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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2024 Air Force **Date:** March 2023

<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 0305114F / <i>Air Traffic Control, Approach, and Landing System (ATCALs)</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	15.266	8.367	8.751	0.000	8.751	15.116	17.852	13.953	11.461	0.000	90.766
673587: <i>Air Traffic Control System</i>	-	15.266	8.367	8.751	0.000	8.751	15.116	17.852	13.953	11.461	0.000	90.766
Quantity of RDT&E Articles	-	-	1	3	-	3	-	-	-	-		

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

To support the Air Force worldwide flying mission, the Air Traffic Control (ATC) Future Technologies (AFT) program element funds research, development, and management of fielded and emerging air traffic control communications, surveillance, automation, positioning, and precision approach and landing systems. AFT supports the 2023 NDAA and 2023 National Defense Strategy (NDS) approach to "improve our ability to integrate, defend, and reconstitute our surveillance and decision systems... despite adversary means of interference or deception" by researching and developing technology and strategies to support Agile Combat Employment (ACE) adaptive basing and agile basing concepts of operation as well as modernizing airfield operations commensurate to the current operating environment.

AFT is comprised of a portfolio of projects focused on identifying and documenting capability gaps and associated mitigating technologies in multiple areas of aircraft launch and recovery for both fixed and expeditionary operations. These gaps and technologies will be outlined in a bridging strategy, capability-based assessments, and AFT capability roadmaps. AFT also pursues RDT&E opportunities in the organization, training, and equipping of ATC-associated career fields and any new civil ATCALs technologies that may have military utility.

FY24 ATCALs development efforts will continue to research and develop new ATCALs capabilities necessary to ensure enduring, resilient, efficient, and safe air operations. These may include, but not be limited to: military and civil airspace interoperability; lightweight, multi-function expeditionary systems technology; development of a Man-Portable TACAN Electronically Scanned Antenna (MP-TACAN ESA) and high-power beacon transponder. As these technologies and architectures mature, fixed base and deployable ground system upgrades will be coordinated and fielded concurrently with related manned and unmanned aircraft avionics capabilities that may be required. When implemented, these efforts will enable DoD aircraft to enhance safety, security, efficiency, and affordability of global flight operations.

The FY24 funding request was reduced by \$1.124 million to account for the availability of prior year execution balances.

The MP-TACAN ESA is a Middle Tier Acquisition (MTA) effort. The MP-TACAN ESA MTA effort is \$6.338M including RDT&E and procurement of prototype units. The MP-TACAN ESA is fully across the Future Years Defense Program.

FY24 RDT&E funding for PE 0305114F, ATCALs MP-TACAN ESA is in compliance with budgeted end items per the approved test strategy and FY23 Omnibus, Sec. 8059.

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This program element may include necessary 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 FY22 \$0.000M was expended for civilian pay expenses in this program element, and in FY23 \$0.153M is forecasted for civilian pay expenses in this program element.

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.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Previous President's Budget	15.749	8.511	7.418	0.000	7.418
Current President's Budget	15.266	8.367	8.751	0.000	8.751
Total Adjustments	-0.483	-0.144	1.333	0.000	1.333
• 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	-0.483	0.000			
• Other Adjustments	0.000	-0.144	1.333	0.000	1.333

**Change Summary Explanation**

There were no Congressional Adds in FY2023.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
<b>Title:</b> Air Traffic Control (ATC) Future Technologies (AFT)	12.879	6.795	5.956	0.000	5.956
<b>Description:</b> Focus is on aircraft launch and recovery, airspace interoperability, expeditionary technology development and prototyping, optimization of flight capability and adherence to safety of flight mandates. AFT will continue coordination with the FAA to develop an Infill radar certification process to mitigate windfarm interference with air traffic control radar systems and evaluate technologies supporting multiple functions such as Airfield Operations and Counter-small Unmanned Aerial systems (Cs-UAS) in a single system operating in a tactical environment.					

