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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0401218F / KC-135s
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	-	18.409	51.105	31.977	0.000	31.977	49.847	93.235	12.826	12.825	0.000	270.224
675261: <i>KC-135 Upgrades</i>	-	18.409	51.105	31.977	0.000	31.977	49.847	93.235	12.826	12.825	0.000	270.224
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 In FY 2024, PE 0604858F, Tech Transition Program, Project 645351, Prototyping effort was transferred to PE 0401218F, KC-135s, Project 675261, KC-135 Upgrades in order to Integrate and Test on the KC-135.

A. Mission Description and Budget Item Justification

The KC-135 is the US Air Force's aerial refueling workhorse. In FY 2023, USAF KC-135s offloaded 64,946,367 gallons of fuel and refueled 38,360 aircraft in support of global operations. The KC-135 provides air refueling through either the refueling boom or drogue. As a cargo aircraft, the C/KC-135 can carry six (6) standard 463-L pallets. KC-135 modernization funding is vital to ensure the KC-135 fleet can support global aerial refueling operations to 2050 and beyond. RDT&E efforts include but are not limited to Mobile User Objective System, COMM2 Crypto & Data, High Frequency Modernization, Center Console Refresh, and Winglets.

Mobile User Objective System (MUOS): Integration and test for MUOS-capable radios on Block 45 aircraft in the COMM 3 position with Beyond Line-of-Sight (BLOS) Integrated Waveform (IW) and LOS SATURN capability with HAVE QUICK II backward compatibility. The KC-135 fleet must comply with the National Security Agency (NSA) mandate or will lose secure communications, which significantly degrades its ability to support worldwide operations. The ARC-210 Gen 3 radios have Diminishing Manufacturing Sources and Material Shortages (DMSMS) and will become obsolete on the CEASEKEY date. Requirement: AMC's 10-050 Crypto, 15-046 MUOS, 16-053 SATURN, and 17-039 IW. This modification is part to the USAF RCMP for crypto modernization as directed by CSAF in Nov 2022 and DoD CIO in 2016.

Center Console Refresh (CCR) replaces the Flight Display System (FDS) and Fuel System (FS) that is facing parts obsolescence issues and will render the aircraft non mission capable. The Integrated Fuel Management Panel (IFMP) and Fuel Management Advisory Computer (FMAC) are no longer procurable with limited repair capability. The Multi-Function Displays (MFD) are out of production with a limited cache of Liquid Crystal Display (LCD) glass. The A11 card within the Control Display Unit (CDU) is obsolete and no repair capability exists at this time. Current organizational maintenance efforts to cannibalize and repair have negated the impact so far. CCR fleet impacts will be experienced with the with the IFMP as early as 4QFY23 and with the CDU 2QFY25 to the effect of up to 30 aircraft per quarter. Requirement: AMC's 22-009

High Frequency (HF) Modernization: Integration and test to replace legacy HF radio with a modernized HF radio on KC-135 aircraft. A modernized HF communications capability is necessary to enable future sustainability and growth to operate in satellite communications (SATCOM)-denied environment while maintaining global, secure voice and data between Mobility Air Forces' aircraft and command and control (C2) agencies to exchange classified information. Requirement: AMC's 18-100 Modernized HF. This modification is part to the USAF RCMP for crypto modernization as directed by CSAF in Nov 2022 and DoD CIO in 2016.

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COMM2 Crypto and Data: Integration and test for ARC-210 Gen 3 radio replacement in the COMM 2 position with secure voice and SATURN capability with HAVE QUICK II backward compatibility, and a replacement solution for the Very High Frequency (VHF) Data Link (VDL)-2000. The KC-135 fleet must comply with the NSA mandate or will lose secure communications which significantly degrades its ability to support worldwide operations. The ARC-210 Gen 3 radios have DMSMS and become obsolete on the CEASEKEY date. VDL replacement is required for civil airspace compliance. Requirement: AMC's 10-050 Crypto, 16-053 SATURN, 22-033 VDL Solution. This modification is part to the USAF RCMP for crypto modernization as directed by CSAF in Nov 2022 and DoD CIO in 2016.

Winglets: Research and development of winglets for KC-135 aircraft to increase operational energy. This effort continues Air Force Research Laboratory's initial prototyping.

MAF Connectivity: Capabilities using the KC-135 to develop MAF Connectivity path forward as the tanker needs to be able to connect to the Joint fight to close kill chains and logistics chains. Possible capabilities include, but are not limited to, intelligent gateways, antennas, radios, software updates, crew displays, and multiple aperture array housings.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, and 0606398F. In FY 2023, \$0.360M was expended for civilian pay expenses in this program element, and in FY 2024, \$1.910M is forecast 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. Program Change Summary (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	12.955	51.105	33.084	0.000	33.084
Current President's Budget	18.409	51.105	31.977	0.000	31.977
Total Adjustments	5.454	0.000	-1.107	0.000	-1.107
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	6.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.546	0.000			
• Other Adjustments	0.000	0.000	-1.107	0.000	-1.107

Change Summary Explanation

FY 2025 funding request was reduced by \$1.163 million to account for the availability of prior year execution balances.

