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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons							
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	3,674.494	224.550	387.564	610.942	0.000	610.942	514.005	500.028	664.530	476.668	Continuing	Continuing
674785: F-22	3,671.531	172.848	286.270	413.149	0.000	413.149	315.587	423.296	485.152	476.668	Continuing	Continuing
674788: F-22 Tactical Mandates	2.963	51.702	101.294	197.793	0.000	197.793	198.418	76.732	179.378	0.000	0.000	808.280

Note

In FY 2013, a separate Program Element (0605213F) was created for Increment 3.2B. All Increment 3.2B efforts and associated funding prior to FY2013 are included in the F-22A Squadrons (0207138F) budget documentation.

In FY 2015, a separate Project (Budget Program Activity Code [BPAC] 674788) was created for F-22 Tactical Mandates, formerly known as F-22 Mandates.

In FY 2017 HMDCS was a new start

In FY 2017 GPS military code was a new start

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 25+ years. The F-22 is the only operational multi-mission fighter aircraft that combines stealth, supercruise, maneuverability and integrated avionics to make it the world's most capable combat aircraft. The Engineering and Manufacturing Development (EMD) phase of F-22 acquisition is complete. The program is now continuing pre-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, electronic warfare (EW), and Intelligence Surveillance Reconnaissance (ISR) capabilities.

The FY 2018 funding request increased by \$187.937 million as compared to the FY 2017 funding request. This request includes a \$95M RMD for the TacLink 16 and Advanced Technology Development, in support of early Sensor Enhancement work. The FY 2018 President's Budget included \$50M increase in PE 0207138F for Laboratory Test and Operations (LTO) work associated with technology refresh. Additionally, there was a \$28M increase as TacMan continues its development work and \$14M to support ongoing F-22 Small Projects.

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

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

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Appropriation/Budget Activity		R-1 Program Element (Number/Name)			
3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development		PE 0207138F I F-22A Squadrons			
B. Program Change Summary (\$ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	231.599	387.564	423.005	0.000	423.005
Current President's Budget	224.550	387.564	610.942	0.000	610.942
Total Adjustments	-7.049	0.000	187.937	0.000	187.937
• 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	-7.049	0.000			
• Other Adjustments	0.000	0.000	187.937	0.000	187.937
Change Summary Explanation					
2018: The increase of \$187.937M includes a \$95M increase for the TacLink 16 program and Advanced Technology Development, for Sensor Enhancement work. Additionally, the FY 2018 President's Budget includes \$50M in PE 0207138F for Laboratory Test and Operations (LTO) work associated with technology refresh.					

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674785 / F-22			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
674785: F-22	3,671.531	172.848	286.270	413.149	0.000	413.149	315.587	423.296	485.152	476.668	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 07 PE 0207138F, project 674785, F-22 Sensor Enhancements will be a new start in FY 2019.

In FY 2013, a separate Program Element, 0605213F, was created for Increment 3.2B upon designation as an ACAT I program. All Increment 3.2B efforts and associated funding prior to FY 2013 are included in the F-22A Squadrons, 0207138F, budget documentation.

In FY 2015, a separate Budget Project Activity Code (BPAC 674788) was created for F-22 Tactical Mandates, formerly known as F-22 Mandates.

F-22 development and production are complete. The remaining program consists of F-22 Operational Flight Program (OFP) updates, capability enhancements, and mandates necessary to sustain F-22 weapon system survivability, lethality and availability. The "Continuing" Cost to Complete and Total Cost reflect these initiatives.

A. Mission Description and Budget Item Justification

The F-22 Raptor represents the USAF's priority placed on providing the Joint Force with air dominance, operational access, and homeland & cruise missile defense for the next 25+ years. The F-22 is a multi-mission fighter aircraft that combines stealth, supercruise, advanced maneuverability and integrated avionics to make it the world's most capable combat aircraft. While F-22 Engineering and Manufacturing Development (EMD) and aircraft production completed May 2012, funding for F-22 modernization is "continuing" beyond the FYDP.

This program funds all non-MDAP development efforts for the F-22. The program is now continuing the pre-planned and evolutionary modernization effort through incremental development phases that enhance the F-22 anti-access/area denial, Air Superiority and Global Strike capabilities. The development program modernizes and upgrades the air vehicle, engine, avionics, and training systems to improve/enhance F-22 weapons, communications, EW, and ISR capabilities.