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
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**FY 2023 Plans:**  
Continue with ATC Future Technologies Analyses and Research to drive innovation for the Airfield Operations community which include the following tasks:

- Continue development of the Lightweight Deployable Instrument Landing System (LD-ILS).
- Continue to develop the MATS tactical operations automation and communications equipment, with access to multiple radar and weather sensor feeds for display of airspace and air traffic controller visual support capability to visualize an integrated local and Beyond Visual Line of Sight (BVLOS) airspace picture.
- Continue the development and maturation of Multi-Function Tactical Radar System (MTRS) technology including, but not limited to a single wideband actively electronic scanned array to detect multiple types of air targets and export the data to multiple processing systems to provide air defense, force protection, ATC/airspace control and weather, and C2 information to determine the actual size of the system, coverage capabilities, and MTRS effectiveness.
- Continue development of the Man-Portable TACAN high power beacon transponder amplifier to increase range of coverage.
- Continue to coordinate with the Man-Portable TACAN Replacement and Electronically Scanned Antenna Development Programs.
- Continue monitoring complimentary and GPS alternative PNT developments to ensure early integration into ATCALs plans and programs.
- Continue development of threshold parameters and requirements for certification of Infill Radar systems in the National Airspace System.
- Begin testing and evaluation of Lightweight Deployable Instrument Landing System.
- Continue to mature the Airfield Operations Accelerator/Testbed facility.

**FY 2024 Base Plans:**  
Continue AFT Analyses and Research to drive innovation for the Airfield Operations community which include the following tasks:

- Will continue development of the Lightweight Deployable Instrument Landing System (LD-ILS), to include analysis and test and evaluation.
- Will demonstrate a pre-production MATS capability to visualize an integrated local and BVLOS airspace picture.
- Will continue the development and maturation of MTRS technology including, but not limited to a single wideband actively electronic scanned array to detect multiple types of air targets and export the data to multiple

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

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
<p>processing systems to provide protection, ATC/airspace control, and C2 information via experimentation to determine the actual size of the system, coverage capabilities, and MTRS effectiveness.</p> <ul style="list-style-type: none"> <li>- Will continue to develop the Man-Portable TACAN high power beacon transponder amplifier to increase range of coverage.</li> <li>- Will continue to coordinate with the Man-Portable TACAN Replacement and Electronically Scanned Antenna Development Programs.</li> </ul> <p><b>FY 2024 OCO Plans:</b> N/A</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> Funding was reduced \$1.124M to account for the availability of prior year execution balance. This reduction was partially offset by a \$0.3M inflationary adjustment.</p>					
<p><b>Title:</b> Man-Portable Electronically Scanned Antenna (MP-TACAN ESA)</p> <p><b>Description:</b> Develops new electronically scanned antenna to replace the existing Man-Portable Tactical Air Navigation (TACAN) mechanical antenna. The new antenna will reduce system weight, improve reliability, and extend battery life. The Development and Test Effort includes one prototype antenna and three additional antennas for qualification testing.</p> <p>The Man-Portable TACAN provides aircraft with point-to-point navigation and instrument flight approaches to forward operating sites/landing zones, and is critical to mission success in adverse weather conditions. It replaces 40+ year old legacy systems that are no longer supportable. The Man-Portable TACAN also supports the 2022 NDAA and 2022 National Defense Strategy for rapidly deployable, adaptive, and scalable family of systems. Through FY29, a total of 68 systems will be procured (58 for the Active Duty and 10 for the Air National Guard).</p> <p><b>FY 2023 Plans:</b></p> <ul style="list-style-type: none"> <li>- Conduct Preliminary Design Review</li> <li>- Continue prototype development and antenna subassemblies</li> <li>- Complete System Test Plan</li> <li>- Conduct Critical Design Review in July</li> <li>- Deliver prototype antenna for Developmental Test and Evaluations (DT&amp;E)</li> </ul>	1.982	1.572	2.795	-	2.795

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Conduct DT&E  <b>FY 2024 Base Plans:</b> - Will manufacture three qualification units - Will conduct Qualification Testing - Will complete Preliminary and final Qualification Test Reports - Will conduct Performance Test Demonstration with Government furnished Beacon/Transponder - Will conduct Operational Testing in May 2024  <b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> Funding increase due to purchase of three additional antennas for qualification testing and evaluation. The Availability of additional antennas minimizes schedule risk during the testing period.					
<b>Title:</b> NOTAMs Software Development  <b>Description:</b> The DoD NOTAMs system provides aircrews and airfield operations personnel with air field conditions, temporary flight restrictions, navigation aid and airfield lighting outages, and special instructions for departing or landing at DoD airfields. Funding continues NOTAMs software development to incorporate International Civil Aviation Organization (ICAO) required digital codes, formats, and queries that enhance flight safety.  <b>FY 2023 Plans:</b> No funds required. Effort completed with FY22 funds.  <b>FY 2024 Base Plans:</b> No funds required. Program complete  <b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> Program complete. No FY24 funds required.	0.405	0.000	0.000	-	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	15.266	8.367	8.751	0.000	8.751

