Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force											Date: April 2022	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604004F / *Advanced Engine Development*							
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
Total Program Element	-	642.581	583.712	353.658	0.000	353.658	757.468	917.761	937.646	955.867	Continuing	Continuing
643608: *Advanced Engine Dev*	-	642.581	583.712	353.658	0.000	353.658	757.468	917.761	937.646	955.867	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Engine Development Program enables demonstration of adaptive engine prototypes. This program is maturing fuel efficient adaptive engine component technologies and reducing associated risk in preparation for next-generation propulsion system development for combat aircraft applications. Adaptive engine technology enables next generation combat aircraft capabilities by combining the efficiency of high bypass turbofans used by commercial airlines with the performance demanded of military fighter engines. This technology has undergone initial development under the auspices of the Air Force Research Laboratory through the Adaptive Versatile Engine Technology (ADVENT) and Adaptive Engine Technology Demonstrator (AETD) programs.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY 2021 3.064 million was expended for civilian pay expenses in this program element, and in FY 2022 2.199 million is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	665.280	123.712	0.000	0.000	0.000
Current President's Budget	642.581	583.712	353.658	0.000	353.658
Total Adjustments	-22.699	460.000	353.658	0.000	353.658
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	460.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-23.914	0.000			
• Other Adjustments	1.215	0.000	353.658	0.000	353.658

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Change Summary Explanation

FY 2021 - SBIR/STTR Transfer
FY 2021 - Undistributed 3600 Mark

FY 2022 - Congressional Program Increase - AETP

FY 2023 - The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Adaptive Engine Transition Program	299.905	473.536	286.096
Description: The Adaptive Engine Transition Program (AETP) will design and manufacture multiple adaptive engine prototypes, complete component rig assessments, characterize materials, and inform manufacturing process improvements. The program will demonstrate adaptive engine technology can be scaled to meet military fighter engine size requirements, while ensuring appropriate manufacturing and technology readiness levels by producing flight-weight prototypes. The prototype engines will demonstrate fuel efficiency increases, thrust increases, and new component technologies by performing sea-level, altitude, and durability assessments across multiple power settings. These assessments will provide data to quantify the capability and reduce risk in areas such as thermal capacity, reliability, and supportability, among others. The FY 2023 Budget Justification Exhibit includes a breakout of the FY 2021 through FY 2023 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress. ***FY 2022 Plans:*** Funds prototype engine assessments and airframe integration/adaptive propulsion design efforts. ***FY 2023 Plans:*** Funds continuation of prototype engine assessments and product design activities that include addressing known design improvements, engine weight reduction initiatives, development of engine controls and accessories (Full Authority Digital Engine Control-FADEC) and F-35 integration. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 decreased compared to FY 2022 by $187.44 million. Funding decreased to align with activities executable within the remaining ceiling of the current contracts.			
Title: Next Generation Adaptive Propulsion	342.676	110.176	67.562

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: The Next Generation Adaptive Propulsion (NGAP) effort will design and perform component risk reduction for adaptive engine prototypes enabling Next Generation Air Dominance (NGAD) capabilities. NGAP will select appropriate adaptive engine technologies that can meet Next Generation Air Dominance (NGAD) engine requirements while ensuring appropriate manufacturing and technology readiness levels. The FY 2023 Budget Justification Exhibit includes a breakout of the FY 2021 through FY 2023 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress. ***FY 2022 Plans:*** Funds continuation of NGAP preliminary design activities and initiation of prototyping activities for Next Generation Air Dominance (NGAD) capabilities. Prototyping activity will drive digital engineering transformation in the propulsion industry by including requirements for the use of digital design processes, digital thread connectivity between engine and weapon system contractors, and digital product definition and manufacturing. More details can be provided in an appropriate forum. ***FY 2023 Plans:*** Continue adaptive prototyping planning, complete preliminary design activities, and transition to NGAP detailed design activities for Next Generation Air Dominance (NGAD) capabilities. More details can be provided in an appropriate forum. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 Funding decreased compared to FY 2022 by $42.614 million. Funding decrease is reflective of the Air Force priority to enable near-term transition of AETP and the fiscal constraints associated between AETP and NGAP within the program element.			
Accomplishments/Planned Programs Subtotals	642.581	583.712	353.658

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

C. Accomplishments/Planned Programs (in Millions)
Updated FY 2021 distributions reflect a flow of funds to the Adaptive Engine Transition Program to avert a cessation of activities while under the FY 2022 continuing resolution authorities.

E. Acquisition Strategy

For the Adaptive Engine Transition Program, the Air Force awarded two limited source, cost plus incentive fee contracts back in FY 2016 to General Electric and Pratt & Whitney due to their unique qualifications to design a high performance, flight-weight adaptive turbine engine in the thrust class for AETP. Incentive categories include engine weight, performance factors, and maintainability and supportability, with specific metrics for each category incentivized. Embedded in each AETP contract

