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**Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 3: Advanced Technology Development (ATD)</i>					<b>R-1 Program Element (Number/Name)</b> PE 0603605F / <i>Advanced Weapons Technology</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	33.681	35.195	39.064	0.000	39.064	38.677	30.238	30.840	31.458	Continuing	Continuing
633151: <i>High Power Solid State Laser Technology</i>	-	16.337	13.385	20.824	0.000	20.824	11.987	12.237	12.480	12.730	Continuing	Continuing
633152: <i>High Power Microwave Development and Integration</i>	-	17.344	21.810	18.240	0.000	18.240	26.690	18.001	18.360	18.728	Continuing	Continuing

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

This program provides for the development, integration, demonstration, and detailed assessment of directed energy weapon technologies for potential application on Air Force platforms. These include high energy laser (HEL), high power electromagnetics (HPEM), 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. This program also develops advanced optical imaging for space situational awareness. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

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.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
Previous President's Budget	33.542	30.195	31.064	0.000	31.064
Current President's Budget	33.681	35.195	39.064	0.000	39.064
Total Adjustments	0.139	5.000	8.000	0.000	8.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.743	0.000			
• SBIR/STTR Transfer	-0.604	0.000			
• Other Adjustments	0.000	0.000	8.000	0.000	8.000

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

**Project:** 633152: *High Power Microwave Development and Integration*

Congressional Add: *Counter-electronics high power microwave advanced missile*

<b>FY 2015</b>	<b>FY 2016</b>
10.000	5.000

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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603605F / <i>Advanced Weapons Technology</i>
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<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>	FY 2015	FY 2016
Congressional Add Subtotals for Project: 633152	10.000	5.000
Congressional Add Totals for all Projects	10.000	5.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603605F / <i>Advanced Weapons Technology</i>				<b>Project (Number/Name)</b> 633151 / <i>High Power Solid State Laser Technology</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
633151: <i>High Power Solid State Laser Technology</i>	-	16.337	13.385	20.824	0.000	20.824	11.987	12.237	12.480	12.730	Continuing	Continuing

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

This project provides for the development, integration, demonstration, and detailed assessment of HEL 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.

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

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<b>Title:</b> High Energy Laser/Beam Control	16.337	13.385	20.824
<b>Description:</b> Develop and demonstrate advanced beam control technologies, integrated laser systems, and aircraft self-protection laser technologies. Demonstrate beam control components integrated with HELs for Air Force utility.			
<b>FY 2015 Accomplishments:</b> With DARPA, integrated their electric laser with the Air Force beam control system in order to conduct high power lethality testing against various targets including counter-RAM (rockets, artillery, mortar), surface-to-air missiles (SAM) and aircraft. Continued design of a full scale turret with aero-effects mitigation.			
<b>FY 2016 Plans:</b> Complete experiments with the joint DARPA and Air Force high energy laser system against various targets including ground targets and surface-to-air missiles. Document field lethality data, modeling and simulation tools, and lessons learned on the tests. Begin preparation for integration of a moderate power laser system into a pod for aircraft self-protection ground demo. Continue with the design of a full scale turret with aero-effects mitigation, integrate with light weight beam director and control system, and plan for testing.			
<b>FY 2017 Plans:</b> Continue the integration of a moderate power laser system into a pod for aircraft self-protect demonstration. Complete the integration/verification of the beam control system into a pod. Continue the development of vulnerability criteria for the Air Superiority mission. Complete verification tests of the moderate power ground-to-air fiber laser weapons system demonstration.			
<b>Accomplishments/Planned Programs Subtotals</b>			
	16.337	13.385	20.824

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

N/A

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<b>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603605F / <i>Advanced Weapons Technology</i>	<b>Project (Number/Name)</b> 633151 / <i>High Power Solid State Laser Technology</i>

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

**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>Appropriation/Budget Activity</b> 3600 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603605F / <i>Advanced Weapons Technology</i>	<b>Project (Number/Name)</b> 633152 / <i>High Power Microwave Development and Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
633152: <i>High Power Microwave Development and Integration</i>	-	17.344	21.810	18.240	0.000	18.240	26.690	18.001	18.360	18.728	Continuing	Continuing

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

This project develops and demonstrates HPEM and other unconventional weapon generation and transmission technologies that support a wide range of Air Force missions such as the potential disruption, degradation, damage, or destruction of an adversary's electronic infrastructure and military capability. It also provides inputs to the susceptibility, vulnerability, and lethality databases.

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

	FY 2015	FY 2016	FY 2017
<b>Title:</b> HPEM Technologies	7.344	16.810	18.240
<b>Description:</b> Develop and evaluate HPEM and other unconventional weapon technologies for various platforms, including aerial, for applications such as counter-electronics. Develop and evaluate HPEM technologies for non-lethal, anti-personnel weapon applications.			
<b>FY 2015 Accomplishments:</b> Began design of a class of reusable, multi-pulse, multi-target counter-electronics payloads capable of being hosted in various advanced platforms. Characterized, modeled, tested and evaluated red directed energy threats on blue assets.			
<b>FY 2016 Plans:</b> Refine design of a class of reusable, multi-pulse, multi-target counter-electronics payloads capable of being hosted in various advanced platforms. Characterize, model, test and evaluate red directed energy threats on blue assets. Begin initial preparations for the next generation high power microwave (HPM) demonstration.			
<b>FY 2017 Plans:</b> Finalize design and evaluation of the utility of a class of reusable, multi-pulse, multi-target counter-electronics payloads capable of being hosted in various advanced platforms. Characterize, model, test and evaluate current and projected red directed energy threats on blue assets. Begin the next generation HPM demonstration.			
<b>Accomplishments/Planned Programs Subtotals</b>	7.344	16.810	18.240

	<b>FY 2015</b>	<b>FY 2016</b>
<b>Congressional Add:</b> Counter-electronics high power microwave advanced missile	10.000	5.000

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	FY 2015	FY 2016
<b>FY 2015 Accomplishments:</b> Conducted Congressionally directed effort.		
<b>FY 2016 Plans:</b> Conduct Congressionally directed effort.		
<b>Congressional Adds Subtotals</b>	10.000	5.000

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

N/A

**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.