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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603605F / <i>Advanced Weapons Technology</i>
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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	-	29.094	31.855	98.503	0.000	98.503	114.373	65.545	45.668	46.578	Continuing	Continuing
633151: <i>High Power Solid State Laser Technology</i>	-	29.094	23.171	40.815	0.000	40.815	45.813	45.056	24.695	25.139	Continuing	Continuing
633152: <i>High Power Microwave Development and Integration</i>	-	0.000	8.684	57.688	0.000	57.688	68.560	20.489	20.973	21.439	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program provides for the development, integration, demonstration, and detailed assessment of directed energy (DE) weapon technologies for potential application on Air Force platforms. These include high energy laser (HEL), high power microwaves (HPM), and other unconventional weapon generation and transmission technologies, which can support a wide range of Air Force applications. The program develops a corresponding susceptibility, vulnerability, and lethality database for directed energy weapons. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this program element would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601SF, and 0602298F.

The Department of the Air Force technologies in this program are both enabling and enduring as we invest in maturing emerging technologies that address established mission gaps, and transformational technologies that address integrated enterprise capabilities intended to reshape the future force across air, space, and cyber warfighting domains. Development of transformational operational capabilities through advanced technology solutions focuses on five strategic capabilities: Global Persistent Awareness; Resilient Information Sharing; Rapid, Effective Decision-Making; Complexity, Unpredictability, and Mass; and Speed and Reach of Disruption and Lethality.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2019 Air Force penalty total is 50.0M. The calculated percentage reduction to each research, development, test and evaluation and pro

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

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B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	31.388	28.258	0.000	0.000	0.000
Current President's Budget	29.094	31.855	98.503	0.000	98.503
Total Adjustments	-2.294	3.597	98.503	0.000	98.503
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.403			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.003	0.000			
• SBIR/STTR Transfer	-1.034	0.000			
• Other Adjustments	-1.257	0.000	98.503	0.000	98.503

Change Summary Explanation

Decrease in FY 2021 reflects reprogramming to support Research and Development Projects, 10 U.S.C. Section 2363, an amendment to PL 110-417, 10 U.S.C. Section 2358 and 10 U.S.C. 2805(d)(1)(B).

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 FY2023 cannot be made in a relevant manner

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Appropriation/Budget Activity 3600 / 3					R-1 Program Element (Number/Name) PE 0603605F / <i>Advanced Weapons Technology</i>				Project (Number/Name) 633151 / <i>High Power Solid State Laser Technology</i>			
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
633151: <i>High Power Solid State Laser Technology</i>	-	29.094	23.171	40.815	0.000	40.815	45.813	45.056	24.695	25.139	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for the development, integration, demonstration, and detailed technical assessment of high energy laser devices, advanced imaging and beam control technologies needed for applications such as force protection, force application, precision engagement, and aircraft self-protection. Laser system concept assessments to include vulnerability assessments and target effect testing are performed.

This project includes the initiation and development of programs addressing Department of the Air Force capability gaps and provides technologies for transformational future force capabilities. Transformational efforts will be identified through a competitive process and be responsive to DAF design priorities. Selected efforts will be designated as transformational, indicating enterprise-level priority.

