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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 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305205F / <i>Endurance Unmanned Aerial Vehicles</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
Total Program Element	-	20.000	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.000
67A026: <i>MAGIC</i>	-	20.000	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.000

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

This PE focuses USAF efforts on long endurance platform projects and their associated sensors and communications suites. Efforts include, but are not limited to, optionally piloted airships, Remotely Piloted Aircraft (RPAs), or more standard aircraft platforms flown as manned or unmanned.

The Integrated Sensor Is Structure (ISIS) project intended to develop a radar that is fully integrated into a station-keeping, stratospheric airship. The ISIS project effort was completed in FY 2015.

The Medium Altitude Global ISR and Communications (MAGIC) project was developing a multiple-day, medium altitude ISR unmanned aircraft system (UAS) to provide long endurance surveillance with a multiple sensor payload. This concept was initiated by the Office of the Secretary of Defense (OSD) as a Joint Capabilities Technology Demonstration (JCTD) in FY 2010. Aurora Flight Sciences (AFS)'s Orion Remotely Piloted Aircraft (RPA) concept was chosen as the JCTD candidate by OSD/Director of Defense, Research and Engineering (DDR&E) per the recommendation of the Combatant Commands. The MAGIC/Orion RPA initiative was subsequently released from the JCTD process and transitioned to the Air Force as the sponsor and 645th Aeronautical Systems Group (AESG, a.k.a. BIG SAFARI Systems Program Office) as the manager of this developmental initiative in FY 2011. AFS and the 645th AESG performed flight test series demonstration August 2013 to March 2015 at Naval Air Weapons Station China Lake, CA. The flight test demonstration completed in FY 2015. The Block 0 (a.k.a. prototype) air vehicle and associated ground test articles have been re-located to Aurora Flight Sciences in Manassas, VA. Follow-on development of the Orion RPA Block 1 air vehicle and system continues with the remainder of the FY 2015 \$20M Congressional Add and the addition of the FY 2016 \$5M Congressional Add.

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>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	20.000	0.000	0.000	0.000	0.000
Current President's Budget	20.000	5.000	0.000	0.000	0.000
Total Adjustments	0.000	5.000	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	5.000			
• 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:** 67A026: *MAGIC*

Congressional Add: *MAGIC*

	<b>FY 2015</b>	<b>FY 2016</b>
	20.000	5.000
Congressional Add Subtotals for Project: 67A026	20.000	5.000
Congressional Add Totals for all Projects	20.000	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 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305205F / <i>Endurance Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 67A026 / <i>MAGIC</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
67A026: <i>MAGIC</i>	-	20.000	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Medium Altitude Global ISR and Communications (MAGIC) project was an Air Force led technology and concept development to demonstrate the ability for a Remotely Piloted Aircraft (RPA) to stay airborne in the medium altitude structure for a multiple day duration mission with a minimum of 1,000 pounds payload capacity of intelligence, surveillance and reconnaissance sensor systems. The MAGIC concept was initiated by OSD/DDR&E in FY 2010 in response to the Combatant Commanders ranking this type of initiative as the highest priority for a Joint Concept and Technology Demonstration (JCTD). In FY 2011, the Air Force accepted this initiative as the sponsor and MAGIC was subsequently removed from consideration as a JCTD and transitioned into the Air Force as a developmental project.

The MAGIC project was intended to provide the USAF with data regarding sensor and aircraft performance parameters at a multiple day duration at medium altitude flight. The objectives laid out in the JCTD competition and selection of Aurora Flight Sciences (AFS)'s Orion RPA for the long endurance demonstration was managed by the 645th Aeronautical Systems Group (AESG).

In FY 2010, OSD/DDR&E (now ASD/R&E) provided \$5M of initial funding to AFRL to initiate the MAGIC project. In FY 2011, ASD/R&E provided an additional \$5M to keep the MAGIC project development moving forward. The Air Force provided \$10M of FY 2011. Congressional Adds of \$19M in FY 2012, \$50M in FY 2013, and \$20M in FY 2015 provided the Endurance UAV program manager with the funding for the continuation of the Orion RPA development and initiation of the three phase flight testing series.