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C. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>Title: KC-135 MUOS radio</p> <p>Description: The KC-135 COMM 3 position requires an upgraded radio with MUOS (Mobile User Objective System), IW (Integrated Waveform), SATURN (Second-generation Anti-jam Tactical UHF Radio for NATO) capabilities and BLOS and LOS secure voice and data connectivity. This upgrade derives from an NSA cryptographic modernization mandate and DoD MUOS/SATURN transition directive.</p> <p>If requirements are not met, the KC-135 will not have secure military Satellite Communications (SATCOM) radio capability needed to communicate with the Joint Force, other MAF aircraft, and C2 agencies.</p> <p>The KC-135 MUOS radio program replaces the existing ARC-210 Gen 3 radio with a cryptographic modernized, MUOS-capable, ARC-210 Gen 6 radio. Integration of this new radio requires remote control unit, high power amplifier, low noise amplifier, SATCOM antenna, software and associated wiring and hardware.</p> <p>FY 2024 Plans: Complete integration efforts with software release.</p> <p>FY 2025 Base Plans: NA</p> <p>FY 2025 OCO Plans: Funding decreased due to transition from Engineering, Manufacturing, and Development phase to Procurement.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: NA</p>		6.288	7.713	0.000	0.000	0.000
<p>Title: KC-135 Winglets</p> <p>Description: This program adds winglets to the left and right outboard wing section of KC-135 aircraft. The winglets use Active Load Alleviation Control System (ALACS) that will decrease stress loads throughout the entire wing body. Winglets reduce aircraft drag and increase fuel efficiency. Scope: TBD fleet size. Air Force Research Laboratory (AFRL) projects fuel savings of approximately \$35-56M annually, based on simulations and anticipated improved operational benefits.</p> <p>FY 2024 Plans:</p>		-	13.429	0.000	-	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Integration, preliminary design and test efforts ongoing at the AFRL. FY 2025 Base Plans: N/A FY 2024 to FY 2025 Increase/Decrease Statement: Funding decreased due to transition from Engineering, Manufacturing, and Development phase to Procurement.					
Title: Center Console Refresh Description: Center Console Refresh (CCR) replaces the Flight Display System (FDS) and Fuel System (FS) that is facing parts obsolescence issues and will render the aircraft non mission capable. The Integrated Fuel Management Panel (IFMP) and Fuel Management Advisory Computer (FMAC) are no longer procurable with limited repair capability. The Multi-Function Displays (MFD) are out of production with a limited cache of Liquid Crystal Display (LCD) glass. The A11 card within the Control Display Unit (CDU) is obsolete and no repair capability exists at this time. Current organizational maintenance efforts to cannibalize and repair have negated the impact so far. CCR fleet impacts will be experienced with the with the IFMP as early as 4QFY23 and with the CDU 2QFY25 to the effect of up to 30 aircraft per quarter. FY 2024 Plans: CCR contracting activities to include source selection and development for five line replaceable units (LRUs) within the Fuel System and Flight Display Systems. FY 2025 Base Plans: CCR contracting activities to include phase 2 development and prototype for five line replaceable units (LRUs) within the Fuel System and Flight Display Systems. FY 2024 to FY 2025 Increase/Decrease Statement: Funding increased due to increased EMD 2nd year development efforts.	1.610	14.120	23.485	-	23.485
Title: High Frequency Modernization Description: This modification replaces the legacy HF radio with a modernized HF radio on KC-135 aircraft to operate in a SATCOM-denied environment while maintaining global, secure voice/data between Mobility Air Forces' aircraft and command and control (C2) agencies to exchange classified information. This complies with DoD directive to modernize HF capability.	0.072	3.000	0.000	-	0.000