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

<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> <u>Base</u>	<u>FY 2024</u> <u>OCO</u>	<u>FY 2024</u> <u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 0305114F: <i>Air Traffic Control, Approach, and Landing System</i>	6.024	5.971	11.845	0.000	11.845	11.323	11.648	11.877	12.115	0.000	70.803

**Remarks**

**E. Acquisition Strategy**

ATCALs is a basket program element with multiple programs in various stages of acquisition which provide the air traffic control infrastructure to support peacetime and wartime missions. The ATC Future Technology (AFT) portfolio is focused on fixed-based and lightweight, scalable, readily deployable ATC equipment to support the National Defense Strategy. Current contracting efforts include, but are not limited to, Multi-Function Tactical Radar, Man-Portable TACAN high power beacon transponder, Man-Portable Electronically Scanned Antenna, Lightweight Deployable Instrument Landing System, Infill Radar certification process and evaluation of a sensor agnostic Mobile Air Traffic Surveillance System.

Contract types include, but are not limited to, full and open competition, Other Transaction Authority, Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR). Other activities such as Infill Radar certification are executed via Military Inter-Departmental Purchase Requests, and Project Orders with various organizations (FAA, MITRE, Army, Navy and the Air Force Flight Standards Agency).

The Air Force Program Executive Officer (PEO) Digital is the Milestone Decision Authority (MDA) for ATCALs. PEO Digital has further delegated MDA authority for specific programs within the ATCALs Enterprise. Program support, cost, contracts, logistics, and financial management support is managed by the Air Force Life Cycle Management Center Aerospace Management Systems Division (AFLCMC/HBA).

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305114F / Air Traffic Control, Approach, and Landing System (ATCALs)	<b>Project (Number/Name)</b> 673587 / Air Traffic Control System
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<b>Product Development (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
AFT Expeditionary Technology Development and Prototyping	C/FFP	AFLCMC/HBA : Hanscom AFB, MA	-	2.838	Mar 2022	4.932	Mar 2023	3.626	Mar 2024	-		3.626	Continuing	Continuing	-
Man-Portable TACAN Electronically Scanned Antenna	C/FFP	AFLCMC/HBAA : Tinker AFB, OK	-	1.757	Jul 2022	1.306	Jan 2023	2.370	Jan 2024	-		2.370	0.000	5.433	-
NOTAMs Software	C/CPAF	AFDW/PK : Andrews AFB, MD	-	0.405	May 2022	0.000	May 2023	0.000		-		0.000	0.000	0.405	-
<b>Subtotal</b>			-	5.000		6.238		5.996		-		5.996	Continuing	Continuing	N/A

**Remarks**  
FY24 funding includes procurement of three antennas for qualification testing. One prototype antenna funded in FY23.

<b>Support (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
AFT Research/Analysis	MIPR	FAA : Washington, DC	-	2.188	Mar 2022	0.469	Oct 2022	0.942	Oct 2023	-		0.942	Continuing	Continuing	-
AFT Travel	Various	Not specified. : TBD	-	0.090	Mar 2022	0.030	Jan 2023	0.169	Jan 2024	-		0.169	Continuing	Continuing	-
AFT Civilian Direct Cite Authorizations	Allot	AFLCMC/FZA : TBD	-	0.000		0.153	Oct 2022	0.156	Oct 2023	-		0.156	0.000	0.309	-
<b>Subtotal</b>			-	2.278		0.652		1.267		-		1.267	Continuing	Continuing	N/A

