Weapon Systems Modernization Priorities Book

AIR NATIONAL GUARD

2021

AIR NATIONAL GUARD

FOREWORD

The year 2020 has challenged our nation and the world in extraordinary ways. Despite these immense challenges, modernizing Air National Guard (ANG) assets remains critical to supporting our warfighting and domestic mission sets. Keeping our assets relevant ensures we can face a worldwide pandemic and still execute a variety of missions at home and overseas. The ANG remains committed to concurrent support of deployments with combat-ready contingency forces in every corner of the world, while retaining our strong connection with our local communities through our domestic support to civil authorities.

At the heart of the ANG modernization process is the Air Reserve Components' Weapons and Tactics Conference (WEPTAC), where deliberation amongst our unit experts in every major weapon system leads to defining clear capability requirements, industry engagement, and implementation of off-the-shelf capabilities. This process directly influences U.S. Air Force-wide weapon system transformation and interoperability in line with the "modernize key capabilities" tenants of the *2018 National Defense Strategy*.

Although this year's WEPTAC utilized a "hybrid model" to greatly reduce physical presence at the conference, all the working groups still convened, many of them virtually, and provided the necessary input to help shape our weapon systems' priorities.

The priorities identified in this book will continue to improve readiness and prepare the ANG to meet the future challenges of our Nation, both locally and globally.

MICHAEL A. LOH
Lieutenant General, USAF
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Introduction

The 2021 Air National Guard (ANG) Weapons Systems Modernization Priorities Book documents capability priorities identified during the October 2020 Air Reserve Component Weapons and Tactics (WEPTAC) Conference. WEPTAC hosted representatives from all ANG and Air Force Reserve (AFR) units, as well as representation from the active component.

The 2021 WEPTAC Book is organized into 19 weapon system mission sets. Each Tab begins with a summary page of capabilities identified at WEPTAC, categorized as Critical (Crucial - within the next one to three years), Essential (Vital - within the next three to five years), or Desired (Enhances mission success in the five-year timeframe).

For each Critical capability identified, an information paper is included within the weapon system Tab. A header within each information paper identifies its appropriate Service Core Function or functional category as one of the following:

Air Superiority / Global Precision Attack
Rapid Global Mobility
Space Superiority / Cyberspace Superiority
Command and Control
Global Integrated ISR
Special Operations / Personnel Recovery
Simulation and Distributed Mission Operations
Agile Combat Support

Applicable Funding Appropriation Definitions

0350 – National Guard and Reserve Equipment Account
3840 – ANG Operations and Maintenance, one-year funding
3010 – Aircraft Procurement, three-year funding
3600 – Research and Development, two-year funding
3080 – Other Procurement, three-year funding
(NOTE: In most cases, Non-Recurring Engineering (NRE) costs are paid for with 3600 Research, Development, Test and Engineering (RDT&E) money, but in some cases they can be paid for with 3010, 3080, or 0350 procurement money.)

The State Matrix, found on the next page, identifies ANG weapons systems locations by state/territory. These depictions reflect the force structure as of 01 Dec 2020.

State Matrix

Weapons System Reference Table by State (01 Dec 2020)

Refer to Weapon System Tabs for Specific Information (Classic Associate Units are shown in red.)

	A-10	B-2	C-17	C-130H/J	Special Mission C- 130	C-32B, E-8C, C-40	F-15	F-16	F-22	HH-60	KC-135	MQ-9	AOC, BCC, CRC	Cyber, Space	DCGS, MC-12W, RC-26B	GA / ST / TACP	Range
AK			●	H	HC					●	●		BCC	Space		GA	
AL								●			●				RC-26B /DCGS		
AR				H								●		Cyber	DCGS		
AZ								●			●	●			RC-26B		
CA				J	HC		●			●		●		CY/SP(2)	RC-26 / DCGS	GA	
CO								●						Space(3)			Range
CT				H									CRC				
DC						C-40		●									
DE				H										Cyber			
FL							●						AOC	Space			
GA				H		E-8C							CRC		DCGS	TACP	
GU														Space			
HI			●						●		●		AOC/BCC	Space	DCGS		
IA											●	●	CRC	Cyber	DCGS / RC-26		DMO
ID	●													Cyber		TACP	
IL				H							●		AOC			TACP	
IN	●														DCGS	TACP	Range
KS											●		CRC	Cyber(3)	DCGS	TACP	Range
KY				H												ST	
LA							●									TACP	
MA							●								DCGS		
MD	●			H										Cyber(3)			
ME											●						
MI	●										●	●	AOC	Cyber			
MN				H				●									
MO		●		H									AOC				Range
MS			●								●		AOC/CRC		RC-26B	TACP	Range
MT				H													
NC			●	H												TACP	
ND												●			DCGS		
NE											●						
NH											●						
NJ						C-32B		●			●			Cyber		TACP	Range
NM					HC/MC					●					RC-26B /DCGS		
NV				H											DCGS		
NY			●		HC/LC					●		●	AOC/BCC	Space		GA/TACP	Range
OH				H				●			●	●	CRC				
OK								●							MC-12W	TACP	
OR							●						CRC			ST	
PA					EC-130J						●	●	AOC	Cyber		TACP	Range
PR				H									CRC				
RI				J										Cyber			
SC								●									
SD								●									
TN			●								●	●		Cyber	DCGS		
TX				H				●				●		Cyber	RC-26B	TACP	Range
UT											●		CRC		DCGS		
VA									●					Cyber	DCGS		
VI																	
VT								●						Cyber			
WA											●		BCC	Cyber(2)	RC-26B	TACP	
WI								●			●		CRC		RC-26B		Range
WV			●	H											RC-26B		
WY				H													

A-10

- **Close Air Support (CAS)**
- **Forward Air Controller – Airborne (FAC-A)**
- **Combat Search and Rescue**
- **ANG Units Provide 40% of the Total Fleet**

The A-10 is well-suited to execute current and future Overseas Contingency Operations. With eleven weapons stations, the A-10 can engage any target with a wide variety of general-purpose and precision munitions, including its 30-millimeter cannon. The A-10's combat survivability, wide combat radius, and ability to land at and operate from austere airfields provide flexibility beyond that of other fixed-wing Air Force close air support assets. Its extensive loiter time and advanced targeting pod capabilities provide superior support for ground forces in its Forward Air Controller-Airborne role.

The ANG operates 85 A-10s in four squadrons. ANG aircraft have the helmet-mounted integrated targeting modification, drastically reducing the time required to acquire targets. This ultimately increases both survivability and lethality. ANG A-10 aircraft are equipped with two ARC-210 radios, giving them a unique capability to simultaneously communicate via secure line-of-sight and beyond-line-of-sight, extensively contributing toward successful combat search and rescue mission success.

Current, A-10 modernization priorities include a high-resolution center display, which allows pilots to see the high-definition picture provided by targeting pods. Display upgrades improve A-10 pilots' ability to positively identify friendly forces while aiding in the search, identification, surveillance, and tracking of enemy personnel. Additional upgrades include an integrated noise-canceling, a three-dimensional cockpit audio system, and an anti-jam embedded Global Positioning System.