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was an option for the Next Generation Adaptive Propulsion (NGAP) effort. In FY 2018, these options were exercised and awarded to optimize risk reduction for Next Generation Air Dominance (NGAD) capabilities through the NGAP effort. Acquisition planning to enable transition of NGAP prototyping activities to new contracts that include digital engineering transformation requirements and increase program acquisition agility is underway. To support transition of the AETP to a program of record, the program office is looking to leverage the remaining scope and ceiling of the current contracts for continuing engine development and integration work in FY 2023. For AETP Engineering, Manufacturing and Development, the program office plans to establish a new contract that includes digital engineering transformation requirements with the selected engine contractor. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Propulsion Directorate, Wright-Patterson Air Force Base, Ohio.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604004F / *Advanced Engine Development*	**Project (Number/Name)** 643608 / *Advanced Engine Dev*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Adaptive Engine Transition Program - GE	C/CPIF	GE : Evendale, OH	-	130.719	Oct 2020	6.457	Oct 2021	139.849	Oct 2022	-		139.849	0.000	277.025	-
Adaptive Engine Transition Program - PW	C/CPIF	PW : East Hartford, CT	-	163.635	Oct 2020	6.457	Oct 2021	139.849	Oct 2022	-		139.849	0.000	309.941	-
Next Generation Adaptive Propulsion (Preliminary Design) - GE	C/CPIF	GE : Evendale, OH	-	167.223	Oct 2020	47.500	Oct 2021	0.000	Oct 2022	-		0.000	0.000	214.723	-
Next Generation Adaptive Propulsion (Preliminary Design) - PW	C/CPIF	PW : East Hartford, CT	-	170.902	Oct 2020	47.500	Oct 2021	0.000	Oct 2022	-		0.000	0.000	218.402	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - TBD	C/TBD	TBD : TBD	-	-		10.113	Apr 2022	66.046	Oct 2022	-		66.046	Continuing	Continuing	-
		Subtotal	-	632.479		118.027		345.744		-		345.744	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Adaptive Engine Transition Program - Program Management Support	Various	Various : TBD	-	5.551	Dec 2020	460.622	Dec 2021	6.398		-		6.398	0.000	472.571	-
Next Generation Adaptive Propulsion - Program Management Support	Various	Various : TBD	-	4.551	Dec 2020	5.063	Dec 2021	1.516		-		1.516	Continuing	Continuing	-
		Subtotal	-	10.102		465.685		7.914		-		7.914	Continuing	Continuing	N/A

	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	642.581		583.712		353.658		-		353.658	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force			Date: April 2022
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	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

The FY 2023 Budget Justification Exhibit includes a breakout of the FY 2021 through FY 2023 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress.

Distribution of FY 2021 funding updated to reflect flow of funds to the Adaptive Engine Transition Program (AETP) to avert cessation of activities while under the FY 2022 continuing resolution authorities.

FY 2022 Adaptive Engine Transition Program (AETP) distributions will be updated to reflect the congressional program increase once congressional concurrence with the spend plan for the funds is obtained. Next Generation Adaptive Propulsion (NGAP) distributions updated to reflect continuation of preliminary design activities under current contracts.

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604004F / *Advanced Engine Development*	**Project (Number/Name)** 643608 / *Advanced Engine Dev*

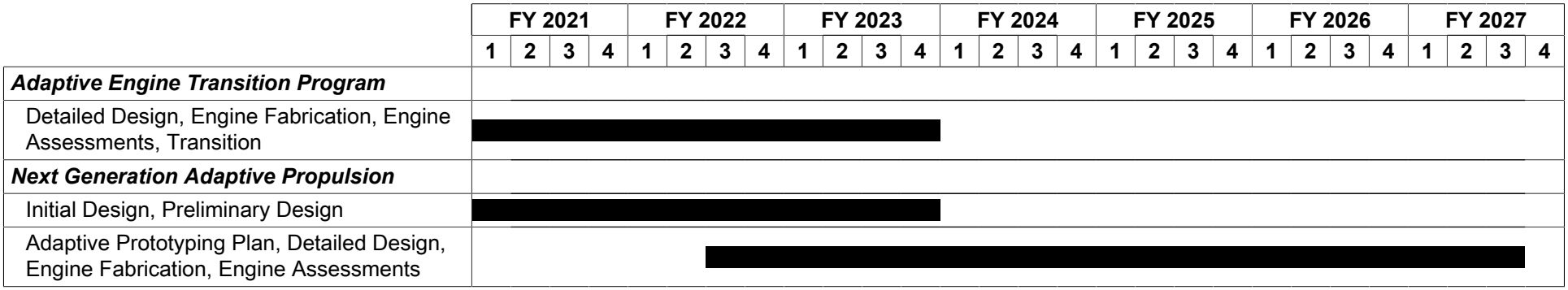

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604004F / *Advanced Engine Development*	**Project (Number/Name)** 643608 / *Advanced Engine Dev*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Adaptive Engine Transition Program				
Detailed Design, Engine Fabrication, Engine Assessments, Transition	1	2021	4	2023
Next Generation Adaptive Propulsion				
Initial Design, Preliminary Design	1	2021	4	2023
Adaptive Prototyping Plan, Detailed Design, Engine Fabrication, Engine Assessments	3	2022	3	2027

Note

The FY 2023 Budget Justification Exhibit includes a breakout of the FY 2021 through FY 2023 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress.

The Adaptive Engine Transition Program consists of four phases: detailed design, engine fabrication, engine assessments and transition.

Program deliverables include: military adaptive engine detailed design parameters and models; multiple engine sets of hardware (plus spare parts); matured technologies; major rig assessment data (controls, combustor, etc.); program reviews; and technology, afford-ability, sustainability and integration studies.

The Next Generation Adaptive Propulsion effort consists of six phases initial design, preliminary design, adaptive prototyping planning, detailed design, engine fabrication, and engine assessments.

Program deliverables include: military adaptive engine detailed design parameters and models; engine hardware (plus spare parts); matured technologies; major rig assessment data (controls, combustor, etc.); program reviews; and technology, afford-ability and sustainability studies for Next Generation Air Dominance (NGAD) capabilities.

Initial Design, Preliminary Design end extended to fourth quarter.

Additional details can be provided in the appropriate forum.