobility (AGM) effort for the modernization of the C-5, C-17, C-130, KC-10, and KC-135 (fielded during MPS Inc 5) as well as follow on modernization to the KC-46.</p> <p>- Complete fielding for GM 1.3.310</p> <p><b>FY 2020 Plans:</b></p> <p>- Continued 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.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p> <p>- FY20 increased because FY19 was partially with FY18 funds. Also the increased work for V2.x program increments in FY20, as the move from concept into development and testing.</p>				
<p><b>Title:</b> Special Mission ACC (SMACC)</p> <p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Develop and test RC-135 V3.3</li> <li>- Develop, test, and field the E-3 Dragon V3.002</li> <li>- Complete and obtain the release recommendation for E-3/E08 V2.1.2.</li> <li>- Complete development and test V2.2</li> <li>- Obtain the release recommendation for the EC-130 V2.0</li> <li>- Obtain the release recommendation for SMACC CSAR V1.1 (Release 4).</li> <li>- Continuation of CSAR development under follow on CSAR-Pedro King (PK) effort. Integration/development, testing, and release is 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.</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Fielding decision of RC-135 V3.3</li> <li>- Release Recommendation for E-3/E-8 V2.2</li> <li>- Continue modernization of the E-3 Dragon and EC-130</li> <li>- Continuation of CSAR-PK modernization</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>		15.768	15.055	10.405

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
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 (As an approved extension of the SMACC CSAR V1.1 program or under the CSAR Pedro King 804 effort.				
<p><b>Title:</b> Framework (FW)</p> <p><b>Description:</b> Framework is the core software component 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. FW includes the interfaces required to be integrated into the various platforms and weapons systems. Services being developed include Local Points, Mission Folders, and Moving Map.</p> <p><b>FY 2019 Plans:</b> N/A, not officially an ACATIII until FY20</p> <p><b>FY 2020 Plans:</b> Framework will be classified as a program of record. The Framework program will be an agile development effort with service drops versus the traditional major framework releases. Services that are currently in the FY20 planning stage include vertical obstruction, point exports, UCI route management and Moving Map capabilities. The current FW funding is \$5.645M with \$4.045M coming from the B-1 MPE and \$1.6M coming from JPADS procurement and being reprogrammed into 3600 for FW.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FW will become a line item in the FY20 BES. The funding was realigned from the following programs: JPADS and B-1 in FY20. The out-years will be transferred from JPADS, B-1, F-22, F-15, and MAFPS Modernization. This is not a New Start.</p>		0.000	0.000	4.805
<p><b>Title:</b> MAF Automated Flight Planning Service (MAFPS)Phase II</p> <p><b>Description:</b> 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.</p> <p><b>FY 2019 Plans:</b> - Complete testing and field Release 2. All development is being conducted for these versions via agile development with multiple Sprints. Each of the Sprints provides an interim capability available to the using command should they desire fielding prior to the full completion of application version. Six Sprints are planned for FY19.</p> <p><b>FY 2020 Plans:</b> - Continue modernization of this next generation flight planning system for Air Mobility Command.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b></p>		11.904	1.283	0.681

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
The funding decrease is due to completion of the major development activities in FY19 as the program moves to continued modernization.			
<b>Accomplishments/Planned Programs Subtotals</b>	73.188	54.229	64.444

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• OPAF 03 Line Item 833170: <i>Mission Planning Systems</i>	9.403	8.291	9.300	-	9.300	9.938	9.783	10.586	10.136	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 Battle Management (AFPEO/HB) is the Milestone Decision Authority (MDA) for all MPS Modernization projects (with the exception of those efforts that make up MPS Inc 5 for which the Under Secretary of Defense, Acquisition, Technology, and Logistics is the MDA).

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Mission Planning Software Development (MPEC II)	C/Various	Various : Various	0.000	26.849	Nov 2017	14.658	Nov 2018	24.516	Nov 2019	-		24.516	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	1.031	Jan 2018	1.051	Jan 2019	0.931	Jan 2020	-		0.931	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	3.173	Jan 2018	2.497	Jan 2019	0.408	Jan 2020	-		0.408	Continuing	Continuing	-
Systems Engineering and Integration	C/CPAF	Leidos, Inc. : Reston, VA	0.000	8.367	Jan 2018	8.535	Jan 2019	9.061	Jan 2020	-		9.061	Continuing	Continuing	-
Framework	C/FPIF	Northrop Grumman : Herndon, VA	0.000	10.835	Jan 2018	8.060	Jan 2019	5.645	Jan 2020	-		5.645	Continuing	Continuing	-
Common Components	C/Various	Various : Various	0.000	6.328	Nov 2017	4.844	Nov 2018	7.007	Nov 2019	-		7.007	Continuing	Continuing	-
<b>Subtotal</b>			0.000	56.583		39.645		47.568		-		47.568	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Engineering	C/T&M	SEI : Pittsburgh, PA	0.000	-		-		-		-		-	0.000	0.000	0.080
Cost Estimating	C/T&M	Tecolote Inc : Goleta, CA	0.000	0.202	Nov 2017	0.021	Nov 2018	0.224	Nov 2019	-		0.224	Continuing	Continuing	-
<b>Subtotal</b>			0.000	0.202		0.021		0.224		-		0.224	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	46TS : Eglin AFB, FL	0.000	4.246	Dec 2017	3.775	Dec 2018	4.433	Dec 2019	-		4.433	Continuing	Continuing	-
Certification and Accreditation	MIPR	JITC : Fort Huachuca, AZ	0.000	0.123	Feb 2018	0.115	Feb 2019	0.117	Feb 2020	-		0.117	Continuing	Continuing	-
Type I Training	C/FP	Summit Technologies Inc : Winter Park, FL	0.000	1.212	Jul 2018	1.004	Jul 2019	1.390	Jul 2020	-		1.390	Continuing	Continuing	-
Field Representative Hardware	C/Various	Various : Various	0.000	0.421	Nov 2017	0.164	Nov 2018	0.442	Nov 2018	-		0.442	Continuing	Continuing	-
<b>Subtotal</b>			0.000	6.002		5.058		6.382		-		6.382	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Technical Support	RO	MITRE Corp : Bedford, MA	0.000	4.066	Oct 2017	0.475	Oct 2018	3.773	Oct 2018	-		3.773	Continuing	Continuing	-
Program Management Administration	Various	Various : Various	0.000	6.335	Nov 2017	9.030	Nov 2018	6.497	Oct 2018	-		6.497	Continuing	Continuing	-
<b>Subtotal</b>			0.000	10.401		9.505		10.270		-		10.270	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		0.000	73.188	54.229	64.444	-	64.444	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
<b>Mission Planning Systems (MPS) Modernization</b>																												
F-15 v4.1 Fielding			■																									
F-15 v4.2 Fielding					■																							
F-15 v5.0 Fielding								■																				
F-15 v6.0 Fielding										■																		
F-15 v6.1 Fielding													■															
F-16 Blk 40/50 M7.2 Fielding							■																					
F-22 v13.1 Fielding								■																				
F-22 v14.0 Fielding										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
F-22 v14.1 Fielding														■														
F-22 v14.2 Fielding																							■					
B-1 Release 9 Fielding		■																										
B-1 Release 11 Fielding												■																
CAF Modernization Continued Integration, Test, and Fielding																												
SMACC E-3/ E-8 Release 2.1 Fielding					■																							
SMACC E-3/E8 Release 2.2 Fielding								■																				
SMACC E-3/E8 Release 2.3 Fielding																									■			
SMACC EC-130H Release 2.0							■																					
SMACC EC-130H Release 2.1 Fielding													■															
SMACC E-3 DRAGON Release 3 Fielding								■																				
SMACC E-3 DRAGON Release 3.1 Fielding																										■		
SMACC RC-135 Release 3.3 Fielding																												
SMACC RC-135 Release 3.4 Fielding																											■	