A-10
2020 Weapons and Tactics Conference

Critical Capabilities List

- Digital high-definition targeting pod interface and display
- Automated, digital electronic warfare suite
- Find, fix, and target within a contested, degraded, and operationally limited environment
- Improve ability to tactically deploy to (and operate from) austere airfields
- Upgraded communications systems which function within contested, degraded, and operationally limited environments

Essential Capabilities List

- Integrate fire and forget autonomous targeting and sorting anti-armor weapon capable of standoff from modern threat systems from all altitudes in a contested, degraded, and operationally limited environment
- Full AIM-9X integration
- Improved high definition digital recording capability of all displays, HUD, and sensors
- All-weather capability to Find/Fix/Target within a contested, degraded, and operationally limited environment
- Digital suspension equipment integration

Desired Capabilities List

- Integration of network-enabled long-range/stand-off munitions
- Improved zero illumination night vision, capable of viewing in multiple spectrums
- Rapid and agile hardware integration capability
- Standardized squadron deployable communications and mission planning suite

A-10: DIGITAL HIGH-DEFINITION TARGETING POD INTERFACE AND DISPLAY

1. Background. ANG A-10s require improved Positive Identification (PID), intelligence, surveillance, reconnaissance, and battle-tracking capabilities. Friendly forces and enemy combatant PID are crucial in any conflict. Advanced Targeting Pod (ATP) digital output upgrades with color video provide high-resolution feeds, coupled with high-definition displays, and enable visual identification of friendly and enemy forces from greatly increased standoff ranges. High-resolution displays in the A-10 enable full utilization of targeting pod color improvements. Each of the 85 ANG A-10s requires an upgraded high-resolution display system.

2. Program Details.

Quantity	Unit Cost	Program Cost
High-Resolution Display Non-Recurring Engineering (3010)	**N/A**	**$9,000,000**
94 High-Resolution Displays (3010) *	**$420,000**	**$39,480,000**
Total		**$48,480,000**

* Includes 10% spares

A-10: AUTOMATED DIGITAL ELECTRONIC WARFARE SUITE

1. Background. The A-10 electronic warfare (EW) suite requires considerable modernization to keep pace with surface-to-air threat technology advancements and proliferation. The Air Force identified these vulnerabilities in the 2012 A-10 Operational Viability and Sustainment Gap Analysis Report. A-10 EW modernization requires a focus on several critical capabilities in the radio frequency spectrum: radar warning receiver (RWR) modernization and improved chaff program development. The A-10 fleet has a legacy analog electronic attack (EA) Pod (ALQ-184). All require replacements that are digital-based. A-10 vulnerabilities in the infrared (IR) spectrum must also be addressed through the development of IR countermeasures (IRCM) which effectively decoy modern IR threats by replacing the AAR-47 with a missile warning system capable of detecting those threats more reliably and at greater distances. Modernized EW suite subsystems, architecture, and countermeasures will allow the A-10 to conduct full-spectrum combat operations in the vast majority of today's contested environments. Each of the 85 ANG A-10s requires an ALR-69A kit and advanced IRCM system as well as a new EA Pod.

2. Program Details.

Quantity	Unit Cost	Program Cost
ALR-69A RWR Non-Recurring Engineering (NRE) (3010)	**N/A**	**$5,000,000**
94 ALR-69A Upgrades (3010) *	**$600,000**	**$56,400,000**
Advanced IRCM System NRE (3010)	**N/A**	**$10,000,000**
94 Advanced IRCM Systems (3010) *	**$500,000**	**$47,000,000**
EA Pod NRE (3010)	**N/A**	**$10,000,000**
89 EA Pod Replacement (3010)	**$1,320,000**	**$117,480,000**
Total		**$245,880,000**

* Includes 10% spares

A-10: FIND, FIX, AND TARGET WITHIN A CONTESTED, DEGRADED, AND OPERATIONALLY LIMITED ENVIRONMENT

1. Background. The A-10 requires the ability to operate in a Global Positioning System (GPS) degraded environment. Virtually every system on the A-10 depends on the highly accurate timing, position, orientation, and velocity data the Embedded GPS/Inertial Navigation System (INS) [EGI] provides. Adversary attempts to deny GPS capability may degrade or limit the precision of A-10 navigation solutions, decreasing positional awareness, and weapons employment accuracy. The first step to counter or minimize this threat is the installation of a controlled reception pattern antenna, coupled with a digital antenna electronics unit, to nullify the effects of jamming systems. The integration of selective availability anti-spoofing modules reduces the impact of jamming and protects GPS military precise positioning service accuracies. The A-10 needs greater precision and reliability to comply with the national airspace system transition to satellite-based air traffic control. Upgrading the A-10 EGI supports the FAA mandate and provides increased capability to preserve GPS integrity in a contested or degraded electromagnetic environment. Each of the 85 ANG A-10s requires an anti-jam EGI.

2. Program Details.

Quantity	Unit Cost	Program Cost
Anti-Jam EGI Non-Recurring Engineering (3010)	**N/A**	**$15,500,000**
94 Anti-Jam Kits (3010) *	**$225,000**	**$21,150,000**
Total		**$36,650,000**

* Includes 10% spares

A-10: IMPROVED ABILITY TO TACTICALLY DEPLOY TO (AND OPERATE FROM) AUSTERE AIRFIELDS

1. Background. ANG A-10s require an enhanced ability to operate from austere airfields with fewer maintenance and logistics personnel. These capabilities provide Combatant Commanders the flexibility to pre-deploy A-10s closer to the battlespace and enable rapid response during close air support, Forward Air Controller-Airborne, and combat search-and-rescue sorties. Conversion fuel tanks provide additional endurance and minimize the need for additional refueling operations. Each of the four ANG A-10 squadrons requires 32 fuel tanks.

2. Program Details.

Quantity	Unit Cost	Program Cost
Conversion Fuel Tank Non-Recurring Engineering (NRE) (3010)	**N/A**	**$1,000,000**
128 Conversion Fuel Tanks (3010)	**$88,500**	**$11,328,000**
Total		**$12,328,000**

A-10: UPGRADED COMMUNICATIONS SYSTEMS FOR CONTESTED, DEGRADED, AND OPERATIONALLY LIMITED ENVIRONMENTS

1. Background. ANG A-10s require an improved communications suite due to the lack of interconnectivity and security compatibility with many fielded communication and data link systems. An improved A-10 communication suite consists of Three-Dimensional (3D) audio, enhanced data link and associated equipment. Two ARC-210 Generation (Gen) 6, Mobile User Objective System (MUOS) multi-mode digital radios, meet the need for simultaneous beyond-line-of-sight and secure line-of-sight communications. The integration of noise-canceling and 3D audio in the cockpit increases situational awareness by spatially separating aural warning and radio signals and providing angular cueing to ground and air threats when used in conjunction with a Helmet Mounted Cueing System (HMCS). Spatial separation and reduction in ambient noise significantly increase the pilot's ability to process information simultaneously arriving from multiple radios and warning systems. Legacy Situational Awareness Data Link equipment has proven inadequate due to a lack of currently fielded support infrastructure, frequency band constraints, and Joint Interface Control Cell support. The transition of A-10 aircraft to Link 16 will allow seamless deployment, connectivity, and interoperability with the entire A-10 fleet. All ANG A-10s require growth in data link equipment due to the future mandates that will eliminate current SADL communications equipment.

2. Program Details.

Quantity	Unit Cost	Program Cost
ARC-210 Gen 6 MUOS Capable Radios NRE (3010)	**N/A**	**$3,000,000**
179 ARC-210 Gen 6 MUOS Radios (3010) * **	**$100,000**	**$17,900,000**
Directional Audio Non-Recurring Engineering (NRE) (3010)	**N/A**	**$5,000,000**
94 Directional Audio Kits (3010) *	**$80,000**	**$7,520,000**
200 Directional Audio Pilot Equipment (3010) *	**$7,000**	**$1,400,000**
12 Unit Test Equipment (3010) *	**$45,000**	**$540,000**
Data Link (Link 16) Non-Recurring Engineering (3010)	**N/A**	**$3,000,000**
85 Data Link Upgrades	**$200,000**	**$17,000,000**
Total		**$55,360,000**

* Includes 10% spares
** Two radios per aircraft

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Command and Control

- **Air Surveillance and Defense for North America and Hawaii**
- **Air Battle Management**
- **C-NAF Integration/Augmentation**
- **Military Range Control**
- **Ground Controlled Intercept**
- **Flight Safety Monitoring**

Air Operations Center (AOC). The AOC weapon system is employed by the Joint Forces Air Component Commander (JFACC), facilitating operational control and direction of theater air, and space and cyber forces. Air National Guard AOC and Air Force Forces (AFFOR) staffs are comprised of personnel and facilities postured to support Homeland Defense, Overseas Contingency Operations, and Defense Support of Civil Authorities (DSCA). AOC personnel are organized as divisions specializing in integrated, distributive Command and Control processes, and products. The AFFOR staff is organized as special and functional directorates which provide planning teams to the Commander Air Force Forces in support of the JFACC.