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

	FY 2016	FY 2017	FY 2018
Title: Increment 3.2A	0.427	0.104	0.000
Description: The F-22 Increment 3.2A Modernization Program is software development to improve Electronic Protection, Combat Identification and Link 16 interoperability.			
FY 2016 Accomplishments: Continued Increment 3.2A implementation.			
FY 2017 Plans:			

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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017
Increment 3.2A implementation is complete.			
FY 2018 Plans: N/A			
Title: Update 6 Interoperability Description: 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. FY 2016 Accomplishments: Contract was awarded for remaining OFP content development. Update 6 Interoperability began design, code, and test for IFDL/Link 16 interoperability and TSV modernization. Continued integration and test of crypto modernization. FY 2017 Plans: Update 6 Interoperability continuing code/system test, and began formal Development Test for IFDL/Link 16 interoperability and TSV modernization. Continuing integration and test of crypto modernization. Completed Preliminary Design Review (PDR) and Milestone B. FY 2018 Plans: Update 6 Interoperability continues code/system test, and continues formal development test for IFDL/Link 16 interoperability and TSV modernization. Continued integration and test of crypto modernization.		43.190	56.700
Title: Software Support Description: Software support develops, tests and fields new capabilities and capability enhancements for training devices and Integrated Maintenance Information System (IMIS) software in order to maintain concurrency with aircraft configuration and capability. Software Support includes Pilot Training Systems (PTS) and IMIS software development to include Integrated Maintenance Data System (IMDS) and Reliability and Maintainability Information System (REMIS) interface development. FY 2016 Accomplishments: Implemented Advanced Diagnostic Interface Tool (ADIT) and Multiplex Bus Fault Isolation (MBFI) capability within IMIS. FY 2017 Plans:		1.015	0.000
			48.530
			3.400

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Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons		Project (Number/Name) 674785 / F-22	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
N/A					
FY 2018 Plans: Modify and field four Man in the Loop (MITL) stations at the Nellis AFB, Virtual Warfare Center, ensuring F-22 capability and concurrency with the F-22 weapon system.					
Title: Advanced Technology Development (ATD) Description: Technology maturation, risk reduction, studies, and demonstrations of classified F-22 development efforts.			20.676	66.466	126.400
FY 2016 Accomplishments: Completed technology maturation and risk reduction projects in support of various classified F-22 development efforts.					
FY 2017 Plans: Continuing technology maturation and risk reduction projects in support of various classified F-22 development efforts. During FY 2017, ATD will begin providing technology maturation and acquisition planning in support of the F-22 Sensor Enhancements Program.					
FY 2018 Plans: 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.					
Title: System Engineering/Program Management Support Description: Provides F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.			7.710	8.500	9.470
FY 2016 Accomplishments: Provided F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.					
FY 2017 Plans: Providing F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.					
FY 2018 Plans: Provide F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.					
Title: Reliability and Maintainability Maturation Program (RAMMP)			0.700	0.700	2.500

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
<p>Description: The RAMMP Program provides for solution identification and integration of upgrades to improve reliability, availability and maintainability (RAM) for the F-22 combined test fleet, located at Edwards AFB. The associated RAMMP effort develops candidate RAMMP initiatives which are down-selected for implementation based on their development maturity, reduction to Mean Time Between Failure (MTBF), Mean Time to Repair (MTTR), impacts to the safety of the pilot or aircraft and the return on investment (ROI) as associated with the total F-22 life cycle costs. The RAMMP program includes modifications to address corrosion, and urgent response requirements for the aircraft such as Automatic Back-Up Oxygen System (ABOS).</p> <p>FY 2016 Accomplishments: Completed 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.</p> <p>FY 2017 Plans: Continuing 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.</p> <p>FY 2018 Plans: 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. In FY 2018, the F-22 program will add an additional operational test aircraft to the combined test fleet, by bringing an aircraft out of flyable storage.</p>					
<p>Title: F-22 Small Projects</p> <p>Description: 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.</p> <p>FY 2016 Accomplishments: Continued F-22 technology studies and demonstrations for DT Weapon Assets, Threat Modeling Support, Test Support, Test Aircraft Modifications, continue Common Range Integrated Instrumentation System Implementation (CRIIS) Network development effort, PT, Dynamic SAR, Flutter Excitation System (FES), GFE, and continue acquisition planning for EW enhancements.</p> <p>FY 2017 Plans: 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.</p> <p>FY 2018 Plans:</p>			19.500	24.100	30.380