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Mission Planning Systems (MPS) Modernization</i></b>				
F-15 v4.1 Fielding	3	2018	3	2018
F-15 v4.2 Fielding	1	2019	1	2019
F-15 v5.0 Fielding	4	2019	4	2019
F-15 v6.0 Fielding	3	2020	3	2020
F-15 v6.1 Fielding	2	2021	2	2021
F-16 Blk 40/50 M7.2 Fielding	3	2019	3	2019
F-22 v13.1 Fielding	4	2019	4	2019
F-22 v14.0 Fielding	1	2020	1	2021
F-22 v14.1 Fielding	1	2021	1	2021
F-22 v14.2 Fielding	1	2022	1	2022
B-1 Release 9 Fielding	2	2018	2	2018
B-1 Release 11 Fielding	3	2020	3	2020
CAF Modernization Continued Integration, Test, and Fielding	3	2020	4	2024
SMACC E-3/ E-8 Release 2.1 Fielding	1	2019	1	2019
SMACC E-3/E8 Release 2.2 Fielding	4	2019	4	2019
SMACC E-3/E8 Release 2.3 Fielding	4	2021	4	2021
SMACC EC-130H Release 2.0	2	2019	2	2019
SMACC EC-130H Release 2.1 Fielding	2	2020	2	2020
SMACC E-3 DRAGON Release 3 Fielding	3	2019	3	2019
SMACC E-3 DRAGON Release 3.1 Fielding	3	2020	3	2020
SMACC RC-135 Release 3.3 Fielding	3	2019	3	2020

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675380 / <i>Mission Planning Systems (MPS) Modernization</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SMACC RC-135 Release 3.4 Fielding	4	2020	4	2020
CSAR-PK Development/Integration, Testing, and Releasing	1	2019	4	2022
GM 1.4 (KC-46) Release 1 Fielding	1	2020	1	2020
AGM Development/Integration, Testing, and Releasing	2	2019	3	2021
MAFPS Release 2 Fielding	2	2019	2	2019
MAF Modernization Continued Integration, Test, and Fielding	3	2020	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>				<b>Project (Number/Name)</b> 675385 / <i>MPS Increment 5</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675385: <i>MPS Increment 5</i>	0.000	0.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.794
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Prior costs for Inc 5 were \$59.9M and are included in Project 675380 as those programs were under MPS Modernization. Current Total Cost for Inc 5 in Project 675385 is \$0.818

**A. Mission Description and Budget Item Justification**

MPS Inc 5 develop and test will be completed in FY19. Inc 5 consists of the following three programs.

- 1) Mobility Air Forces Automated Flight Planning Service (MAFPS);
- 2) Air Mobility Command (AMC) Transition; and
- 3) Special Mission Air Combat Command, Combat Search and Rescue (SMACC CSAR)

These projects, and their associated platforms, comprise the overarching program known as MPS Inc 5.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> MPS Increment 5	0.794	0.000	0.000
<b>Description:</b> MPS Inc 5 continues and completes the development of: 1) Mobility Air Forces Automated Planning Service (MAFPS) system; 2) AMC Transition; and 3) Special Mission Air Combat Command, Combat Search and Rescue (SMACC CSAR).			
<b>FY 2019 Plans:</b> Complete testing and field SMACC CSAR and AMC Transition release 1.3.300. Completion of these efforts will lead to the last acquisition event, the Full Deployment Declaration (FD). FY18 3600 funds were used for the minimal effort which fell into FY19.			
<b>FY 2020 Plans:</b> None. Development will complete in FY19 with the completion of the Full Deployment (FD) Declaration			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> No FY20 development funding - program completed development in FY19.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.794	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force Date: February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675385 / <i>MPS Increment 5</i>
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**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

MPS Inc 5 consists of multiple capability upgrades across multiple platforms that are developed and fielded using a variety of contracting instruments. It leverages strategies and efforts originally established under MPS Increment IV and MPS Modernization. The Air Force Life Cycle Management Center at Hanscom AFB (AFLCMC/HB) competitively awarded multiple ID/IQ (Indefinite Delivery/Indefinite Quantities) contracts for software development. Currently there are 5 qualified contractors, one of which is Small Business set aside, and each Delivery Order (DO) is competed among the 5 contractors.

Efforts to accomplish program activities such as software development, systems engineering and integration, training, and support were competitively awarded using a variety of contract types (e.g. Cost Plus Award Fee (CPAF), Fixed Price (FP), Fixed Price Incentive Fee (FPIF)).

Program Management Administration (PMA) contracts were 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 program management, contracting, legal, and financial management support.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675385 / <i>MPS Increment 5</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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			
Mission Planning Software Development (MPEC II)	C/CPIF	DCS Corporation : Alexandria, VA	0.000	0.026	Nov 2017	-		-		-		-	Continuing	Continuing	0.388
HH-60/HC-130J/N/P Release 1	PO	Organic : Robins AFB, GA	0.000	0.021	Nov 2017	-		-		-		-	Continuing	Continuing	0.169
SM-ACC CSAR Tools	MIPR	Various : Various	0.000	-		-		-		-		-	Continuing	Continuing	0.296
Systems Engineering and Integration	C/CPAF	Leidos, Inc. : Reston, VA	0.000	0.271	Jan 2018	-		-		-		-	Continuing	Continuing	1.202
Air Refueling Tool	C/FFP	Navy Mission Planning Systems : Point Mugu, CA	0.000	-		-		-		-		-	Continuing	Continuing	0.359
<b>Subtotal</b>			0.000	0.318		-		-		-		-	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Estimating	C/T&M	Tecolote Inc. : Goleta, CA	0.000	-		-		-		-		-	Continuing	Continuing	0.028
<b>Subtotal</b>			0.000	-		-		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	46TS : Eglin AFB, FL	0.000	0.104	Dec 2017	-		-		-		-	Continuing	Continuing	0.405
Type I Training	C/FP	Spiral solutions & Technologies, Inc. : Bellevue, NE	0.000	0.104	Jan 2018	-		-		-		-	Continuing	Continuing	0.370
<b>Subtotal</b>			0.000	0.208		-		-		-		-	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675385 / <i>MPS Increment 5</i>
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Technical Support	RO	MITRE Corp. : Bedford, MA	0.000	0.170	Nov 2017	-		-		-		-	Continuing	Continuing	0.966
Program Management Administration	C/CPFF	Odyssey Systems Consulting Group, LTD. : Wakefield, MA	0.000	0.098	Nov 2017	-		-		-		-	Continuing	Continuing	0.387
<b>Subtotal</b>			0.000	0.268		-		-		-		-	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			0.000	0.794		0.000		-		-		-	Continuing	Continuing	N/A

**Remarks**  
 Prior costs for Inc 5 is \$59.9M and are included in Project 675380 as those programs were under MPS Modernization. As well as cost to complete for Inc 5 of \$5.168 are in Project 675380. Total Cost for Inc 5 in Project 675385 is \$5.197 this does not include TWCF (Transportation Capital Working Fund).