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

	FY 2021	FY 2022	FY 2023
Title: High Energy Laser/Beam Control	29.094	22.418	40.815
Description: Develop and demonstrate advanced beam control technologies, integrated laser systems, and aircraft self-protection laser technologies. Demonstrate beam control components integrated with high energy lasers for the Department of the Air Force utility.			
FY 2022 Plans: Continue SHIELD (Self-Protect High Energy Laser Demonstrator) system development and integration for technical demonstration. Continue planning for flight testing.			
FY 2023 Plans: In keeping with 2-star summit decision in 2019 to address integrated base defense priority, continue to develop the SHIELD demonstration to address counter-cruise missile defense. Complete system integration of the SHIELD laser pod. Conduct SHIELD ground test.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased by 18.397M compared to FY 2022 due to the Air Force's increased emphasis on Directed Energy Technology.			
Title: Transformational Technology Development	0.000	0.753	0.000
Description: Continually funded effort. This funding allocation will start new and continue Transformational Technology Developments. The Transformational Technology Development program will select new projects, in alignment with mission			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>focused areas which include, but are not limited to: Intelligent Planning and Wargaming; Battlespace Awareness; Integrated Base Defense; and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to development and demonstration of new high energy laser devices, advanced imaging and beam control technologies, as well as assessments to enable new laser system concept development. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made.</p> <p>FY 2022 Plans: Select Transformational Technology Development efforts as new starts in FY 2022 that support the National Defense Strategy and Department of Air Force priorities.</p> <p>FY 2023 Plans: Fund the follow-on efforts for projects started in FY 2022. Select Transformational Technology Development efforts as new starts in FY 2023 that support the National Defense Strategy and Department of the Air Force priorities.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Budget decreased from \$0.753M in FY 2022 to zero (\$0.00) in FY 2023 because no funding was reallocated from Thrust 1 in FY 2023 for the Transformational Component.</p>				
Accomplishments/Planned Programs Subtotals		29.094	23.171	40.815
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
Not Applicable				
D. Acquisition Strategy				
Not Applicable				

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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
633152: <i>High Power Microwave Development and Integration</i>	-	0.000	8.684	57.688	0.000	57.688	68.560	20.489	20.973	21.439	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates high power microwave and other unconventional electromagnetic field generation and transmission technologies that can be integrated into future weapon systems to support a wide range of the Department of the Air Force missions such as air base defense or the damage/destruction of an adversary's electronic infrastructure. It also provides inputs to the susceptibility, vulnerability, and lethality databases used across the Department of Defense to understand thresholds for scalable effects of directed energy weapons.

This project includes the initiation and development of programs addressing DAF capability gaps and provides technologies for transformational future force capabilities. Transformational efforts will be identified through a competitive process and be responsive to DAF design priorities. Selected efforts will be designated as transformational, indicating enterprise-level priority.

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

	FY 2021	FY 2022	FY 2023
Title: High Power Microwave Technologies	0.000	3.826	52.474
Description: Develop and evaluate high power microwave and other unconventional weapon technologies for various platforms, including aerial, for applications such as counter-electronics. Develop and evaluate high power microwave technologies for non-kinetic and counter-electronic weapon applications.			
FY 2022 Plans: Initiate high power microwave payload integration into an advanced, reusable, aerial platform. Continue to characterize, model, test and evaluate current and projected blue Directed Energy weapons against relevant red assets. Conduct the joint static technology demonstration of a compact High Power Microwave weapon with the Navy. Design next generation High Power Microwave sources.			
FY 2023 Plans: Continue high power microwave payload integration into an advanced, reusable, aerial platform. Continue to characterize, model, test and evaluate current and projected blue Directed Energy weapons against relevant red assets. Develop next generation High Power Microwave sources.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2023 increased by \$48.648M compared to FY 2022 due to the Air Force's increased emphasis on Directed Energy Technology.				
Title: Transformational Technology Development		0.000	4.858	5.214
Description: Continually funded effort. This funding allocation will start new and continue Transformational Technology Developments. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming; Battlespace Awareness; Integrated Base Defense; and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to development and demonstration of new high power microwave sources, transmission technologies, and applications, to include non-kinetic and counter-electronic. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made.				
FY 2022 Plans: Fund the follow-on efforts for projects started in FY 2021. Select Transformational Technology Development efforts in FY 2022 that support the National Defense Strategy and Department of the Air Force priorities				
FY 2023 Plans: Fund the follow-on efforts for projects started in FY 2022. Select Transformational Technology Development efforts in FY 2022 that support the National Defense Strategy and Department of the Air Force priorities.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased by \$0.456M compared to FY 2022 due to increased emphasis on Transformational Component efforts.				
Accomplishments/Planned Programs Subtotals		0.000	8.684	57.688
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
Not Applicable				
D. Acquisition Strategy				
Not Applicable				