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

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>If requirements are not met, then KC-135 aircraft loses BLOS communication capability with MAF aircraft and C2 agencies if satellite connectivity is lost. Additionally, KC-135 aircraft loses the capability to use HF for Air Traffic Control communication during transoceanic flights.</p> <p>This form fit radio replaces the current ARC-190 radio with the new ARC-260 radio.</p> <p>FY 2024 Plans: Initial integration contract award and support of modernized HF radio and communications capabilities integration.</p> <p>FY 2025 Base Plans: N/A</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Funding decreased due to transition from Engineering, Manufacturing, and Development phase to Procurement.</p> <p>Title: COMM2 Crypto and Data Program.</p> <p>Description: This effort replaces the ARC-210 Gen 3 radio in the COMM 2 position with secure voice and SATURN capability with HAVE QUICK II backward compatibility, and a replacement solution for the VDL-2000. ARC-210 Gen 3 radios on KC-135 aircraft have DMSMS and are approaching end of life, becoming obsolete on the NSA-mandated CEASEKEY date. VDL replacement is required for civil airspace compliance. This effort complies with the Cryptographic Mandate.</p> <p>If requirements are not met, KC-135 aircraft risk ineffective communications via unsecure voice, lose data communications, anti-jam capabilities, and realize limited maintenance capabilities to support legacy radios. This will significantly degrade the ability to support worldwide operations.</p> <p>This modification will include Integration and Test of updated Operating Flight Plan software and Prototype; ARC-210 Gen 6 to replace the current Gen 3; removal of VDL, integrate and replace with VHF-4000E.</p> <p>FY 2024 Plans: EMD activities (contract award, SRR, Upfront SIL testing)</p> <p>FY 2025 Base Plans:</p>					
	4.615	2.189	8.492	0.000	8.492

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
EMD activities (CDR, DT/OT and software release) FY 2025 OCO Plans: Complete EMD FY 2024 to FY 2025 Increase/Decrease Statement: Funding decreased due to transition from Engineering, Manufacturing, and Development phase to Procurement.					
Title: MAF Connectivity Description: Congressional Add received Oct 2023: Capabilities using the KC-135 to develop MAF Connectivity path forward as the tanker needs to be able to connect to the Joint fight to close kill chains and logistics chains. Possible capabilities include, but are not limited to, intelligent gateways, antennas, radios, software updates, crew displays, and multiple aperture array housings. FY 2024 Plans: Contract awards, development, integration/testing and research (phase 2) FY 2025 Base Plans: N/A FY 2025 OCO Plans: N/A FY 2024 to FY 2025 Increase/Decrease Statement: N/A	5.824	10.654	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	18.409	51.105	31.977	0.000	31.977

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025 Base</u>	<u>FY 2025 OCO</u>	<u>FY 2025 Total</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>FY 2029</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 C13500: C-135	144.557	153.595	146.564	-	146.564	175.454	139.928	206.590	171.045	455.100	1,592.833
• APAF 06 C13500: <i>Initial Spares</i>	2.024	2.591	3.240	-	3.240	4.857	6.350	6.285	4.424	0.000	29.771

Remarks

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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force Date: March 2024

Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development*

R-1 Program Element (Number/Name)
PE 0401218F / KC-135s

E. Acquisition Strategy

KC-135 MUOS acquisition strategy addresses cryptographic modernization mandates and DoD directives by executing a 28 month, Sole Source, Cost Plus Fixed Fee EMD contract followed by a three-year production and installation effort.

KC-135 MUOS Radio Major Events/Milestones: Critical Design Review 3QFY23; Development Testing/Operational Testing 4QFY24; Milestone-C 1QFY25

Center Console Refresh (CCR)
Planned ASP approval 2QFY24
Planned Award 1QFY25

KC-135 HF radio acquisition strategy addresses HF modernization mandates and DoD directives by executing a 12 month, Sole Source, Cost Plus Fixed Fee EMD contract followed by a three-year procurement (AFLCMC/WNY will maintain the production contract with BAE) and installation effort.

High Frequency Modernization Major events: Program start-up, Early Strategy and Issues Session 2QFY24

COMM2 Crypto & Data acquisition strategy addresses crypto modernization mandates and DoD directives by executing a 15 month, Sole Source, Cost Plus Fixed Fee EMD contract followed by a three-year production and installation effort.