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**Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675385 / <i>MPS Increment 5</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>MPS Increment 5</i></b>	
AMC Transition (GM Release 1.3.300)	██████████
CSAR Rel 1.0	██
Full Deployment Declaration	██████████

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208006F / <i>Mission Planning Systems</i>	<b>Project (Number/Name)</b> 675385 / <i>MPS Increment 5</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>MPS Increment 5</i></b>				
AMC Transition (GM Release 1.3.300)	1	2019	3	2019
CSAR Rel 1.0	1	2019	1	2019
Full Deployment Declaration	2	2019	4	2019

**Note**

Complete testing and field CSAR and Global Mobility 1.3.300. This effort was originally programmed and planned in FY18 with FY18 funding. Recent slips have shifted approximately \$300k of effort into FY19. This effort will be budgeted as originally planned.

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208007F / <i>Tactical Deception</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	3.623	6.949	7.446	0.000	7.446	3.474	0.497	0.506	0.515	Continuing	Continuing
674550: <i>Air Base Resiliency</i>	-	3.623	6.949	7.446	0.000	7.446	3.474	0.497	0.506	0.515	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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	3.761	6.949	7.446	0.000	7.446
Current President's Budget	3.623	6.949	7.446	0.000	7.446
Total Adjustments	-0.138	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	-0.138	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>
<b>Title:</b> Non-Kinetic Air Base Defense	3.623	6.949	7.446
<b>Description:</b> 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.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208007F / <i>Tactical Deception</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b><i>FY 2019 Plans:</i></b> Provide trained, capable MILDEC planners to combatant commands.</p> <p>Funding increased due to requirements.</p> <p><b><i>FY 2020 Plans:</i></b> needed to meet reqts</p> <p><b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> increase needed to meet reqts</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	3.623	6.949	7.446

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

N/A

**Remarks**

**E. Acquisition Strategy**

N/A

**F. 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-4, RDT&E Schedule Profile: PB 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208007F / <i>Tactical Deception</i>	<b>Project (Number/Name)</b> 674550 / <i>Air Base Resiliency</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Non-Kinetic Air Base Defense Development</i></b>	
Non-Kinetic Defense Development	[REDACTED]

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208007F / <i>Tactical Deception</i>	<b>Project (Number/Name)</b> 674550 / <i>Air Base Resiliency</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Non-Kinetic Air Base Defense Development</i></b>				
Non-Kinetic Defense Development	2	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208064F / <i>OPERATIONAL HQ - CYBER</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	7.602	0.000	7.602	5.537	2.266	2.307	14.810	Continuing	Continuing
676002: <i>Cyber Systems Modernization</i>	-	0.000	0.000	7.602	0.000	7.602	5.537	2.266	2.307	14.810	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 7, PE 0208064F, project 676002, Cyber Command and Control Mission System (C3MS) Modernization, is a new start.

**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.

**Budget Item Description:** C3MS will start 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force				<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>		<b>R-1 Program Element (Number/Name)</b> PE 0208064F / OPERATIONAL HQ - CYBER				
<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	
Previous President's Budget	0.000	0.000	7.602	0.000	7.602	
Current President's Budget	0.000	0.000	7.602	0.000	7.602	
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	
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>				<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Cyber Command and Control Mission System (C3MS) Modernization				0.000	0.000	7.602
<b>Description:</b> 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.						
<b>FY 2019 Plans:</b> N/A						
<b>FY 2020 Plans:</b> - Will automate battle management processes to define and provide cyber situational awareness to improve Air Force cyber command and control.  - Will develop multi-level security capabilities.  - Will develop man-to-machine to dynamically interoperate with Air Operations Center (AOC) systems.  - Will develop visualization tools for force location, mission, effect, and linked information.						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increasing due to initiation of C3MS modernization						
<b>Accomplishments/Planned Programs Subtotals</b>				0.000	0.000	7.602

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208064F / <i>OPERATIONAL HQ - CYBER</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 831010: <i>Comsec Equipment</i>	6.408	11.705	5.113	-	5.113	4.801	4.940	5.028	17.579	0.000	55.574

**Remarks**

**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 solution 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.

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208064F / OPERATIONAL HQ - CYBER	<b>Project (Number/Name)</b> 676002 / Cyber Systems Modernization
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		6.202	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		6.202		-		6.202	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		1.000		-		1.000	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		0.400	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.400		-		0.400	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	0.000	7.602	-	7.602	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208064F / OPERATIONAL HQ - CYBER	<b>Project (Number/Name)</b> 676002 / Cyber Systems Modernization

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Automated Battle Management and Cyber SA</b>				
Architecture and Modeling Support	2	2020	4	2024
Software Development	2	2020	4	2024
Test and Evaluation	3	2020	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	38.241	40.168	35.178	0.000	35.178	33.620	33.678	34.292	46.897	Continuing	Continuing
670375: <i>Network Warfare Systems and Support</i>	-	38.241	40.168	0.000	0.000	0.000	0.000	0.000	0.000	11.428	Continuing	Continuing
674540: <i>Cyber Tech Products - Payloads</i>	-	0.000	0.000	6.615	0.000	6.615	7.110	7.053	6.579	6.805	Continuing	Continuing
674541: <i>Cyber Tech Projects - Platforms</i>	-	0.000	0.000	10.054	0.000	10.054	10.268	10.713	10.743	11.112	Continuing	Continuing
674542: <i>Cyber Tech Projects - Access/Infrastructure</i>	-	0.000	0.000	18.509	0.000	18.509	16.242	15.912	16.970	17.552	Continuing	Continuing

**Note**  
 PE 0208087F, Distributed Cyber Warfare Operations, changed from AF Offensive Cyber Operations.

**A. Mission Description and Budget Item Justification**

Distributed Cyber Warfare Operations (DCWO) provides advanced offensive cyber warfare capabilities to the 24th 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 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).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>
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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 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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	39.693	40.526	35.178	0.000	35.178
Current President's Budget	38.241	40.168	35.178	0.000	35.178
Total Adjustments	-1.452	-0.358	0.000	0.000	0.000
• Congressional General Reductions	0.000	-0.358			
• 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	-1.452	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
670375: <i>Network Warfare Systems and Support</i>	-	38.241	40.168	0.000	0.000	0.000	0.000	0.000	0.000	11.428	Continuing	Continuing
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 in order 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 in these three areas that when tied together provide cyber effects to Combatant Commanders.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Distributed Cyber Warfare Operations 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.

Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Platforms	18.925	16.803	0.000
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Continue enhancements to the CMP Platform and other platform components to satisfy prioritized requirements from USAF Offensive Cyber Operations Mission Threads.</li> <li>- Execute an approved FY18 NDAA Pilot Program for Agile Software Development.</li> <li>- At a minimum, conduct delta accreditation and fielding of CMP Increment 2 Build 3 and Build 4. More frequent deliveries will be based on user demand.</li> <li>- Transition from 6 month delivery Builds to a Continuous Delivery program structure.</li> </ul> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding decreased due to transfer to Project 674541, Cyber Tech Projects - Platforms</p>				
<p><b>Title:</b> Access</p> <p><b>Description:</b> The Access capability provides connectivity and required infrastructure by leveraging industry and other Government/non-Government mission partners' applications and programs.</p> <ul style="list-style-type: none"> <li>- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.</li> </ul> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- 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.</li> <li>- Continue to develop and transition OCO quick reaction capabilities for next-generation OCO weapon system supporting requirements from USAF Offensive Cyber Operations Mission Threads.</li> <li>- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.</li> </ul> <p><b>FY 2020 Plans:</b></p>		14.827	20.123	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
N/A			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> - Funding decreased due to transfer to Project 674542, Cyber Tech Projects - Access/Infrastructure			
<b><i>Title:</i></b> Payloads  <b><i>Description:</i></b> 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, 210-925-6653.  <b><i>FY 2019 Plans:</i></b> - Continue the development of cyber tools and payloads by leveraging industry and other Government/non-Government mission partnered developed applications and programs.  - Continue to develop and transition cyber tool and payload quick reaction capabilities for current and next-generation OCO weapon systems supporting requirements from USAF OCO Mission Threads.  - Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.  <b><i>FY 2020 Plans:</i></b> N/A  <b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> - Funding decreased due to transfer to Project 674540, Cyber Tech Projects - Payloads	4.489	3.242	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	38.241	40.168	0.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 834320: C3 Countermeasures	16.990	23.931	-	-	-	-	-	-	-	0.000	40.921

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	Total Cost
			Base	OCO	Total					Complete	
• OPAF 03 Line Item 834010: <i>General Information Technology</i>	8.781	0.000	-	-	-	-	-	-	-	0.000	8.781
• OPAF 03 Line Item 831010: <i>COMSEC Equipment</i>	0.000	0.070	-	-	-	-	-	-	-	0.000	0.070

**Remarks**

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	16.684	Dec 2017	14.028	Nov 2018	-		-		-	Continuing	Continuing	-
Access/Infrastructure	Various	Various : Various	-	12.202	Jan 2018	17.229	Jan 2019	-		-		-	Continuing	Continuing	-
Payloads	Various	Various : Various	-	2.583	Jan 2018	0.924	Jan 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	31.469		32.181		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.576	Feb 2018	0.694	Dec 2018	-		-		-	Continuing	Continuing	-
Access/Infrastructure	MIPR	47 CTS : San Antonio, TX	-	0.191	Jul 2018	0.407	Dec 2018	-		-		-	Continuing	Continuing	-
Payloads	MIPR	Various : San Antonio, TX	-	0.378	Jun 2018	0.000		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.145		1.101		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	1.665	Jan 2018	2.081	Oct 2018	-		-		-	Continuing	Continuing	-
PSC - Acquisition Support - Access	C/Various	Various : San Antonio, TX	-	2.435	Oct 2017	2.486	Oct 2018	-		-		-	Continuing	Continuing	-
PSC - Engineering & Technical Assistance Support Services (ETASS & FFRDC) - Payloads	C/FFP	Various : San Antonio, TX	-	1.527	Sep 2018	2.319	Apr 2018	-		-		-	Continuing	Continuing	-



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024					
	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>Platform</b>																														
CMP Development Increment 2 Build 1	█																													
CMP Development Increment 2 Build 2	█																													
CMP Development Increment 2 Build 3			█																											
CMP Development Increment 2 Build 4					█																									
CMP Continuous Delivery per Section 874 Pilot Program Plan							█																							
Platform Integration	█																													
<b>Access</b>																														
AF Unique Access			█																											
Next-Gen OCO WS			█																											
DCWO Infrastructure Development	█																													
<b>Payloads</b>																														
Payload Development	█																													
Corner Series Development	█																													
Tools Development	█																													

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 670375 / <i>Network Warfare Systems and Support</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Platform</b>				
CMP Development Increment 2 Build 1	1	2018	1	2018
CMP Development Increment 2 Build 2	1	2018	3	2018
CMP Development Increment 2 Build 3	3	2018	1	2019
CMP Development Increment 2 Build 4	1	2019	2	2019
CMP Continuous Delivery per Section 874 Pilot Program Plan	3	2019	4	2019
Platform Integration	1	2018	4	2019
<b>Access</b>				
AF Unique Access	2	2018	4	2019
Next-Gen OCO WS	3	2018	4	2019
DCWO Infrastructure Development	1	2018	4	2019
<b>Payloads</b>				
Payload Development	1	2018	4	2019
Corner Series Development	1	2018	4	2019
Tools Development	1	2018	4	2019

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				<b>Project (Number/Name)</b> 674540 / <i>Cyber Tech Products - Payloads</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674540: <i>Cyber Tech Products - Payloads</i>	-	0.000	0.000	6.615	0.000	6.615	7.110	7.053	6.579	6.805	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY20, 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, in order 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 in these three areas that when tied together provide cyber effects to Combatant Commanders. Cyber payload capabilities are required to have 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.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Distributed Cyber Warfare Operations 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.

- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Payloads	0.000	0.000	6.615
<b>Description:</b> 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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674540 / <i>Cyber Tech Products - Payloads</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.			
<b>FY 2019 Plans:</b> N/A			
<b>FY 2020 Plans:</b> - 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.  - Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding increased due to relative operational priorities between DCWO efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	6.615

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 834320: C3 Countermeasures	0.000	0.000	2.939	-	2.939	2.811	2.550	2.595	7.751	Continuing	Continuing

**Remarks**

**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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674540 / <i>Cyber Tech Products - Payloads</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.

**E. 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 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0208087F / Distributed Cyber Warfare Operations				674540 / Cyber Tech Products - Payloads							
<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Payload Development	Various	Various : Various	-	-		-		4.346	Nov 2019	-		4.346	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		4.346		-		4.346	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Payload Test and Evaluation	MIPR	47 CTS : San Antonio, TX	-	-		-		0.200	Dec 2019	-		0.200	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.200		-		0.200	Continuing	Continuing	N/A
<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
PSC - Engineering & Technical Assistance Support Services (Various)	C/FFP	Various : San Antonio, TX	-	-		-		2.069	Apr 2020	-		2.069	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		2.069		-		2.069	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	-		0.000		6.615		-		6.615	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674540 / <i>Cyber Tech Products - Payloads</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Payload Development</i></b>	
Payloads Development	
Corner Series Development	
Tools Development	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674540 / <i>Cyber Tech Products - Payloads</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Payload Development</i></b>				
Payloads Development	1	2020	4	2024
Corner Series Development	1	2020	4	2024
Tools Development	1	2020	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				<b>Project (Number/Name)</b> 674541 / <i>Cyber Tech Projects - Platforms</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674541: <i>Cyber Tech Projects - Platforms</i>	-	0.000	0.000	10.054	0.000	10.054	10.268	10.713	10.743	11.112	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY20, 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, in order 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 in these three areas that when tied together 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.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Distributed Cyber Warfare Operations 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)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Platforms	0.000	0.000	10.054
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674541 / <i>Cyber Tech Projects - Platforms</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
N/A			
<b><i>FY 2020 Plans:</i></b> - 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.			
<b><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></b> - Funding decreased due to relative operational priorities between DCWO efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	10.054