Battle Control Center (BCC). The BCC operations force includes four ARC operations groups and squadrons. BCCs support North American Aerospace Defense and Northern Command as part of the homeland defense mission, DSCA, and search and rescue. BCCs provide 24/7 aerospace surveillance, warning, control, and maritime warning in the defense of North America.

Control and Reporting Center (CRC). The CRC, at the operational and tactical level, provides surveillance, tactical communications, data links, and combat-related air battle management of joint air operations with real-time networked situational awareness. There are 10 CRC units across the enterprise that support both Active Duty and ANG missions.

Command and Control
2020 Weapons and Tactics Conference

Critical Capabilities List

AOC

- Weapon System Modernization
- Data Link Training Tool
- Secure Voice Capability
- Single Pane of Glass Display Capability
- Mission Defense Team Toolkit

BCC

- Battle Management Training Next
- Agile Operations Center
- Beyond Line of Sight High-Frequency Capability
- Sector-level Data Link Lab
- Sector Data Wall

CRC

- Radar Replacement and Modernization
- Electronic Attack Training Suite
- Remote Radar and Voice Communications Integration
- 23A Rapid Deployable Interface Kit
- Data Link Training Suite

Essential Capabilities List

AOC

- Redundant Independent Circuit Path
- Coalition Network Access
- Joint Worldwide Intelligence Communications System with VTC
- Common Operating Picture/Common Intelligence Picture
- Full Motion Video ISR Integration Applications and Hardware

BCC

- In-Sector Coder Software Licenses
- Data Ecosystem Technical Integration
- Advanced-Data Link Upgrade
- Battle Management Aids

CRC

- Advanced Intelligence and Fire Control Interoperability Feeds
- Security Upgrades for TSCIF Compliancy
- Data Cross-Domain Solution Incorporating Chat
- MDT Training Suite

Desired Capabilities List

To save space, desired lists can be obtained upon request from NGB/A5.

AOC: WEAPON SYSTEM MODERNIZATION

1. Background. ANG Air Operations Center (AOC) units require the modernized Block 20 Falconer Weapon System to maintain readiness with the impending termination of the current 10.1 Weapon System. The absence of an Air Reserve Component (ARC) Block-20 AOC weapon system fielding plan will significantly detriment the ARCs ability to provide the support aligned AOCs depend on for combat mission ready (CMR) manning and distributed Multi-Domain Operations (MDO). The current plan does not include fielding hardware to functional AOCs or ARC Air Operations Groups (AOG). Instead, ARC units are expected to access the weapon system strictly through the Cloud environment with no consideration for an external network outage. The planned approach presents multiple challenges to ARC AOGs combat mission readiness/operational training, ongoing distributed operations, and effective reach-back capability for aligned geographic AOCs. It presents a risk to the mission through degradation challenging ARC AOG unit's access to the Cloud in a conflict where the cyber-enabled environment is contested and/or degraded. Program Action Directive 10-2 directs ARC units to train to the same standard as their aligned active-component AOC—requiring ARC-aligned systems to match as closely as possible. Attachment 2 to Air Force Policy Directive 13-1 directs that ARC upgrades should be timed to coincide with their geographically supported-aligned AOC. The current plan to field Block-20 Weapon System hardware only to active-component AOCs is inconsistent with this guidance, presenting a risk to readiness and potential risk to mission during operations necessitating Distributed Operations, Split Operations, Reach-Back, and Continuity of Operations (COOP). The six ANG AOCs require one Block-20 Lite AOC-Weapons System each consisting of scaled down hardware and software to directly support aligned AOC requirements for CMR augmentation and distributed operations.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Block-20 Lite Hardware/Block 20 Weapon System (3080)	**$2,500,000**	**$15,000,000**
Total		**$15,000,000**

AOC: DATA LINK TRAINING TOOL

1. Background. ANG Air Operations Center units require an operational level data link training tool to allow the Joint Interface Control Cell (JICC) operators to conduct training on a significant number of Air Combat Command (ACC) mandated training task list items outlined in Air Force Instruction 13-1, Volume 3, ACC/A3. Unlike the active component, ANG units cannot consistently accomplish data link training using a "live" architecture from home station. The data link training tool will need to interface with the various Tactical Data Systems (TDS) to set up, manage, and manipulate a simulated data link architecture. The data link training tool will need to have a database that incorporates current and future Army, Navy, Marine, and Air Force assets. The training tool will, at a minimum, allow an operator to manipulate Department of Defense assets in a three-dimensional environment (range, altitude, and Latitude/Longitude), add/remove net time reference, accurate line-of-sight calculations between airborne, ground, and surface assets, and allow operators to identify data loops and lag situations. These requirements will allow for the transmission and reception of J-Series message traffic anomalies. These requirements allow the JICC to simulate and manage a real-world architecture and inject link problems that would require operator input to identify and correct. An operational level data link training tool will support link training requirements for the JICC operators and allow its team to maintain readiness in data link management and C2 operations. Solutions to this requirement must have an Authority to Operate or an Interim Authority to Operate to allow seamless integration with the Weapons System and the TDS components. This upgrade will be for six of the ANG AOCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Training Systems w/HD Support (3080)	**$1,272,000**	**$7,632,000**
Total		**$7,632,000**

AOC: SECURE VOICE CAPABILITY

1. Background. ANG Air Operations Center (AOC) units require the capability to communicate directly via radio to supported commanders, fielded units, and state emergency agencies. ANG AOCs need a modernized secure core radio package (CRP), a Mobile User Objective System tactical satellite-compatible radio, a high-frequency (HF) radio, antenna systems, and radio-to-internet protocol (IP) bridge and communications security equipment. AOC units must train and operate on the same systems as their supported active component AOCs. Without these capabilities, units cannot train or execute to full mission requirements. ANG AOCs require five of the following: CRPs, HF radios, and IP bridges.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 CRPs (3080)	**$130,000**	**$650,000**
5 HF Radios (3080)	**$40,000**	**$200,000**
5 IP Bridges (3080)	**$300,000**	**$1,500,000**
Total		**$2,350,000**

AOC: SINGLE PANE OF GLASS DISPLAY CAPABILITY

1. Background. ANG Air Operations Center (AOC) operators and Air Force contingency planners need a single pane of glass (SPG) to conduct operations and training. The SPG solution provides simultaneous views of multiple classified and unclassified domains from a single client, enabling enhanced awareness of the battlespace. The SPG solution must be able to support the performance requirements of the graphics-intensive applications inherent to Block 20 AOC Weapon System. A SPG solution is vital to modernizing AOC operations, bringing enhanced capability to the operator for more effective and efficient mission execution. This capability is required for six ANG AOCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 SPG Solutions (3080)	**$1,000,000**	**$6,000,000**
Total		**$6,000,000**