**Remarks**  
Various contract types, performing activity and city/states are result of the use of Military Interdepartmental Purchase Requests (MIPR), Purchase Requests (PR), Project Orders (PO), etc. that are sent to multiple agencies in support of some tasks.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305114F / Air Traffic Control, Approach, and Landing System (ATCALs)	<b>Project (Number/Name)</b> 673587 / Air Traffic Control System
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFT Remote Air Traffic Control Tower Capability EOA	WR	Various : Various	-	0.500	Mar 2022	0.015	Jul 2023	0.240	Mar 2024	-		0.240	0.000	0.755	-
AFT ATCALs Operational Test & Evaluation	WR	Various : Various	-	0.250	Jul 2022	0.245	Jul 2023	0.139	Jul 2024	-		0.139	Continuing	Continuing	-
Infill Radar Wind Turbine Radar Interference Mitigation	MIPR	FAA/AFRL : Wash DC/Rome, NY	-	1.926	Apr 2022	0.000		0.000		-		0.000	0.000	1.926	-
Mobile Air Traffic Surveillance System MATS	MIPR	Various : Various	-	4.817	Sep 2022	-		-		-		-	0.000	4.817	-
MP TACAN Government Test	MIPR	Various : Various	-	-		0.041		0.086		-		0.086	Continuing	Continuing	-
<b>Subtotal</b>			-	7.493		0.301		0.465		-		0.465	Continuing	Continuing	N/A

**Remarks**  
FY23 to FY24 increase funds relocation of the Remote Air Traffic Control Tower at a new location. Includes teardown, transportation, setup, and system performance flight check.

<b>Management Services (\$ in Millions)</b>				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Man-Portable TACAN Electronically Scanned Antenna Program Support Cost PSC	C/FFP	AFLCMC/HBAA : Tinker AFB, OK	-	0.225	Jul 2022	0.225	Jul 2023	0.339	Jul 2024	-		0.339	0.000	0.789	-
AFT Program Support Cost PSC Contractor Services AFLCMC AFLCMC/HBAG, Hanscom AFB	C/CPFF	Various : Hanscom AFB, MA	-	0.270	Jul 2022	0.951	Jul 2023	0.684	Jul 2024	-		0.684	Continuing	Continuing	-
<b>Subtotal</b>			-	0.495		1.176		1.023		-		1.023	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2024 Air Force</b>								<b>Date: March 2023</b>					
<b>Appropriation/Budget Activity</b> 3600 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0305114F / Air Traffic Control, Approach, and Landing System (ATCALs)				<b>Project (Number/Name)</b> 673587 / Air Traffic Control System					
	<b>Prior Years</b>	<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	15.266		8.367		8.751		-		8.751	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305114F / Air Traffic Control, Approach, and Landing System (ATCALs)	<b>Project (Number/Name)</b> 673587 / Air Traffic Control System

FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
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

<b>Air Traffic Control (ATC) future Technology (AFT)</b>	
Multi-Function Tactical Radar System (MTRS)	
Lightweight Deployable Instrument Landing System (LD-ILS)	
Man-Portable TACAN High Power Beacon Transponder	
Infill Radar	
Mobile Air Traffic Surveillance System (MATS)	
AFT Technology Evaluation and Market Research	
<b>Man-Portable TACAN Electronically Scanned Antenna</b>	
Contract Award 28 Jul 22	
Hardware Development	
Prototype DT&E / Qualification Testing	
Operational Assessment/Final Report	
<b>NOTAMs Software Development</b>	
Software Development/Validation	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2024 Air Force		<b>Date:</b> March 2023
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Air Traffic Control (ATC) future Technology (AFT)</i></b>				
Multi-Function Tactical Radar System (MTRS)	2	2022	4	2028
Lightweight Deployable Instrument Landing System (LD-ILS)	4	2022	4	2027
Man-Portable TACAN High Power Beacon Transponder	1	2022	1	2026
Infill Radar	1	2023	4	2023
Mobile Air Traffic Surveillance System (MATS)	4	2022	4	2024
AFT Technology Evaluation and Market Research	1	2022	4	2028
<b><i>Man-Portable TACAN Electronically Scanned Antenna</i></b>				
Contract Award 28 Jul 22	4	2022	4	2022
Hardware Development	3	2022	2	2023
Prototype DT&E / Qualification Testing	3	2023	2	2024
Operational Assessment/Final Report	3	2024	1	2025
<b><i>NOTAMs Software Development</i></b>				
Software Development/Validation	1	2022	2	2023