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 834320: <i>C3 Countermeasures</i>	0.000	0.000	14.944	-	14.944	14.296	12.967	13.197	39.417	Continuing	Continuing
• OPAF 03 831010: <i>Comsec Equipment</i>	0.000	0.000	2.790	-	2.790	-	-	-	-	2.790	5.580

**Remarks**

**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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674541 / <i>Cyber Tech Projects - Platforms</i>

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674541 / <i>Cyber Tech Projects - Platforms</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		6.969	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		6.969		-		6.969	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		0.750	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.750		-		0.750	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		2.335	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		2.335		-		2.335	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	0.000	10.054	-	10.054	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674541 / <i>Cyber Tech Projects - Platforms</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Platform Development</i></b>	
Cyber Mission Platform Continuous Delivery	
Platform Integration	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674541 / <i>Cyber Tech Projects - Platforms</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Platform Development</i></b>				
Cyber Mission Platform Continuous Delivery	1	2020	4	2024
Platform Integration	1	2020	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>				<b>Project (Number/Name)</b> 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674542: <i>Cyber Tech Projects - Access/Infrastructure</i>	-	0.000	0.000	18.509	0.000	18.509	16.242	15.912	16.970	17.552	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, in order 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 in these three areas that when tied together 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.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Force Distributed Cyber Warfare Operations 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.

- Some aspects of the effort are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6653.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Access	0.000	0.000	18.509
<b>Description:</b> The Access capability provides connectivity and required infrastructure by leveraging industry and other Government/non-Government mission partners' applications and programs.			

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<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, 210-925-6653.</p> <p><b>FY 2019 Plans:</b> N/A</p> <p><b>FY 2020 Plans:</b> - 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.</p> <p>- 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.</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, 210-925-6653.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding decreased due to relative operational priorities between DCWO efforts.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	18.509

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 834320: <i>C3 Countermeasures</i>	0.000	0.000	7.154	-	7.154	6.843	6.207	6.318	18.869	Continuing	Continuing

**Remarks**

**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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674542 / <i>Cyber Tech Projects - Access/Infrastructure</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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		13.386	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		13.386		-		13.386	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		0.760	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.760		-		0.760	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		4.363	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		4.363		-		4.363	Continuing	Continuing	N/A

Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
-	-	0.000	18.509	-	18.509	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Air Force</b>		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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><i>Access Development</i></b>																												
AF Unique Access																												
Next-Gen Offensive Cyber Operations Weapon System																												
DCWO Infrastructure Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208087F / <i>Distributed Cyber Warfare Operations</i>	<b>Project (Number/Name)</b> 674542 / <i>Cyber Tech Projects - Access/Infrastructure</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Access Development</b>				
AF Unique Access	1	2020	4	2024
Next-Gen Offensive Cyber Operations Weapon System	1	2020	4	2024
DCWO Infrastructure Development	1	2020	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / <i>AF Defensive Cyberspace Operations</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	19.628	38.387	16.609	0.000	16.609	16.819	18.754	17.633	15.126	Continuing	Continuing
677820: <i>Computer Security RDTE: Firestarter</i>	-	6.005	21.308	3.264	0.000	3.264	6.536	8.668	7.957	6.915	Continuing	Continuing
677821: <i>Cyberspace Vulnerability Assessment</i>	-	12.140	15.514	11.745	0.000	11.745	8.655	8.425	7.985	6.490	Continuing	Continuing
677822: <i>Cyber Defense Analysis</i>	-	0.256	0.268	0.274	0.000	0.274	0.279	0.285	0.290	0.295	Continuing	Continuing
677823: <i>AFCERT</i>	-	1.227	1.297	1.326	0.000	1.326	1.349	1.376	1.401	1.426	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), 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 24th 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. The FY 2020 funding request was reduced by \$3.16 million to account for the availability of prior year execution balances.

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 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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force Date: February 2019

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
PE 0208088F / *AF Defensive Cyberspace Operations*

weapon system to meet scope and scale of the USCYBERCOM directed Cyber Protection Teams and AF Mission Defense Teams. The FY 2020 funding request was reduced by \$3.773 million to account for the availability of prior year execution balances.

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), Web Risk Assessment (WRA), 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.

AF Computer Emergency Response Team (AFCERT) supports 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) 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / <i>AF Defensive Cyberspace Operations</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	20.964	24.166	23.542	0.000	23.542
Current President's Budget	19.628	38.387	16.609	0.000	16.609
Total Adjustments	-1.336	14.221	-6.933	0.000	-6.933
• Congressional General Reductions	-0.608	-0.779			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	15.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.728	0.000			
• Other Adjustments	0.000	0.000	-6.933	0.000	-6.933

**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 Subtotals for Project: 677820

Congressional Add Totals for all Projects

	<b>FY 2018</b>	<b>FY 2019</b>
	-	7.500
	-	7.500
Congressional Add Subtotals for Project: 677820	-	15.000
Congressional Add Totals for all Projects	-	15.000

**Change Summary Explanation**

The FY 2020 funding request was reduced by \$6.933 million to account for the availability of prior year execution balances.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations				<b>Project (Number/Name)</b> 677820 / Computer Security RDTE: Firestarter			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
677820: Computer Security RDTE: Firestarter	-	6.005	21.308	3.264	0.000	3.264	6.536	8.668	7.957	6.915	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 24th 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Cyber Forensic Tools & Methodologies	1.600	1.500	0.812
<b>Description:</b> 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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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677820 / Computer Security RDTE: Firestarter		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>FY 2019 Plans:</b> - Continue the development, enhancement, and transition of incident response data gathering and attack attribution technologies</p> <p><b>FY 2020 Plans:</b> - Will continue the development, enhancement, and transition of incident response data gathering and attack attribution technologies</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding decreased to account for the availability of prior year execution balances.</p>				
<p><b>Title:</b> Cyber Threat Recognition</p> <p><b>Description:</b> Enhancing cyber platform technology to identify zero-day threats in real time.</p> <p><b>FY 2019 Plans:</b> - Continue to normalize and automate methods and procedures to identify zero day cyber threats prior to system compromise</p> <p><b>FY 2020 Plans:</b> - Will continue to normalize and automate methods and procedures to identify zero day cyber threats prior to system compromise</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding decreased to account for the availability of prior year execution balances.</p>		1.320	1.411	0.626
<p><b>Title:</b> Cyber Threat Attribution &amp; Mitigation</p> <p><b>Description:</b> Includes risk mitigation techniques for wireless networks and systems; active response, dynamic policy enforcement and computer/net attack attribution efforts.</p> <p><b>FY 2019 Plans:</b> - 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><b>FY 2020 Plans:</b> - 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><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - N/A</p>		0.835	0.750	0.700
<p><b>Title:</b> Transition of Cyber and Information Assurance Technologies</p>		2.250	2.647	1.126