AOC: MISSION DEFENSE TEAM TOOLKIT

1. Background. ANG Air Operations Center (AOC) units require mission defense team (MDT) Toolkits to maintain readiness support to protect local weapons systems (WSs) from compromise by adversaries in a continually contested environment. Program Action Directive 10-2 directs Air Reserve Component (ARC) units to train to the same standard as their aligned active-component AOC and requires ARC-aligned systems to be as similar as possible. The active component AOC's only have the manpower to sustain normal phase one daily operations, they rely heavily on the ARC to augment them during increased tempo operations. Without these MDT toolkits, the ARC Air Communications Squadrons (ACOMS) will be unable to meet the four Air Force information dominance strategic goals. Those goals of assuring freedom of action, providing trusted information, developing a cyber-workforce, and optimizing the planning/resources/acquisition requirements. The continued evolution of AOCs weapons system allows the active component AOCs the ability to remotely train and conduct distributed operations. These operations require ARC Weapons Systems to have the same level of data integrity, availability, and non-repudiation of the active duties AOCs. Without properly trained augmentation from aligned ARC ACOMS the active component is potentially vulnerable to cyber compromises. The inability to address a never-ending cyber threat may result in mission compromise or disruption. This capability is required for each of the six ANG AOCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Mission Defense Team Toolkits (3080)	**$500,000**	**$3,000,000**
Total		**$3,000,000**

BCC: BATTLE MANAGEMENT TRAINING NEXT

1. Background. ANG Battle Control Centers (BCC) require the ability to conduct all initial qualification training, mission qualification training, and continuation training using deployed in-garrison personnel. BCCs are the desired operational capability statement tasked to conduct all training objectives at each squadron. An intelligent instruction system would optimize instructional areas where repetition and accessibility are critical. The solution should leverage advanced technology such as artificial intelligence, machine learning, natural language processing, and eye-tracking. The solution should present realistic, self-guided training scenarios, and debriefing tools, which will ultimately reduce the instructor support requirements. The BCCs need the solution implemented incrementally beginning with single-player instructional modules, part-task trainers, and scenarios, followed with more complex missions and threats, and finally as a multi-player, a secured system incorporating the latest advanced threats, environments, and capabilities. This capability is required for each of the four BCCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
Single Player Core Skills Integration (3080)	**N/A**	**$965,000**
Single Player Complex Skills and Threats (3080)	**N/A**	**$600,000**
Multi-Player/Secure/Advanced Training Suite (3080)	**N/A**	**$2,545,000**
Total		**$4,110,000**

BCC: AGILE OPERATIONS CENTER

1. Background. ANG Battle Control Centers (BCC) require the modernization of the operation center infrastructure at the Eastern Air Defense Sector (EADS), Western Air Defense Sector (WADS), Alaskan Air Defense Sector (AADS), and Pacific Air Defense Sector (PADS), to increase operator efficiency, expedite decision making and accommodate the Joint All Domain Command and Control concept and the Advance Battle Management System. The Agile Ops Center accomplishes this through the use of a video matrix fusion engine. The use of this technology is to classify agnostic enabling potential future higher classification levels and eliminates multi-classification-level equipment separation requirements between systems on operation floors. The Agile Ops Center covers all "front-end" IT to include passive infrastructure (e.g. fiber/copper cabling), integrated furnishings Systems, audio, visual, Keyboard, Video, and Mouse (KVM) switch, telephony, and video matrix technology. Additional items include "back-end" active infrastructure (i.e. network routers, switches, and all "non-Pathfinder Integrated" mission systems). Agile Ops Center technology delivers continuous infrastructure and human factors for homeland defense performance at the speed of relevance that are not possible with the current infrastructure. The current infrastructure and user interface/number of interfaces required causes exponential differences in a timeline from minutes to seconds for the BCC team. This timeline includes the ability to detect, identify, track, decide to alert/scramble shooters, and potentially defeat threats to U.S. citizens. An Agile Ops Center is required for each of the four BCCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
EADS Agile Ops Center-4832 Sq Ft (3080)	**$2,000**	**$9,664,000**
WADS Agile Ops Center-5575 Sq Ft (3080)	**$2,000**	**$11,150,000**
AADS Agile Ops Center-3736 Sq Ft (3080)	**$2,000**	**$7,472,000**
PADS Agile Ops Center-4730 Sq Ft (3080)	**$2,000**	**$9,460,000**
Total		**$37,746,000**

BCC: BEYOND-LINE-OF-SIGHT HIGH-FREQUENCY CAPABILITY

1. Background. The Battle Control Centers (BCC) require modernized tactical data link and enhanced communication capabilities to meet evolving mission requirements. Access to a High-Frequency (HF) global terminal is needed to support air defense command and control mission requirements using beyond-line-of-sight HF Link 11 as the primary means of data transfer and communication. Homeland defense missions regularly occur over water and/or polar regions where connectivity is sparse or non-existent. Access to global Link 11 capabilities will mitigate connectivity issues and enable Higher Headquarters situational awareness. This capability is needed for three BCCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
3 HF Global Terminals (3080)	**$1,200,000**	**$3,600,000**
Total		**$3,600,000**

BCC: SECTOR-LEVEL DATA LINK LAB

1. Background. The Battle Control Centers (BCC) Joint Interface Control Cell (JICC) requires a standalone data link lab to address Multi-Tactical Data Link (TDL) Network (MTN) operational, testing, and training limitations. The CONUS JADC2 data link architecture is limited by fixed link nodes that are vulnerable to contested or degraded operations. Adding data link equipment adds operational edge resilience by providing equipment ready to host CONUS networks. The data link lab would also allow the Joint Interface Control Officer (JICO) to test operations TDL architectural reconfigurations and to experiment with protocol-specific changes before implementation without interfering with the operational architecture. The experimentation and testing of these changes and features would lead to a more efficient and effective tactical network. Additionally, as a different user using the same equipment sets, Interface Control Officers/Technicians (ICO/T) need an MTN separate from the operational MTN on which to train to become proficient at configuration and troubleshooting techniques before interfacing with the operational network to avoid significant unwanted impacts. The development of a training lab designed with specific capabilities in mind would provide ICTs a standalone and isolated environment that is available for training at any time. ICTs and their instructors undergoing structured training regiments, evaluations, or performing remedial training would have a dedicated suite of systems available to work specific scenarios focusing on the needs of each trainee. TDL training simulators allow ICO/Ts to train on current and future capabilities not currently implemented such as Integrated Fire Control, command and control Weapons Commands, and Electronic Warfare. This capability is needed for each of the four BCCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 Ground TDL System (3080)	**$80,000**	**$320,000**
4 Halo Satellite Communications Simulator (3080)	**$60,000**	**$240,000**
Total		**$560,000**

BCC: SECTOR DATA WALL

1. Background. ANG Western Air Defense Sector (WADS) require a Video Data Wall to display mission-critical information about the Air Defense Mission. The visualization of mission data for all operators to see during an air intercept is vital to the success of the mission. Currently, WADS relies on disjointed displays to include projectors and monitors to cobble together situational awareness of the command and control function. A new Video Data Wall will standardize the type of viewing medium weather projector or monitor and it will allow many different types of data sources to be displayed at any given time. Additionally, current technology will make operation and maintenance of the new data wall seamless to the end-user. This capability is needed for the WADS sector.