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017
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.			
Title: Combined Test Force (CTF) Description: 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. FY 2016 Accomplishments: Conducted flight testing at Air Force Flight Test Center (AFFTC). The significant programs undergoing flight test at AFFTC included: Increment 3.2B, F-22 Tactical Mandates planning, Update 6, CRIIS, and Low Drag Pylons. FY 2017 Plans: Continued flight testing at AFFTC and required technology refresh. Significant flight test programs at AFFTC included Increment 3.2B, Seek Eagle, and Low Drag Pylons. Also accomplished flight test planning for the following upcoming programs: F-22 Tactical Mandates, TACLink 16, Update 6, Sensor Enhancements, Advanced Technology Development (ATD), Flutter Excitation System (FES), and Common Range Integrated Instrumentation System (CRIIS). FY 2018 Plans: Significant programs scheduled for flight test at AFFTC include: Update 6, refueling certifications, Sensor Enhancements, ATD, FES, and CRIIS. In FY 2018, the F-22 program will add an additional operational test aircraft to the fleet by bringing an aircraft out of flyable storage.		46.100	48.500
Title: Laboratory Test & Operations (LTO) Description: The LTO is a continuous activity that plans and conducts development, integration, test, & verification (IT&V) 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; Vehicle Integration Facility (VIF); and the Vehicle System Simulator (VSS). Through the ACS, LTO provides the combat air forces with advanced mission-level test and training capability via a fully representative virtual simulation. FY 2016 Accomplishments: Increased lab availability in support of F-22 programs. Updated critical systems as required to support new aircraft configurations and capabilities. Accomplished OFP verification and risk reduction. Supported pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test & Evaluation Center test planning; and test event rehearsals. Supported periodic Air		33.530	53.200
			129.859

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
Force Wargaming Center (AFWC) operational mission data updates. The significant programs that executed in lab tests were Increment 3.2B, F-22 TACLink 16, F-22 Tactical Mandates, Update 6, Advanced Technologies and AFWC mission data loads. FY 2017 Plans: Maintaining lab availability in support of F-22 programs. Updating critical systems to include tech refresh, as required to support new aircraft configurations and capabilities. Accomplished OFP verification and risk reduction. Supported pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test & Evaluation Center test planning; and test event rehearsals. Supported periodic AFWC operational mission data updates. The significant programs that executed in lab tests were Increment 3.2B, F-22 TACLink 16, F-22 Tactical Mandates, Update 6, Advanced Technologies and AFWC mission data loads. FY 2018 Plans: 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 & Evaluation Center test planning; and test event rehearsals. Support periodic AFWC operational mission data updates. The significant programs planned for lab test are F-22 TacLink 16, F-22 Tactical Mandates, Update 6, Advanced Technologies and AFWC mission data loads.					
Title: Helmet Mounted Display and Cueing System (HMDCS) Description: The HMDCS program will select, integrate, test and field a mature HMDCS to take full advantage of advanced weapons such as the AIM-9X, and improved battlespace situational awareness during day/night within-visual-range engagements. The HMDCS will be integrated on all Block 30/35 Raptors. FY 2016 Accomplishments: N/A FY 2017 Plans: Conduct studies, analysis and acquisition planning for the HMDCS. FY 2018 Plans: Continue studies, analysis and acquisition program planning. Release request for proposal.			0.000	3.500	4.810
Title: F-22 Global Positioning System (GPS) Military Code (M-Code) Description: The F-22 GPS M-Code program consists of the software and hardware development, test and fielding necessary to ensure the F-22's ability to maintain Precision, Navigation and Timing (PNT) capabilities in GPS degraded environments. This effort will include the integration of Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M) onto the F-22 for M-Code, replacement of the current GPS antenna with a Controlled Radiation Pattern Antenna (CRPA), as well as other capabilities, to prevent exploitation of the weapon system by adversaries and provide assured PNT.			0.000	24.500	3.200