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677820 / Computer Security RDTE: Firestarter
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<p><b>Description:</b> 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 &amp; simulation; secure interoperable distributed agent computing, and others that relate to defending the AF networks.</p> <p><b>FY 2019 Plans:</b> - Continue enhancing and transitioning customer funded cyber and IA technology to operational USAF components in accordance with rapid requirements documentation</p> <p><b>FY 2020 Plans:</b> - Will continue enhancing and transitioning customer funded cyber and IA technology to operational USAF components in accordance with rapid requirements documentation</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> - Funding decreased to account for the availability of prior year execution balances.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	6.005	6.308	3.264

	FY 2018	FY 2019
<p><b>Congressional Add:</b> Internet of Things Research</p> <p><b>FY 2019 Plans:</b> - 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><b>Congressional Add:</b> Transportation Research</p> <p><b>FY 2019 Plans:</b> - Craft and execute integrated transportation research and development plan</p> <p>- Perform research, develop basic test configurations, conduct assessments, and complete technical reports on a variety of Air Force transportation methods</p>	-	7.500
<b>Congressional Adds Subtotals</b>	-	15.000

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

N/A

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677820 / Computer Security RDTE: Firestarter
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	3.375	Jan 2018	17.221	Jan 2019	1.710	Jan 2020	-		1.710	Continuing	Continuing	-
Firestarter Integration	C/CPFF	Various : Various	-	1.271	Jan 2018	2.271	Jan 2019	0.638	Jan 2020	-		0.638	Continuing	Continuing	-
<b>Subtotal</b>			-	4.646		19.492		2.348		-		2.348	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.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	1.303	Jan 2018	1.369	Jan 2019	0.691	Jan 2020	-		0.691	Continuing	Continuing	-
<b>Subtotal</b>			-	1.303		1.369		0.691		-		0.691	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.056	Jan 2018	0.447	Jan 2019	0.225	Jan 2020	-		0.225	Continuing	Continuing	-
<b>Subtotal</b>			-	0.056		0.447		0.225		-		0.225	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	6.005	21.308	3.264	-	3.264	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677820 / Computer Security RDTE: Firestarter

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>Firestarter</b>																												
Cyber Forensic Tools & Methodologies	[REDACTED]																											
Cyber Threat Recognition	[REDACTED]																											
Cyber Threat Attribution & Mitigation	[REDACTED]																											
Transition of Cyber/IA Technologies	[REDACTED]																											
Internet of Things Research																												
Transportation Research																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677820 / Computer Security RDTE: Firestarter

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Firestarter</b>				
Cyber Forensic Tools & Methodologies	1	2018	4	2024
Cyber Threat Recognition	1	2018	4	2024
Cyber Threat Attribution & Mitigation	1	2018	4	2024
Transition of Cyber/IA Technologies	1	2018	4	2024
Internet of Things Research	1	2019	2	2020
Transportation Research	1	2019	2	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations				<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
677821: <i>Cyberspace Vulnerability Assessment</i>	-	12.140	15.514	11.745	0.000	11.745	8.655	8.425	7.985	6.490	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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Cyber Threat Mitigation	2.200	0.900	0.800
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b> - Continue development of technologies to conduct vulnerability assessments, network intrusion analysis and systems vulnerability analysis			
<b>FY 2020 Plans:</b> - Will continue development of technologies to conduct vulnerability assessments, network intrusion analysis and systems vulnerability analysis			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
N/A				
<p><b>Title:</b> Defensive Next Generation Development</p> <p><b>Description:</b> Development 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.</p> <p><b>FY 2019 Plans:</b> - Continue development to support modernization of DCO capabilities and technologies to support Cyber Protection Teams and Mission Defense Teams</p> <p><b>FY 2020 Plans:</b> - Will continue development to support modernization of DCO capabilities and technologies to support Cyber Protection Teams and Mission Defense Teams</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decrease due to the availability of prior year execution balances.</p>		8.940	13.614	9.945
<p><b>Title:</b> Test &amp; Evaluation</p> <p>Description: Test and Evaluation</p> <p><b>Description:</b> Test and Evaluation provides both developmental testing of new development capabilities and a network environment for testing.</p> <p><b>FY 2019 Plans:</b> - Continued developmental testing for of DCO capability products and technologies prior to fielding</p> <p><b>FY 2020 Plans:</b> - Will continue developmental testing for DCO capability products and technologies prior to fielding</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A</p>		1.000	1.000	1.000
<b>Accomplishments/Planned Programs Subtotals</b>		12.140	15.514	11.745

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• OPAF 03 Line Item 831010: COMSEC Equipment	16.792	26.813	20.629	-	20.629	30.422	41.456	38.893	39.019	Continuing	Continuing

**Remarks**

**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).

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment
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<b>Product Development (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Cyber Threat Mitigation - Mission Oriented Mapping	C/CPFF	Various : Various	-	0.800	Jan 2018	0.900	Jan 2019	0.800	Jan 2020	-		0.800	Continuing	Continuing	-
Defensive Next Gen - Data & Analysis	C/CPFF	Various : Various	-	1.035	Mar 2018	1.950	Mar 2019	0.850	Mar 2020	-		0.850	Continuing	Continuing	-
Defensive Next Gen - Training Simulator	C/FFP	Various : Various	-	5.082	Apr 2018	7.058	Apr 2019	6.000	Apr 2020	-		6.000	Continuing	Continuing	-
Defensive Next Gen - Sensor Optimization	C/FFP	Various : Various	-	1.133	Mar 2018	1.650	Mar 2019	-		-		-	Continuing	Continuing	-
Defensive Next Gen - Data Collection and Correlation	C/FFP	Various : Various	-	1.226	Mar 2018	1.092	Mar 2019	1.231	Mar 2020	-		1.231	Continuing	Continuing	-
Defensive Next Gen - Cloudshield Capabilities	C/FFP	Various : Various	-	0.690	Aug 2018	0.690	Aug 2019	0.690	Aug 2020	-		0.690	Continuing	Continuing	-
<b>Subtotal</b>			-	9.966		13.340		9.571		-		9.571	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Test Support	MIPR	46 Test Squadron : Eglin, FL	-	1.000	Oct 2017	1.000	Oct 2018	1.000	Oct 2019	-		1.000	Continuing	Continuing	-
<b>Subtotal</b>			-	1.000		1.000		1.000		-		1.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
PMA - Engineering & Technical Assistance Support Services (ETASS & FFRDC)	Various	AFLCMC/PZ : Bedford, MA	-	1.174	Jan 2018	1.174	Jan 2019	1.174	Jan 2020	-		1.174	Continuing	Continuing	-
<b>Subtotal</b>			-	1.174		1.174		1.174		-		1.174	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Cyber Vulnerability Assessment</b>	
Test and Evaluation	[REDACTED]
Cyber Threat Mitigation	[REDACTED]
Defensive Next Generation Development (Data & Analysis)	[REDACTED]
Defensive Next Generation (Data Collection and Correlation)	[REDACTED]
Defensive Next Generation Sensor Optimization	[REDACTED]
Defensive Next Generation (Training Simulator)	[REDACTED]
Defensive Next Generation (Cloudshield Capabilities)	[REDACTED]

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677821 / Cyberspace Vulnerability Assessment

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Cyber Vulnerability Assessment</b>				
Test and Evaluation	2	2018	4	2024
Cyber Threat Mitigation	1	2018	4	2024
Defensive Next Generation Development (Data & Analysis)	2	2018	4	2024
Defensive Next Generation (Data Collection and Correlation)	2	2018	4	2024
Defensive Next Generation Sensor Optimization	2	2018	4	2024
Defensive Next Generation (Training Simulator)	3	2018	4	2024
Defensive Next Generation (Cloudshield Capabilities)	4	2018	4	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677822 / Cyber Defense Analysis
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
677822: <i>Cyber Defense Analysis</i>	-	0.256	0.268	0.274	0.000	0.274	0.279	0.285	0.290	0.295	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Cyberspace Defense Analysis (CDA) monitors and reports telecommunications that include 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, E-Mail Communications, Internet-based Capabilities, 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 information protection realm and helps ensure our adversaries are not provided early warning of our plans, capabilities, or limitations through malicious, intentional, and/or inadvertent compromises of information.