2. Program Details.

Quantity	Unit Cost	Program Cost
1 Video Data Wall (3080)	**$1,300,000**	**$1,300,000**
Total		**$1,300,000**

CRC: RADAR REPLACEMENT AND MODERNIZATION

1. Background. ANG Control and Reporting Centers (CRC) need a radar replacement for the AN/TPS-75 radar. The CRCs require a long-range radar with equal or greater range than the TPS-75 radar. The radar must provide 360-degree coverage and the capability to detect low observable threats, unmanned aerial systems, and cruise missiles, keeping pace with evolving threat capabilities. It will need to be frequency diverse from the AN/TPS-75 radar to provide redundancy and survivability to the CRC and its defended assets. If an immediate purchase or lease of radar is unavailable, the community needs to modernize the TPS-75. Key components of the TPS-75 radar need to be replaced or updated, with an upgrade that includes a Mode 5 interrogation to keep the CRC's relevant and deployable as the primary surveillance component of Air Force command and control. The modernization will allow the CRCs to remain current until the Air Combat Command purchases and fields a new long-range radar for each squadron. One Long-Range Radar or modernization kit is required for each of the 10 ANG CRCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
12 Radars (3080) *	**$3,800,000**	**$45,600,000**
12 Modernization Kits (3080) *	**$1,200,000**	**$14,400,000**
Total		**$60,000,000**

* Includes 20% spares

CRC: ELECTRONIC ATTACK TRAINING SUITE

1. Background. ANG Control and Reporting Centers (CRC) require the capability to simulate electronic attack (EA) against the CRC radar during real-world training. CRCs do not have the capability to train against an EA-equipped threat and this lack of training results in crews being unprepared to mitigate real-world radar degradation due to the effects of EA. The CRC needs a system that provides barrage, spot, and Doppler noise; velocity-gate-pull-off, range-gate-pull-off, multiple false targets; and digital radio frequency memory generated EA waveforms against the AN/TPS-75 radar. This system will prepare operational crews for emerging threats, which improves the effectiveness and survivability of the CRC and defended assets. Each of the ten ANG CRCs requires an EA training suite.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 EA Training Suites (3080)	**$250,000**	**$2,500,000**
Total		**$2,500,000**

CRC: REMOTE RADAR AND RADIO ACCESS

1. Background. ANG Control and Reporting Centers (CRC) require a Remote Radar and Voice Communications (RRVC) integration package to execute specialized live-fly missions. This capability is needed to maintain proficiency and remain Combat Mission Ready (CMR). The RRVC capability would provide a first-time capability to control various types of live-fly missions remotely from each CRC unit, resulting in a significant reduction in personnel travel costs to maintain CMR. Each of the 10 ANG CRCs require an RRVC capability to access the Federal Aviation Administration communication and radar feeds in order to control missions remotely.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 RRVC Suites (3080)	**$275,000**	**$2,750,000**
Total		**$2,750,000**

CRC: 23A RAPID DEPLOYABLE INTERFACE KIT

1. Background. ANG Control and Reporting Centers (CRC) require a redundant rapidly deployable control system. To deploy the existing system, the control floor must first be packed; to include computers, servers, and related cabling systems. A means to decrease the packing time required and reduce the susceptibility of cabling being destroyed during the pack and unpack is needed. These kits will include all needed cables, repair supplies, and connection ports to allow the in-garrison cabling system to remain in place and the interface kit to be stowed and ready for rapid deployment. This kit will decrease packing time and troubleshooting required to find a broken cable during setup in a deployed location. A rapid deployable interface kit is needed for each of the ten CRC units.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 Rapid Deployable Interface Kits (3080)	**$12,000**	**$120,000**
Total		**$120,000**

CRC: DATA LINK TRAINING SUITE

1. Background. ANG Control and Reporting Centers (CRC) Joint Interface Control Officers and Interface Control Technicians require a deployable set of equipment and software with the ability to monitor the Link 16 Radio Frequency (RF) network. The equipment and software need to be able to connect to a CRC Multifunctional Information Distribution System-Low Volume Terminal (MIDS-LVT 2) terminal, a Joint Tactical Radio System terminal, and be able to monitor all link traffic within an RF Link 16 network. Additionally, the program needs the ability to monitor time qualities, load file compliance, and time slot duty factor. The CRCs are expected to provide the manning and equipment for a Regional Interface Control Cell that is capable of integrated Air Force and Joint and Coalition assets into a Common Operational Picture that can be distributed to all link capable players in any current or potential combat environment. CRC's lack the equipment to train to this capability. The CRC requires the capability to inject simulated surveillance link data to the Multi-Source Correlation Tracker (MSCT), including the ability to preprogram track inputs, as well as support track production during the course of a scenario. The equipment and software will need to be fully customizable to emulate surveillance data like sending unit, track blocks, identification, location, and any other fields found in MIL-STD 6016. The equipment and software need to be able connect to the CRC Simulation Package's distributed interactive simulation (DIS) filter and connect directly to the MSCT. The CRC needs a terminal emulator to replicate realistic terminal RF performance in a simulated environment. The emulator needs to simulate equipment performances over Joint Range Extension Applications Protocol and RF Link 16; additionally, it needs to replicate the capabilities and limitations of various terminals across the DoD and coalition partners. The terminal emulator should include the capability to adjust settings for individual terminals, such as load files, Net Time Reference selection, and power settings. A Data Link Training Suite is needed for each of the ten CRC units.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 Data Link Training Suites (3080)	**$120,000**	**$1,200,000**
Total		**$1,200,000**

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C-17

- **Strategic Airlift**
- **Outsized and Oversized Cargo Airlift**
- **Aeromedical Evacuation Missions**
- **ANG C-17 Units Provide 23% of the Total Fleet**

The C-17 Globemaster III is the nation's newest strategic military airlifter and continues to excel in a wide range of operational mission scenarios. It supports both inter- and intra-theater missions and allows Air Mobility Command to significantly improve throughput during contingency operations. Using C-17s as an intra-theater airlift platform provides relief to the C-130 fleet and reduces ground forces' dependence on vehicle convoys.

The ANG operates 50 C-17 aircraft assigned to five wings and two associate units. The fully-equipped aircraft carries combat-ready military units to any point in the world on short notice and provides critical field support to sustain the fighting force.

C-17
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Critical Capabilities List

- C-17 Self-Protection
- Common Mobility Air Forces Mission Computer
- Cloud-Based Mission Management Suite
- Secure High-Speed Global Data
- Fifth Mission Computer Display and Third Keyboard

Essential Capabilities List

- Automated-Hardened Position, Navigation, and Timing Solution
- Synthetic Head-Up Display
- Three-Dimensional Audio Capability
- Audible G-State Awareness
- Ramp Toe Modification to Eliminate Shoring

Desired Capabilities List

- Single-Pass Precision Airdrop
- Common Maintenance Computer
- High-Definition Night Vision Goggles
- Light-Emitting Diode Landing Lights
- Night Vision Goggle Compatible Mobile Device Screen Covers

C-17: C-17 SELF-PROTECTION

1. Background. The ANG C-17 fleet requires self-defense capabilities to detect and defeat factor modern threats specifically designed to target large Mobility Air Forces aircraft. To detect these threats, C-17s require an open mission system digital backbone. This backbone enables processing at the forward edge and integrating the platform into Advanced Battle Management System and Joint All Domain Command and Control architectures. To defeat these threats, C-17s require onboard and/or off-board threat jamming, decoys, and kinetic and non-kinetic defense measures. The ANG C-17 fleet requires a common carry open-architecture capability flexible enough to be quickly modified to address ever-changing contested environments. The majority of missions flown by ANG C-17s are in areas posing a significant electronic threat with no dedicated off-board assets to provide detection or protection. To survive in modem combat, C-17 aircraft require a radar warning receiver (RWR) capable of processing signals in a dense radio frequency environment that automatically directs countermeasures to defeat those threats. This capability enables C-17s to detect and defend against electronic threats in the likely scenario in which the aircraft is operating independently. Modular defensive systems provide a method for low-cost, simplified improvements to IR detection and suppression capabilities, and degrading the enemy's ability to engage C-17 aircraft. Increased situational awareness is needed to correlate onboard and off-board threat detection, terrain masking, and optimized dynamic rerouting capabilities to minimize exposure to threats. Hardware for this digital backbone on the ANG C-17 fleet can be installed via a mission design series-specific aircraft-to-pylon interface for a mobility air forces common hardpoint. All 50 ANG C-17s require Large Aircraft Infrared Countermeasures (LAIRCM) group A and B kits, RWR, hardpoint kits, and 12 common carry pods.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non Recurring Engineering (3010)	**N/A**	**$12,000,000**
50 LAIRCM Group A Kits (3010)	**$2,100,000**	**$105,000,000**
50 LAIRCM Group B Kits (3010)	**$3,000,000**	**$150,000,000**
50 RWR Group A Kits (3010)	**$250,000**	**$12,500,000**
50 RWR Group B Kits (3010)	**$500,000**	**$25,000,000**
50 Hard-Point Kits (3010)	**$500,000**	**$25,000,000**
12 Mobility Air Forces Common Carry Pods (3010)	**$2,500,000**	**$30,000,000**
Total		**$359,500,000**