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Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674785 / F-22				
B. Accomplishments/Planned Programs (\$ in Millions)										FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: Not applicable.												
FY 2017 Plans: F-22 GPS M-Code development activities support hardware design and evelopment of the CRPA and integration of the Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M), and begin design, code and software integration testing for the F-22 platform interface. Release pre-EMD request for proposal.												
FY 2018 Plans: Continue hardware design and development of the CRPA and integration of the Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M), and continue design, code and software integration testing for the F-22 platform interface.												
Accomplishments/Planned Programs Subtotals										172.848	286.270	413.149
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost	
• APAF: BA05: Line Item # F02200: F-22A Squadrons, PE 0207138F*	111.077	163.008	176.630	0.000	176.630	257.891	257.310	2,347.665	457.265	Continuing	Continuing	
• RDT&E: BA07: PE 0605213F: Increment 3.2B, RDT&E**	115.603	70.290	13.600	0.000	13.600	0.000	0.000	0.000	0.000	0.000	562.070	
• APAF: BA05: Line Item # F2232B: F-22 Increment 3.2B, PE 0207138F***	64.325	78.410	105.756	0.000	105.756	13.081	20.373	6.013	0.000	0.000	316.458	
• MILCON: PE 0207138F: MILCON	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	24.900	
• RDT&E: BA07: PE 0207163F: AIM-120D, AMRAAM, RDT&E****	5.820	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	50.450	
• RDT&E: BA07: PE 0207138F: F-22 Tactical Mandates	51.702	101.294	197.793	0.000	197.793	198.418	76.732	179.378	0.000	0.000	808.280	
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.												

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>	Project (Number/Name) 674785 / <i>F-22</i>	

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

<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
**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.											
****AIM-120D, AMRAAM RDT&E/PE 0207163F, funding provides for the AIM-120 development as a part of the F-22 Increment 3.2B effort.											

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.

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: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674785 / F-22					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Increment 3.2A	SS/CPIF	Lockheed Martin : Fort Worth, TX	398.495	0.427		0.104		0.000		0.000		0.000	0.000	399.026	-
Update 6 Interoperability	SS/ Various	Lockheed Martin : Fort Worth, TX	46.026	43.190	Feb 2016	56.700	Mar 2017	54.990		0.000		54.990	3.850	204.756	-
Software Support	SS/ Various	Lockheed Martin : Fort Worth, TX	290.504	1.015	Nov 2015	0.000		0.000		0.000		0.000	0.000	291.519	-
Advanced Technology Development	Various	Various : Various	97.182	20.676	Feb 2016	66.466	Dec 2016	141.949	Nov 2017	0.000		141.949	Continuing	Continuing	-
Sensor Enhancements	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	0.000		0.000		0.000		0.000		0.000	809.080	809.080	-
System Engineering / Program Management	SS/CPFF	Lockheed Martin : Fort Worth, TX	210.322	7.710	Mar 2016	8.500	Jan 2017	9.470	Jan 2018	0.000		9.470	Continuing	Continuing	-
RAMMP	SS/CPFF	Lockheed Martin : Fort Worth, TX	168.511	0.700	Dec 2015	0.700	Dec 2016	0.700	Dec 2017	0.000		0.700	Continuing	Continuing	-
F-22 Small Projects	Various	Various : Various	554.710	19.500	Nov 2015	24.100	Nov 2016	38.730	Dec 2017	0.000		38.730	Continuing	Continuing	-
HMDCS	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	0.000		3.500	Jul 2017	4.810	Jul 2018	0.000		4.810	27.419	35.729	-
Global Positioning System (GPS) M-Code	SS/CPIF	Lockheed Martin : Fort Worth, TX	0.000	0.000		24.500	Sep 2017	3.200	Aug 2018	0.000		3.200	0.000	27.700	-
Subtotal			1,765.750	93.218		184.570		253.849		0.000		253.849	-	-	-
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Combined Test Force	Various	Various : Various	827.360	46.100	Nov 2015	48.500	Nov 2016	54.600	Nov 2017	0.000		54.600	Continuing	Continuing	-

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Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Laboratory Test & Operations (LTO)	SS/ Various	Lockheed Martin : Ft Worth, TX	659.489	33.530	Nov 2015	53.200	Nov 2016	104.700	Nov 2017	0.000		104.700	Continuing	Continuing	-
Subtotal			1,486.849	79.630		101.700		159.300		0.000		159.300	-	-	-
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Mission Support	Various	Various : TBD	418.932	0.000		0.000		0.000		0.000		0.000	0.000	418.932	-
Subtotal			418.932	0.000		0.000		0.000		0.000		0.000	0.000	418.932	-
			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			3,671.531	172.848		286.270		413.149		0.000		413.149	-	-	-
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force **Date:** May 2017