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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

	FY 2018	FY 2019	FY 2020
<b>Title:</b> Cyber Defense Analysis	0.256	0.268	0.274
<b>Description:</b> Engineering support to conduct Cyber Defense Analysis (CDA) assessment of non-secure telecommunications during peace time and contingency operations.			
<b>FY 2019 Plans:</b> - 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 our networks			
<b>FY 2020 Plans:</b> - Will 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			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	0.256	0.268	0.274

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677822 / Cyber Defense Analysis

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• OPAF 03 Line Item 831010: COMSEC Equipment	13.125	1.259	1.698	-	1.698	1.702	10.498	10.685	10.878	Continuing	Continuing

**Remarks**

**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.

**E. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677822 / Cyber Defense Analysis
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<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	0.256	Jan 2018	0.268	Jan 2019	0.274	Jan 2020	-		0.274	Continuing	Continuing	-
<b>Subtotal</b>			-	0.256		0.268		0.274		-		0.274	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	0.256	0.268	0.274	-	0.274	Continuing	Continuing	N/A

**Remarks**

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677822 / Cyber Defense Analysis

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Cyber Defense Analysis</b>	
Cyber Defense Analysis (FFRDC)	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677822 / Cyber Defense Analysis

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Cyber Defense Analysis</b>				
Cyber Defense Analysis (FFRDC)	1	2018	4	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677823 / AFCERT
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
677823: AFCERT	-	1.227	1.297	1.326	0.000	1.326	1.349	1.376	1.401	1.426	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

AF Computer Emergency Response Team (AFCERT) supports the AF Cyberspace Defense (ACD) weapons 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) 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 AF Cyber Defensive 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 2018	FY 2019	FY 2020
<b>Title:</b> Cyberspace Defense Development	1.227	1.297	1.326
<b>Description:</b> Air Force Computer Emergency Response Team (AFCERT) prevention, detection, and response to adversarial penetration into AF unclassified and classified networks.			
<b>FY 2019 Plans:</b> - Develop and test technologies for the AF Cyberspace Defensive (ACD) weapon system to prevent, detect, and respond adversarial penetration in AF networks			
<b>FY 2020 Plans:</b> - 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			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	1.227	1.297	1.326

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677823 / AFCERT
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 835080: AFNET	30.914	30.044	16.883	-	16.883	23.895	33.325	33.391	34.528	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The AF Cyberspace Defense (ACD) weapons 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.

**E. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677823 / AFCERT

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Integrated Cyber Aggregation Tool</i></b>	
Cyberspace Defense Development	
Test and Evaluation	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208088F / AF Defensive Cyberspace Operations	<b>Project (Number/Name)</b> 677823 / AFCERT

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Integrated Cyber Aggregation Tool</i></b>				
Cyberspace Defense Development	2	2018	4	2024
Test and Evaluation	3	2018	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	13.000	11.603	0.000	11.603	11.602	12.564	12.702	12.840	Continuing	Continuing
676045: <i>Foundational Efforts</i>	-	0.000	13.000	11.603	0.000	11.603	11.602	12.564	12.702	12.840	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 establish 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.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208097F <i>I Joint Cyber Command and Control (JCC2)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	13.000	0.000	0.000	0.000
Current President's Budget	0.000	13.000	11.603	0.000	11.603
Total Adjustments	0.000	0.000	11.603	0.000	11.603
• 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	11.603	0.000	11.603

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208097F / Joint Cyber Command and Control (JCC2)	<b>Project (Number/Name)</b> 676045 / Foundational Efforts
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
676045: Foundational Efforts	-	0.000	13.000	11.603	0.000	11.603	11.602	12.564	12.702	12.840	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 establish 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 2018	FY 2019	FY 2020
<b>Title:</b> Foundational Efforts	0.000	13.000	11.603
<b>Description:</b> 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.			
<b>FY 2019 Plans:</b>			
- Develop pilot tools to automate the sharing of cyber threat data at CCMDs			
- Evaluate capabilities for data sharing of cyber threat			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>	<b>Project (Number/Name)</b> 676045 / <i>Foundational Efforts</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Begin agile acquisition activities to support DevOps tempo</li> <li>- Stand up program office</li> <li>- Execute of acquisition activities and development of requisite documentation</li> </ul> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will develop capabilities and initiate the Cyber Tasking Order used in CMF to conduct cyber operations</li> <li>- Will expand program office to support JCC2 requirements development packages</li> <li>- Will build-up DevOps teams for continued piloting at CCMDs</li> <li>- Will stand up development environment, i.e., hosting services, infrastructure</li> <li>- Will integrate optimal Situational Awareness (SA) capabilities to integrate automated threat information sharing and collaboration</li> </ul> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding decreased due to reduced deployment of development activities at CCMDs.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		0.000	13.000	11.603
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
<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 is currently researching the option to leverage the FY16 National Defense Authorization Act (NDAA) Section 804 or other streamlined approaches to agile acquisition. 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 stakeholder 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.</p>				
<b>E. Performance Metrics</b>				
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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208097F / Joint Cyber Command and Control (JCC2)	<b>Project (Number/Name)</b> 676045 / Foundational Efforts
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	-		3.600	Mar 2019	-		-		-	Continuing	Continuing	-
JCC2 Agile Capability Development	Various	Multiple : Multiple	-	-		5.500	Mar 2019	9.715	Jan 2020	-		9.715	Continuing	Continuing	-
<b>Subtotal</b>			-	-		9.100		9.715		-		9.715	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-		1.888	Continuing	Continuing	-
<b>Subtotal</b>			-	-		3.900		1.888		-		1.888	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	13.000	11.603	-	11.603	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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>	<b>Project (Number/Name)</b> 676045 / <i>Foundational Efforts</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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>Foundational Events</b>																												
Transition USCC pilot systems to USAF																												
JCC2 CI/CD Infrastructure																												
JCC2 Agile Capability Development																												
JCC2 Acquisition Support																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208097F / <i>Joint Cyber Command and Control (JCC2)</i>	<b>Project (Number/Name)</b> 676045 / <i>Foundational Efforts</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Foundational Events</b>				
Transition USCC pilot systems to USAF	1	2019	1	2020
JCC2 CI/CD Infrastructure	1	2019	4	2024
JCC2 Agile Capability Development	2	2019	4	2024
JCC2 Acquisition Support	1	2019	4	2024