C-17: COMMON MOBILITY AIR FORCES MISSION COMPUTER

1. Background. ANG C-17s require secure airborne data communications with other aircraft, command and control (C2) agencies, and ground-based forces. The Mobility Air Forces mission computer data link and data transfer capabilities provide aircrew the ability to report and receive battlespace information such as the position of other aircraft, weather, threat, mission events, mission status, task completion, and resource status. This increased situational awareness allows C2 agencies the ability to track mission progress and facilitate rapid decisions and adjustments during mission execution. Next-generation military ultra-high frequency (UHF) satellite communication (SATCOM) radios provide both data and voice using satellites operating outside of traditional data link bandwidths. This enables the crew to receive real-time updates for weather, departure, and landing information, as well as provides C2 reach-back capability. Electronic flight bags can store and retrieve documents required for flight operations such as technical orders, Air Force Instructions, flight operations manuals, minimum equipment lists, and the most current flight information publications. To reduce crew workload, these solutions require integration with other aircraft systems. ANG C-17s require one set of installation components for each of the 50 airframes and tactical display emulator software at each base to effectively employ data link tactics, techniques, and procedures.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non Recurring Engineering (3010)	**N/A**	**$10,000,000**
55 C-17 Group A Kits (3010)*	**$100,000**	**$5,500,000**
55 C-17 Group B Kits (3010)*	**$750,000**	**$41,250,000**
55 C-17 Data Link Processors (3010)*	**$100,000**	**$5,500,000**
55 Electronic Flight Bags (3010)*	**$240,000**	**$13,200,000**
55 UHF SATCOM Kits (3010)*	**$475,000**	**$26,125,000**
Emulator Software (3010)	**$4,000,000**	**$4,000,000**
Total		**$105,575,000**

* Includes 10% spares

C-17: CLOUD-BASED MISSION MANAGEMENT SUITE

1. Background. ANG C-17 aircraft require secure mobile mission management, planning, and execution up to Information-Level 6 without a Common Access Card or Virtual Private Network. This suite of identity verification and application software shall work on any mobile device, tablet, or browser to provide avenues for transmitting and sharing data required for mission execution. It establishes direct, real-time, secure connections between command and control, mission planners, maintenance, support, and aircrews on any mobile device or browser. Since C-17 crews operate worldwide without regular access to hard-wired military networks, they require mobile applications to facilitate mission preparation, execution, and post-flight tasks whether at home, on-base, or in a hotel room. Scheduling and training tools augment and eventually replace existing software suites to generate mission fragments, build and schedule crews, and perform the go/no-go process. Execution communication applications connect aircrews to planners and commanders while planning applications enable reliable aircraft fuel consumption calculations, vertical profile optimization, fleet management, route generation, and flight plan filing. The enhanced data-sharing capability between electronic flight bags (EFB) enables ANG units to maintain databases with aircraft information and unique performance characteristics and transfer encrypted information to other crewmembers' EFBs for in-flight use. Data and file-sharing reduces data entry errors and inconsistent or conflicting exchanges between crews and supporting agencies. This type of suite ensures maximum effective utilization of all mobile tools to provide aircrews, support, and command personnel with the most accurate and relevant situational awareness. One enterprise Mission Management Suite is required to equip the force.

2. Program Details.

Quantity	Unit Cost	Program Cost
Mission Management Suite (3010)	**N/A**	**$5,000,000**
Total		**$5,000,000**

C-17: SECURE HIGH-SPEED GLOBAL DATA

1. Background. ANG C-17 aircraft require an onboard capability to access secure and unsecured internet data. The C-17 operates globally, presenting a unique challenge where crews need both tactical and strategic situational awareness. Missions can originate thousands of miles and 12-16 hours from the objective area. Crews require the ability to access unsecured networks to assess weather, surface conditions, and support capabilities. Additionally, secure data provides the ability to maintain an updated perspective on the tactical environment allowing the crew to make early decisions that can have a profound impact on mission success. ANG C-17s require one high-speed data system for each of the 50 airframes.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
50 High-Speed Data Systems (3010)	**$1,500,000**	**$75,000,000**
Total		**$80,000,000**

C-17: FIFTH MISSION COMPUTER DISPLAY AND THIRD KEYBOARD

1. Background. ANG C-17s require a fifth mission computer display and third keyboard. C-17 aircraft are employed in complex missions that doctrinally employ an additional crewmember (ACM) with access to a mission computer keyboard (MCK) and display (MCD). C-17s are delivered to the Air Force with a fifth MCD and third MCK on the center pedestal where it would be accessible to an ACM. Upon delivery, these additional units are removed and placed into the supply system. Bases do not carry enough MCD and MCK inventory to provide the expanded capability even though they are required for rescue airdrop (per Air Mobility Command Rescue Airdrop Concept of Operations change 1). The additional MCD and MCK provide an ACM the ability to manipulate the mission computer during critical phases of flight. This reduces aircrew workload, allows both pilots to scan outside the aircraft, and increases situational awareness. The ability to standardize a lookout doctrine between pilots while operating in a threat environment will decrease crew reaction time to threats. When C-17s employ tactical data link, the pilot and copilot workload becomes more task saturated, making the additional MCD and MCK critical to successfully managing crew resources. ANG C-17s require one MCD and one MCK for each of the 50 airframes.

2. Program Details.

Quantity	Unit Cost	Program Cost
50 Mission Computer Displays (3010)	**$150,000**	**$7,500,000**
50 Mission Computer Keyboards (3010)	**$75,000**	**$3,750,000**
Total		**$11,250,000**

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C-130 H/J

- **Tactical Airlift**
- **ANG C-130 Units Provide 49% of the Total Fleet**

With a legacy lasting over 63 years, the C-130 Hercules still remains the U.S. Military's primary combat delivery aircraft. In addition to its primary role in tactical airlift, ANG C-130s support humanitarian, peacekeeping, and disaster relief operations. Procurement efforts continue to address needed updates to the avionics suites, propulsion modernization, improved self-protection, single-pass precision airdrop, and enhanced situational awareness. These improvements ensure that the ANG C-130 fleet remains capable of safely and effectively executing its missions globally and maintains relevancy in tomorrow's fight.

C-130 H/J
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Critical Capabilities List

C-130H

- C-130H Self-protection
- Integrated Defensive Systems for Common Mobility Air Forces Mission Computer
- Propulsion System Upgrades
- Updated Avionics / Instrumentation and Associated Training Devices
- LED Lighting

C-130J

- C-130J Self-protection
- Integrated Defensive Systems for Common Mobility Air Forces Mission Computer
- Self-Contained Contested Training Suite
- Updated Avionics Suite
- Radar Upgrade

Essential Capabilities List

C-130H

- Radar upgrade
- High-Speed Ramp/Door
- Special Mission Processor
- Space Jam 2 Go for Contested, Degraded, and Operationally Limited Environment Training
- Airborne WiFi

C-130J

- Data Link Capability for Weapons System Trainer/Multi-Mission Cockpit Trainers
- Tactical Plot Suite
- Built-in Iridium Phone
- Jam-Resistant Embedded Global Positioning System/Inertial Navigation System and Streamlined Notification
- Cargo Compartment Camera/Backup Camera

Desired Capabilities List

To save space, desired lists can be obtained upon request from NGB/A5.