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674785 / F-22
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	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	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
Update 5 Fleet Release Block 20	■																											
Update 5 Fleet Release Block 30/35	■																											
Update 6 Interoperability Requirements Analysis/Design	■	■	■	■	■	■	■	■																				
Update 6 Interoperability Development, Integration, & Test	■	■	■	■	■	■	■	■	■	■	■	■																
Update 6 Interoperability Preliminary Design Review (PDR)							■																					
Update 6 Interoperability Milestone B							■																					
Update 6 Interoperability Critical Design Review (CDR)											■																	
Update 6 Interoperability Flight Test											■	■	■	■														
Update 6 Interoperability Deployment Decision Review															■													
Update 6 Interoperability Full Deployment Decision (Fleet Release)																■												
Advanced Technology Development Demonstrations	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Advanced Technology Development Studies & Analysis	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
HMDCS Development, Integration and Test													■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
GPS M-Code Development, Integration, and Test													■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>	Project (Number/Name) 674785 / <i>F-22</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Update 5 Fleet Release Block 20	1	2016	1	2016
Update 5 Fleet Release Block 30/35	1	2016	1	2016
Update 6 Interoperability Requirements Analysis/Design	1	2016	2	2017
Update 6 Interoperability Development, Integration, & Test	1	2016	4	2018
Update 6 Interoperability Preliminary Design Review (PDR)	2	2017	2	2017
Update 6 Interoperability Milestone B	2	2017	2	2017
Update 6 Interoperability Critical Design Review (CDR)	3	2018	3	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)	4	2019	4	2019
Advanced Technology Development Demonstrations	1	2016	4	2021
Advanced Technology Development Studies & Analysis	1	2016	4	2021
HMDCS Development, Integration and Test	4	2018	4	2022
GPS M-Code Development, Integration, and Test	4	2017	1	2021

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674788 / F-22 Tactical Mandates			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
674788: F-22 Tactical Mandates	2.963	51.702	101.294	197.793	0.000	197.793	198.418	76.732	179.378	0.000	0.000	808.280
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2015, a separate Budget Program Activity Code (BPAC 674788) within Program Element (PE) 0207138F was created for F-22 Tactical Mandates. Under this BPAC, the F-22 TACLink 16 and F-22 Tactical Mandates (TACMan) programs are managed.

A. Mission Description and Budget Item Justification

The F-22 TACLink 16 and F-22 Tactical Mandates programs are follow-on modernization efforts to Increment 3.2B and Update 6. The programs will provide Open Systems Architecture (OSA), Link 16 Transmit and Mode 5 Identification Friend or Foe (IFF) Transpond/Interrogate on the F-22 Block 30/35 combat coded F-22 fleet.

In FY 2017 the budget began to reflect the TACLink 16 program. The F-22 recognized a valuable opportunity to field OSA and Link 16 Transmit earlier than originally planned under the F-22 Tactical Mandates. The Link 16 Transmit 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. The TACLink 16 program accelerates the installation of this key data link capability. Additionally, the TACLink 16 will enable future life cycle savings opportunities for the F-22 and provide risk reduction effort for the F-22 Tactical Mandates program.

The F-22 Tactical Mandates program will field Mode 5 IFF on the TACLink 16 baseline. 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 over the F-22's legacy Mode 4 capability. This update is particularly critical given Mode 4 functionality may be unavailable when F-22 Tactical Mandates fields.

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.

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

	FY 2016	FY 2017	FY 2018
Title: TACLink 16	0.000	69.614	130.400
Description: The TACLink 16 program 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.			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674788 / F-22 Tactical Mandates		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: The program began its pre-Engineering and Manufacturing Development (Pre-EMD) effort. The program had a successful Preliminary Design Review for its Link 16 radio solution.					
FY 2017 Plans: TACLink 16 will continue design, software modeling and test. Work will begin on development of prototype units for the OSA rack.					
FY 2018 Plans: The contract for Engineering and Manufacturing Development (EMD) will be awarded. TACLink 16 will continue design, software and modeling. Development units will be delivered to begin systems level lab test. Hardware qualification efforts will commence.					
Title: F-22 Tactical Mandates (TACMan) Description: The F-22 TACMan program consists of software development and hardware necessary to provide tactical Mode 5 IFF on the F-22. The program 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.			51.702	31.680	59.700
FY 2016 Accomplishments: The program began its pre-Engineering and Manufacturing Development effort. F-22 Tactical Mandates continued capabilities analysis, design, and software modeling and test.					
FY 2017 Plans: F-22 TACMan will continue design, software modeling, and test. The program will begin prototyping efforts.					
FY 2018 Plans: The contract for EMD will be awarded. F-22 TACMan will continue design, software modeling, and begin system lab test.					
Title: Lab and Combined Test Force (CTF) Description: The Lab Test and Operations (LTO) is a continuous activity that plans and conducts development, integration, test, and verification of F-22 TACMan and TACLink 16 OFPs and hardware. The LTO provides maintenance, staffing, and operation of 18 development labs including five unique major SILs: the AIL, Rail, ACS, VIF, and VSS. The F-22 Combined Test Force, 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 TACMAN and TACLink 16 early before they are more difficult and costly to resolve.			0.000	0.000	7.693