**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 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	26.559	84.702	0.000	84.702	98.701	114.713	114.721	125.436	Continuing	Continuing
672281: <i>Foundational Efforts</i>	-	0.000	26.559	84.702	0.000	84.702	98.701	114.713	114.721	125.436	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. 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

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 2018 Air Force penalty total is \$14.373M. 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.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	28.759	29.702	0.000	29.702
Current President's Budget	0.000	26.559	84.702	0.000	84.702
Total Adjustments	0.000	-2.200	55.000	0.000	55.000
• Congressional General Reductions	0.000	-2.200			
• 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	55.000	0.000	55.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
<b>Title:</b> Foundational Efforts	0.000	26.559	84.702	0.000	84.702
<b>Description:</b> 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.					
Unified Platform requirements are developed within the government-lead Unified Platform Continuous Integration/Continuous Deployment DevSecOps pipeline. 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.					
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					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>program management to ensure that agile acquisition development planning and frequent customer engagement is accomplished.</p> <p><b>FY 2019 Plans:</b></p> <ul style="list-style-type: none"> <li>- Deliver capability through an agile development model consisting of epics and incremental/limited deployments supporting a cadence based development process and on-demand delivery schedule.</li> <li>- Develop and deliver capability by leveraging/integrating prototyping activities from the Services and U.S. Cyber Command.</li> <li>- Establish Distributed Common Development/Integration and Staging environments allowing for collaborative capability development.</li> <li>- Some aspects of the effort are classified and will be provided on a need-to-know basis.</li> </ul> <p><b>FY 2020 Base Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue to deliver capability through an agile development model consisting of epics and incremental/limited supporting a cadence based development process and on-demand delivery schedule.</li> <li>- Will continue to develop and deliver capability by leveraging prototyping activities from the Services and U.S. Cyber Command.</li> <li>- Will maintain Distributed Common Development/Integration and Staging environments allowing for collaborative capability development.</li> <li>- Some aspects of the effort are classified and will be provided on a need-to-know basis.</li> </ul> <p><b>FY 2020 OCO Plans:</b> N/A</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funding increased due to additional warfighter capability requirements required of the Unified Platform baseline.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	26.559	84.702	0.000	84.702

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

**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)*

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RDTE 04 0208099F: <i>Unified Platform (UP)</i>	0.000	29.800	10.000	-	10.000	6.000	0.000	0.000	0.000	0.000	45.800
• OPAF 03 835080: <i>AFNET</i>	-	-	4.963	-	4.963	4.964	4.962	4.961	5.050	Continuing	Continuing

**Remarks**

**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 capability implements a scaled agile development framework (SAFe) to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The Unified Platform program executes 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 Unified Platform governance structure.

The initial Unified Platform capability will deliver 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 and a new 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 Unified Platform. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA); they require 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-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
PE 0208099F / *Unified Platform (UP)*

**F. 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 2020 Air Force** **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 672281 / <i>Foundational Efforts</i>
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<b>Product Development (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	18.264	Oct 2019	-		18.264	Continuing	Continuing	18.264
Agile Capability Development	TBD	TBD : TBD	-	-		-		44.838	Oct 2019	-		44.838	Continuing	Continuing	44.838
Distributed Common Development/Integration Environment	TBD	TBD : TBD	-	-		1.400	Feb 2019	1.400	Feb 2020	-		1.400	Continuing	Continuing	1.400
Distributed Common Staging Environment	TBD	TBD : TBD	-	-		2.800	Feb 2019	2.800	Feb 2020	-		2.800	Continuing	Continuing	2.800
<b>Subtotal</b>			-	-		11.559		67.302		-		67.302	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	TBD	TBD : TBD	-	-		1.000	Jan 2019	2.100	Jan 2020	-		2.100	Continuing	Continuing	2.100
<b>Subtotal</b>			-	-		1.000		2.100		-		2.100	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 : Various	-	-		10.100	Dec 2018	11.100	Dec 2019	-		11.100	Continuing	Continuing	11.100
Acquisition Support	Various	Various : Various	-	-		3.000	Dec 2018	3.300	Dec 2019	-		3.300	Continuing	Continuing	3.300
Program Mgmt Office Overhead Costs	Various	Various : Various	-	-		0.900	Dec 2018	0.900	Dec 2019	-		0.900	Continuing	Continuing	0.900
<b>Subtotal</b>			-	-		14.000		15.300		-		15.300	Continuing	Continuing	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	26.559	84.702	-	84.702	Continuing	Continuing	N/A



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**Exhibit R-4, RDT&E Schedule Profile:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 672281 / <i>Foundational Efforts</i>
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FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Foundational Efforts</i></b>	
UP System Technical Coordination	
UP Agile Capability Development	
Distributed Common Development/Integration Environment	
Distributed Common Staging Environment	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 672281 / <i>Foundational Efforts</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Foundational Efforts</i></b>				
UP System Technical Coordination	1	2019	4	2024
UP Agile Capability Development	1	2020	4	2024
Distributed Common Development/Integration Environment	2	2019	4	2024
Distributed Common Staging Environment	2	2019	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Air Force **Date:** February 2019

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208288F / <i>Intel Data Applications</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	1.200	0.000	1.200	1.200	1.224	1.139	1.068	0.967	0.000	6.798
67A051: <i>Space Superiority - Advanced Intelligence Systems</i>	-	0.000	1.200	0.000	1.200	1.200	1.224	1.139	1.068	0.967	0.000	6.798
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.

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 2018 Air Force penalty total is \$14.373M. 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>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	0.000	1.200	0.000	0.000	0.000
Current President's Budget	0.000	1.200	0.000	1.200	1.200
Total Adjustments	0.000	0.000	0.000	1.200	1.200
• 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	1.200	1.200

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Title:</b> Radar Dynamic Cueing	0.000	1.200	0.000	1.200	1.200

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force	<b>Date:</b> February 2019
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208288F / <i>Intel Data Applications</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><b>Description:</b> Develop algorithm to dynamically cue radar assets to increase collection capability and data relevance.</p> <p><b>FY 2019 Plans:</b> Utilize multiple data sources/cues to dynamically target the radar in response to high priority Red Force events of interest.</p> <p><b>FY 2020 Base Plans:</b> N/A</p> <p><b>FY 2020 OCO Plans:</b> Utilize multiple data sources/cues to dynamically target the radar in response to high priority Red Force events of interest.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 effort will be Overseas Contingency Operations.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	1.200	0.000	1.200	1.200

**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).

**F. 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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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208288F / <i>Intel Data Applications</i>	<b>Project (Number/Name)</b> 67A051 / <i>Space Superiority - Advanced Intelligence Systems</i>

FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
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><i>Radar Dynamic Cueing</i></b>	
Algorithm Development	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force		<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208288F / <i>Intel Data Applications</i>	<b>Project (Number/Name)</b> 67A051 / <i>Space Superiority - Advanced Intelligence Systems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Radar Dynamic Cueing</i></b>				
Algorithm Development	3	2019	4	2024

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