C-130H: SELF-PROTECTION

1. Background. The ANG C-130H fleet requires self-defense capabilities to detect and defeat modern threats specifically designed to target large Mobility Air Forces (MAF) aircraft. To detect these threats, C-130Hs require an open mission system compliant digital backbone executing processing at the forward edge and connecting the platform to Air Battle Management System and Joint All Domain Command and Control architectures. To defeat these threats, C-130Hs require onboard and/or off-board threat jamming, decoys, and kinetic and non-kinetic defense measures. To defeat the infrared (IR) threat, Block 40 AN/AAQ-24 Large Aircraft IR Countermeasures (LAIRCM) system, which improves detection against advanced man-portable air defense system threats, while degrading the enemy's ability to engage C-130H aircraft. C-130Hs require an Infrared Suppression System (IRSS) capable of reducing the aircraft's heat signature from engine exhaust in all aspects. To survive in modern combat, C-130H aircraft require a digital radar warning receiver (RWR) capable of providing situational awareness on millimeter wavelength systems in addition to other legacy systems. A suitable RWR requires the ability to geolocate and process signals in a dense radio frequency (RF) environment. The ability to automatically direct countermeasures to defeat those threats is highly desirable. Many of these solutions can be accomplished utilizing a common carry open-architecture mission pod capable of supporting the current and future networked architecture and flexible enough to be quickly modified to address the contested environments. The open-architecture mission system will provide additional capacity for electronic attack/electronic protection. A targeting pod capable of providing standoff acquisition and assessment of drop zones/landing zones ensuring first pass success is a must in future combat. The open-architecture pod requires hard-points for the 113 unmodified C-130Hs (10 are already modified with hard-points), 38 common carry pods, 123 LAIRCM Group A kits, 123 LAIRCM Group B kits, 123 RF Group A Kits, 67 RF Group B Kits, and 24 digital RWR kits.

2. Program Details.

Quantity	Unit Cost	Program Cost
38 MAF Common Carry Pods (3010)	**$2,000,000**	**$76,000,000**
123 C-130H LAIRCM Group A Kits (3010)	**$1,500,000**	**$184,500,000**
123 C-130H LAIRCM Group B Kits (3010)	**$3,000,000**	**$369,000,000**
123 C-130H Next-Generation RF Group A Kits (3010)	**$120,000**	**$14,760,000**
IRSS Non-Recurring Engineering (3010)	**$5,000,000**	**$5,000,000**
123 IRSSs (3010)	**$1,000,000**	**$123,000,000**
67 C-130H Next-Generation RF Group B Kits (3010)	**$775,000**	**$51,925,000**
24 C-130H ALR-69As (3010)	**$500,000**	**$12,000,000**
113 Hard-Point Installations (3010)	**$330,000**	**$37,290,000**
Total		**$886,475,000**

C-130H: INTEGRATED DEFENSIVE SYSTEMS FOR COMMON MOBILITY AIR FORCES MISSION COMPUTER

1. Background. The ANG C-130H fleet requires comprehensive and networked battlespace awareness. The real-time information in the cockpit (RTIC) system allows C-130 aircraft to participate in multiple data link networks using technologies fielded on other Department of Defense assets. The system must be upgraded to Multifunctional Information Distribution System Joint Tactical Radio System (MIDS-JTRS) and ultimately a Tactical Targeting Network Technology (TTNT) with self-healing, jam resistance capabilities. Upgrades to the C-130 RTIC system increases the overarching network capability and provides a common processing and display platform for previously federated systems, resulting in a consolidated situational awareness picture. Integration with the advanced integrated electronic combat system (AIECS) software provides the capability for on-board and off-board threat correlations, data sharing, on-board radar threat system geolocation, route re-planning, and automated countermeasures. Combining the control and outputs of multiple systems into one common graphical interface reduces crew workload, decreases "heads-down" time, and provides improved decision support for aircrews operating in the tactical environment. All 123 C-130H aircraft need RTIC systems with integrated AIECS.

2. Program Details.

Quantity	Unit Cost	Program Cost
AIECS Non Recurring Engineering (NRE) (3010)	**N/A**	**$10,000,000**
123 AIECS Kits (3010)	**$150,000**	**$18,450,000**
123 MIDS-JTRS Terminals (3010)	**$130,000**	**$15,990,000**
Total		**$44,440,000**

C-130H: PROPULSION SYSTEM UPGRADES

1. Background. The ANG C-130H fleet requires a comprehensive propulsion upgrade for increased performance, efficiency, and reliability. Incorporating modular propeller blade technology (NP2000), and an electronic propeller control system (EPCS) provide increased performance and reliability. The T-56 3.5 engine upgrade, with redesigned compressors and turbines, decreases engine life-cycle costs, improves fuel economy, increases reliability, and improves aircraft availability. The modular design of NP2000 eight-bladed propellers decreases propeller maintenance time, increases airlift efficiency during transportation by taking up less pallet space, and increases operational performance. EPCS improves safety by accelerating response time when throttles are rapidly advanced, an issue in previous mishaps. EPCS increases propeller system reliability by 50 percent, decreasing maintenance costs. Each NP2000 kit contains four nacelle kits and each T-56 3.5 kit contains four-engine upgrades. All 134 ANG C-130H models require propulsion system upgrades. Thirty-four ANG C-130Hs are funded for NP2000 and 3.5 upgrades. All 134 ANG C-130Hs are funded for EPCS.

2. Program Details.

Quantity	Unit Cost	Program Cost
100 NP2000 Kits (3010)	**$3,200,000**	**$320,000,000**
100 T-56 3.5 Modified Engines (3010)	**$5,000,000**	**$500,000,000**
Total		**$820,000,000**

C-130H: UPDATED AVIONICS/INSTRUMENTATION AND ASSOCIATED TRAINING DEVICES

1. Background. The ANG C-130H fleet requires avionics modernization. The C-130H faces severe sustainment challenges with current avionics and cockpit instrumentation. Additionally, tactical night operations continue to suffer from non-night vision imaging system (NVIS) compliant lighting. To eliminate critical sustainment issues due to diminishing manufacturing sources (DMS), this modernized cockpit will include: a multifunction engine instrument display system (EIDS), NVIS compatibility, and a modern flight management system with a global positioning system approach and polar navigation capabilities. An NVIS-compatible and modernized glass cockpit, to include a digital overhead panel, reduces crew workload, lowers maintenance costs, and increases capability and sustainability to operate safely at night. The integration of a noise-canceling, three-dimensional (3D) enhanced intercom system increases situational awareness through directional audio correlated to the most significant factor threat. Additionally, this system will reduce excess aircraft noise, eliminate the push-to-talk requirement of the current system, and ultimately reduce crew fatigue while increasing CRM. ARC-210 generation six radios capable of Mobile User Objective Systems (MUOS) and Second Generation Anti-jam Tactical UHF Radio for NATO (SATURN), Beyond-Line-of-Sight radios must be integrated to make the C-130H viable in the future fight. Infrastructure for future capability upgrades must be installed while the cockpit undergoes this significant modification. All 123 C-130H models require updated avionics kits, digital overhead panels, NVIS compatibility kits, 3D audio kits, and an ARC-210 Gen 6 radio. All Weapons Systems Trainers require conversion to the same modernized cockpit suite, all 12 units require access to Distributed Mission Operations capable, level 6 or higher. All 24 ANG C-130H1 aircraft require a second VHF radio antenna.