Orion RPA flight test series and demonstrations were accomplished at Naval Air Weapons Station (NAWS) China Lake, CA between August 2013 and March 2015. The objectives to test/demonstrate basic air vehicle performance, expansion of the flight characteristic envelope, a multiple day sortie and integration of a nominal sensor payload were successfully accomplished on the prototype (Block 0) Orion RPA in a controlled environment non-representative of an operational setting. Subsequent development efforts concentrated on the validation of the Orion RPA system requirements and concept design/specifications for a follow-on air vehicle (Block 1) capable of operational deployment in the event that the Air Force chooses the Orion RPA as a quick reaction capable system for a theater of operation or a program of record.

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

	FY 2015	FY 2016
<b>Congressional Add:</b> MAGIC	20.000	5.000
<b>FY 2015 Accomplishments:</b> Flight Test Series completed at NAWS China Lake, CA in March 2015. Orion RPA demonstrated an 80-hour endurance flight, integration of a beyond line of sight SATCOM capability, and a full		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force	<b>Date:</b> February 2016
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305205F / <i>Endurance Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 67A026 / <i>MAGIC</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>
motion video capable payload. Subsequent efforts concentrated on lessons learned from flight test and applied those concepts to the continued development of a deployable long endurance capability.		
<b>FY 2016 Plans:</b> Follow-on development efforts concentrating on lessons learned from the Orion RPA Block 0 flight test and applying those concepts to continue development of a Block 1 deployable Orion RPA long endurance capability.		
<b>Congressional Adds Subtotals</b>	20.000	5.000

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

N/A

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy for the Air Force to develop a long endurance, persistent ISR capability for the Combatant Commanders was an outgrowth of a Joint Capabilities Technology Demonstration (JCTD) started in FY 2010. Development efforts contracted with Aurora Flight Sciences and their Orion RPA include: completion of studies analysis, development of a prototype air vehicle (Block 0), bench testing of engines and other aircraft components, ground continuity testing of select avionics, flight controls, and engine components, slow and high speed ground taxiing and a full flight series testing of the Orion RPA capabilities to include a multiple day, long duration flight demonstration. Efforts continue between the Aurora Flight Sciences production and management teams and the 645 AESG Systems Program Office to continue hardware and software engineering and development to meet operational airworthiness standards and mission requirements for a deployable air vehicle (Block 1).

**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 2017 Air Force												Date: February 2016				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 7				PE 0305205F / Endurance Unmanned Aerial Vehicles				67A026 / MAGIC								
<b>Product Development (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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	
Product Design and Development	SS/CPFF	Aurora : Manassas, VA	-	10.800	Jan 2015	4.000	May 2016	0.000		0.000		0.000	Continuing	Continuing	14.800	
<b>Subtotal</b>			-	10.800		4.000		0.000		0.000		0.000	-	-	14.800	
<b>Support (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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	
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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	SS/CPFF	Aurora : Manassas, VA	-	7.600	Jan 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	7.600	
<b>Subtotal</b>			-	7.600		0.000		0.000		0.000		0.000	-	-	7.600	
<b>Management Services (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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	
PMA	Allot	645 AESG : Dayton, OH	-	1.600	Jan 2015	1.000	Jan 2016	0.000		0.000		0.000	Continuing	Continuing	-	
<b>Subtotal</b>			-	1.600		1.000		0.000		0.000		0.000	-	-	-	
<b>Project Cost Totals</b>			-	20.000		5.000		0.000		0.000		0.000	-	-	-	



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2017 Air Force</b>		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305205F / <i>Endurance Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 67A026 / <i>MAGIC</i>

	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	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
Retrofit Schedule B -- Block 0 Component Integration	■																											
Flight Test Series 3.1, Long Endurance Demonstration (November-December 2014)	■																											
Sensor Payload Integration		■																										
Flight Test Series 3.2, Payload Integration (March 2015)		■																										
Block 1 Engineering Development, System Requirements and Concept Design Reviews			■	■																								
Block 1 Mature Design Beyond Concept Stage and Interim Design Reviews						■	■	■																				

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305205F / <i>Endurance Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 67A026 / <i>MAGIC</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Retrofit Schedule B -- Block 0 Component Integration	1	2015	1	2015
Flight Test Series 3.1, Long Endurance Demonstration (November-December 2014)	1	2015	1	2015
Sensor Payload Integration	2	2015	2	2015
Flight Test Series 3.2, Payload Integration (March 2015)	2	2015	2	2015
Block 1 Engineering Development, System Requirements and Concept Design Reviews	3	2015	4	2015
Block 1 Mature Design Beyond Concept Stage and Interim Design Reviews	1	2016	4	2016