KC-135 Winglets
Planned ASP approval 3QFY24
Planned Award 4QFY24

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0401218F / KC-135s	Project (Number/Name) 675261 / KC-135 Upgrades
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Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
MUOS Radios Product Development (Integration)	SS/CPFF	Collins Aerospace : Cedar Rapids, IA	-	6.270	Mar 2023	5.400	Mar 2024	-		-		-	Continuing	Continuing	-
COMM 2 Crypto and Data Radio Product Development (Integration & Test)	SS/CPFF	Collins Aerospace : Cedar Rapids, IA	-	4.000	Jan 2024	1.821	Jun 2024	7.982		-		7.982	Continuing	Continuing	-
COMM 2 Crypto and Data EMD Kits	MIPR	Not specified. : TBD	-	0.615	Jul 2023	-		-		-		-	Continuing	Continuing	-
HF Radio Modernization Integration	SS/CPFF	Not specified. : TBD	-	-		3.000	Jul 2024	-		-		-	Continuing	Continuing	-
Center Console Refresh Product Development	C/FPIF	Not specified. : TBD	-	-		10.850	Jun 2024	15.175	Nov 2024	-		15.175	Continuing	Continuing	-
Winglets Development	C/CPAF	Not specified. : TBD	-	-		10.000	Mar 2024	-		-		-	Continuing	Continuing	-
MAF Connectivity	TBD	Not specified. : TBD	-	5.824	Sep 2024	10.653	Dec 2024	-		-		-	Continuing	Continuing	-
Subtotal			-	16.709		41.724		23.157		-		23.157	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
MUOS Support	Various	Not specified. : TBD	-	0.018	Mar 2024	0.027	May 2024	-		-		-	Continuing	Continuing	-
HFM (Travel)	Various	Not specified. : TBD	-	0.072	Sep 2023	-		-		-		-	Continuing	Continuing	-
CCR Support	Various	Not specified. : TBD	-	1.030	Mar 2024	0.460	Jan 2024	2.129	Jan 2025	-		2.129	Continuing	Continuing	-
COMM2 (Travel+Shipping)	Various	Not specified. : TBD	-	-		0.054	Jul 2024	-		-		-	Continuing	Continuing	-
Winglets Support	Various	Not specified. : TBD	-	-		0.582	Mar 2024	-		-		-	Continuing	Continuing	-
MAF Connectivity	Various	Not specified. : TBD	-	-		0.001		0.001		-		0.001	Continuing	Continuing	-
Subtotal			-	1.120		1.124		2.130		-		2.130	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0401218F / KC-135s	Project (Number/Name) 675261 / KC-135 Upgrades
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Test and Evaluation (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
Winglets Flight Test and Certification	TBD	Not specified. : TBD	-	-		2.500	Mar 2024	-		-		-	Continuing	Continuing	-
CCR Edwards Testing	C/CPAF	Not specified. : TBD	-	0.220	Jul 2023	-		1.200	Feb 2025	-		1.200	Continuing	Continuing	-
Subtotal			-	0.220		2.500		1.200		-		1.200	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
CCR Dir Cite Auth Civ Pay	Various	System Program Office : Tinker AFB, OK	-	0.360	Mar 2023	1.910		2.260	Oct 2024	-		2.260	Continuing	Continuing	-
CCR PSC	Various	System Program Office : Tinker AFB, OK	-	-		0.900	Feb 2024	2.720		-		2.720	Continuing	Continuing	-
MUOS (PSC)	Various	Not specified. : TBD	-	0.000	Sep 2023	2.163	Jul 2024	-		-		-	Continuing	Continuing	-
MUOS OGC	Various	Not specified. : TBD	-	0.000	Oct 2023	0.123	Apr 2024	-		-		-	Continuing	Continuing	-
HF (PSC)	Various	Not specified. : TBD	-	0.000	Apr 2023	0.000	Mar 2024	-		-		-	Continuing	Continuing	-
COMM 2 CRYPTO PSC	Various	Not specified. : TBD	-	0.000	Oct 2023	0.314	Jun 2024	-		-		-	Continuing	Continuing	-
COMM2 CRYPTO OGC	Various	Not specified. : TBD	-	0.000	Oct 2023	0.000	Jan 2024	0.510		-		0.510	Continuing	Continuing	-
Winglets (PSC)	Various	Not specified. : TBD	-	-		0.347	Mar 2024	-		-		-	Continuing	Continuing	-
Subtotal			-	0.360		5.757		5.490		-		5.490	Continuing	Continuing	N/A

	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals		-	18.409	51.105	31.977	-	-	31.977	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0401218F / KC-135s	Project (Number/Name) 675261 / KC-135 Upgrades
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FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029			
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

KC-135 MUOS Radio	
EMD, Test, and MS C	
COMM 2 Crypto and Data	
Contract award, EMD and Test	
HF Modernization	
Contract award, EMD and test	
Center Console Refresh (CCR)	
Contract award, EMD and Test	
Winglets	
Contract award, EMD and Test	
MAF Connectivity	
Contract award, Integration/Test/Reserch	

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Air Force **Date:** March 2024

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0401218F / KC-135s	Project (Number/Name) 675261 / KC-135 Upgrades
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
KC-135 MUOS Radio				
EMD, Test, and MS C	1	2023	1	2025
COMM 2 Crypto and Data				
Contract award, EMD and Test	3	2024	4	2025
HF Modernization				
Contract award, EMD and test	3	2024	4	2025
Center Console Refresh (CCR)				
Contract award, EMD and Test	1	2025	3	2028
Winglets				
Contract award, EMD and Test	3	2024	2	2025
MAF Connectivity				
Contract award, Integration/Test/Reserch	4	2023	4	2024