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674788 / F-22 Tactical Mandates				
B. Accomplishments/Planned Programs (\$ in Millions)										FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: CTF and Lab planning efforts were conducted for TACMan.												
FY 2017 Plans: Continue to plan CTF and begin Lab testing of F-22 TACMan and TACLink 16.												
FY 2018 Plans: Continue lab testing and continue planning for CTF testing for TACMan and TACLink 16.												
Accomplishments/Planned Programs Subtotals										51.702	101.294	197.793
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost	
• RDT&E: BA07: PE 0207138F: F-22A Squadrons*	172.848	286.270	413.149	0.000	413.149	315.578	423.296	485.152	476.668	Continuing	Continuing	
• APAF: BA05: Line Item #F02200: F-22A Squadrons, PE 0207138F**	111.077	1,630.008	176.630	0.000	176.630	257.891	257.310	347.665	457.265	Continuing	Continuing	
• RDT&E, BA05, PE 0605213F: F-22A Increment 3.2B***	115.603	70.290	13.600	0.000	13.600	0.000	0.000	0.000	0.000	0.000	562.070	
• APAF: BA05: Line Item #F2232B: F-22A Increment 3.2B, PE 0207138F****	64.325	78.410	105.756	0.000	105.756	13.081	20.373	6.013	0.000	0.000	316.458	
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.												

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons	Project (Number/Name) 674788 / F-22 Tactical Mandates	

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 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-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0207138F / F-22A Squadrons				Project (Number/Name) 674788 / F-22 Tactical Mandates					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
F-22 Tactical Mandates	SS/CPIF	Lockheed Martin : Ft Worth, TX	2.963	51.702	May 2016	31.680	Nov 2017	59.700	Mar 2018	0.000		59.700	308.656	454.701	-
F-22 TACLink 16	SS/CPIF	Lockheed Martin : Ft Worth, TX	0.000	0.000		69.614	Nov 2017	130.400	Mar 2018	0.000		130.400	106.345	306.359	-
Subtotal			2.963	51.702		101.294		190.100		0.000		190.100	415.001	761.060	-
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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 Execution	Various	Various : Various	0.000	0.000		0.000		7.693	Nov 2017	0.000		7.693	39.527	47.220	-
Subtotal			0.000	0.000		0.000		7.693		0.000		7.693	39.527	47.220	-
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			2.963	51.702		101.294		197.793		0.000		197.793	454.528	808.280	-
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force

Date: May 2017

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0207138F / F-22A Squadrons

Project (Number/Name)

674788 / F-22 Tactical Mandates

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	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
TACLink 16 Development , Integration & Test																												
TACLink 16 Preliminary Design Review (PDR)																												
TACLink 16 Milestone B																												
TACLink 16 Production Readiness Review																												
TACLink 16 Installs																												
F-22 Tactical Mandates Requirements Analysis																												
F-22 Tactical Mandates Program Backlog Review																												
F-22 Tactical Mandates Design																												
F-22 Tactical Mandates Development , Integration & Test																												
F-22 Tactical Mandates Preliminary Design Review (PDR)																												
F-22 Tactical Mandates Milestone B																												
F-22 Tactical Mandates Production Readiness Review																												
F-22 Tactical Mandates Installs																												

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / <i>F-22A Squadrons</i>	Project (Number/Name) 674788 / <i>F-22 Tactical Mandates</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
TACLink 16 Development , Integration & Test	2	2017	2	2020
TACLink 16 Preliminary Design Review (PDR)	4	2017	4	2017
TACLink 16 Milestone B	1	2018	1	2018
TACLink 16 Production Readiness Review	1	2019	1	2019
TACLink 16 Installs	2	2021	4	2022
F-22 Tactical Mandates Requirements Analysis	1	2016	3	2016
F-22 Tactical Mandates Program Backlog Review	2	2017	2	2017
F-22 Tactical Mandates Design	3	2016	1	2018
F-22 Tactical Mandates Development , Integration & Test	2	2017	3	2021
F-22 Tactical Mandates Preliminary Design Review (PDR)	4	2017	4	2017
F-22 Tactical Mandates Milestone B	1	2018	1	2018
F-22 Tactical Mandates Production Readiness Review	4	2019	4	2019
F-22 Tactical Mandates Installs	2	2022	4	2022