2. Program Details.

Quantity	Unit Cost	Program
Non-Recurring Engineering (3010)	**N/A**	**$50,000,000**
123 Avionics Kits (3010)	**$2,800,000**	**$344,400,000**
123 NVIS Compatibility Kits (3010)	**$465,000**	**$57,195,000**
12 Aircrew Training Devices (3010)	**$14,000,000**	**$168,000,000**
123 Digital Overhead Panels (3010)	**$150,000**	**$18,450,000**
24 VHF Radio Antennas (3010)	**$50,000**	**$1,200,000**
Directional Audio NRE (3600)	**N/A**	**$5,000,000**
123 3D Audio Kits (3010)	**$50,000**	**$6,150,000**
123 ARC-210 Gen 6 Radios (3010)	**$130,000**	**$15,990,000**
Total		**$666,385,000**

C-130H: LED LIGHTING

1. Background. The ANG C-130Hfleet requires modern light emitting diode (LED) lighting both inside and outside the aircraft. The current landing lights produce the highest heat signature on the aircraft, allowing adversarial man-portable air-defense systems, of any generation, the ability to lock-on for a front aspect engagement. Replacing all external LED lighting will significantly reduce the IR signature of the aircraft, drastically increasing survivability in all theaters. Internal LED lighting will greatly reduce light pollution while conducting NVG operations in addition to decreasing cockpit lighting failures. All 123 ANG C-130Hs require internal and external LED lighting.

2. Program Details.

Quantity	Unit Cost	Program
Internal/External LED Lighting System NRE (3600)	**N/A**	**$2,500,000**
123 LED Internal/External Lighting Systems (3010)	**$100,000**	**$12,300,000**
Total		**$14,800,000**

C-130J: SELF-PROTECTION

1. Background. The ANG C-130J fleet requires self-defense capabilities to detect and defeat factor modern threats specifically designed to target large Mobility Air Forces aircraft. To detect these threats, C-130Js require an open mission system compliant digital backbone executing processing at the forward edge and connecting the platform to Air Battle Management System and Joint All Domain Command and Control architectures. To defeat these threats, C-130Js require onboard and/or off-board threat jamming, decoys, and kinetic and non-kinetic defense measures. Some options to achieve the aforementioned effects are; Block 40 AN/AAQ-24 Large Aircraft IR Countermeasures (LAIRCM) system, which improves detection against advanced man-portable air defense systems threats, while degrading the enemy's ability to engage C-130J aircraft. In addition to a LAIRCM upgrade, C-130Js require an Infrared Suppression System capable of reducing the aircraft's heat signature from engine exhaust in all aspects. To survive in modern combat, C-130J aircraft require a digital radar warning receiver (RWR) capable of providing situational awareness on millimeter wavelength systems in addition to other legacy systems, with geolocation ability, capable of processing signals in a dense radio frequency (RF) environment. The ability to automatically direct countermeasures to defeat those threats is highly desirable. Many of these solutions can be accomplished utilizing a common carry open-architecture mission pod capable of supporting the current and future networked architecture and flexible enough to be quickly modified to address the contested environments. The open-architecture mission system will provide additional capacity for electronic attack/electronic protection. A targeting pod capable of providing standoff acquisition and assessment of drop zones/landing zones ensuring first pass success is a must in future combat. The open-architecture pod requires hard-points for the 16 C-130Js, 4 common carry pods, 16 LAIRCM Group A kits, 8 LAIRCM Group B kits, and 16 digital RWR kits.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
16 C-130J ALR-69A (3010)	**$500,000**	**$8,000,000**
16 C-130J LAIRCM Group A Kits (3010)	**$970,000**	**$15,520,000**
8 C-130J LAIRCM Group B Kits (3010)	**$3,000,000**	**$24,000,000**
16 C-130J Next-Generation RF Group A Kits (3010)	**$420,000**	**$6,720,000**
8 C-130J Next-Generation RF Group B Kits (3010)	**$775,000**	**$6,200,000**
4 MAF Common Carry Pods (3010)	**$2,000,000**	**$8,000,000**
Total		**$73,440,000**

C-130J: INTEGRATED DEFENSIVE SYSTEMS FOR COMMON MOBILITY AIR FORCES MISSION COMPUTER

1. Background. ANG C-130Js require integrated battlespace awareness. Real-time information in the cockpit (RTIC) and Multifunctional Information Distribution System Joint Tactical Radio System (MIDS-JTRS) provide global data link communications, secure beyond-line-of-sight, and line-of-sight capabilities. RTIC and MIDS-JITRS offer a permanent modification to the aircraft and provides the capability to integrate with the advanced integrated electronic combat system (AIECS). AIECS provides capabilities for onboard and off-board threat correlations, data sharing, on-board radar threat system geolocation, and route re-planning. To ensure units can effectively train, operate, and deploy with secure global data link capability, all 16 ANG C-130J aircraft require these capabilities.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
16 C-130J RTIC Group A Kits (3010)	**$150,000**	**$2,400,000**
16 C-130J RTIC Group B Kits (3010)	**$1,000,000**	**$16,000,000**
Total		**$23,400,000**

C-130J: SELF-CONTAINED CONTESTED TRAINING SUITE

1. Background. ANG C-130J aircrews require the ability to train in a global positioning system (GPS) degraded environment and a simulated jamming scenario. A deception-based GPS jamming option is required to accurately reflect scenarios that are not simply GPS on/off scenarios. This system must allow user input to train aircrews before encountering operational situations. The system also needs to account for aircraft position concerning terrain to accurately simulate line-of-sight based threats. One self-contained contested training suite is required at each of the C-130J units.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$1,500,000**
2 Self-Contained Contested Training Suites (3010)	**$75,000**	**$150,000**
Total		**$1,650,000**

C-130J: UPDATED AVIONICS SUITE

1. Background. ANG C-130Js require updated avionics to meet the degradation in mission capability as a result of the Federal Aviation Administration's (FAA) discontinuation of over 300 ground-based navigation aids by 2025. Updated avionics provided with the Block 8.1 upgrade will address terminal access to airfields that are entirely reliant on performance base navigation approaches during instrument meteorological conditions. If this critical requirement is not met by 2025, the result could be a denial of terminal airfield access for C-130J aircraft. All 16 ANG C-130Js require this modification.

2. Program Details.

Quantity	Unit Cost	Program Cost
16 C-130J Block 8.1 Avionics Upgrades (3010)	**$8,000,000**	**$128,000,000**
Total		**$128,000,000**

C-130J: RADAR UPGRADE

1. Background. ANG C-130Js need the ability to conduct accurate combat aerial delivery in both instrument and visual meteorological conditions and contested, degraded, and operationally limited environments. With the emergence of high-end threats, greater terrain awareness is required to enable lower altitude operations, ultimately degrading enemy capabilities. The radar upgrade requires a technical refresh with an increased resolution to include 1-meter synthetic aperture radar. Increased fidelity/resolution for radar updates provides greater airdrop accuracy, which is vital to ensure first pass airdrop success. Replacing the current receiver-transmitter processor will increase reliability while retaining current modes of performance and providing a path for adding future capabilities. Furthermore, the current APN-241 radar configuration will not be sustainable beyond 2030. All 16 ANG C-130Js require a radar upgrade.

2. Program Details.

Quantity	Unit Cost	Program Cost
16 Radar Upgrade (3010)	**$2,000,000**	**$32,000,000**
Total		**$32,000,000**

C-130 Special Mission

- **Commando Solo**
- **Special Operations Forces/Combat Search and Rescue (SOF/CSAR)**
- **Special Mission (Airborne Firefighting, Antarctic Logistics)**
- **ANG Commando Solos Provide 100% of the Total Fleet**
- **ANG CSAR HC-130 Units Provide 38% of the Total Fleet**
- **ANG LC-130s Provide 100% of the Total Fleet**

C-130 Special Mission aircraft include:

EC-130J - The EC-130J "Commando Solo" conducts information operations, psychological operations, and civil affairs broadcasts. The EC-130J is pursuing a roll-on and roll-off "Commando Solo" capability.

HC-130J - ANG HC-130 units continue to deploy in support of overseas contingency operations and provide emergency rescue and relief support during domestic operations. The ANG is finishing recapitalizing the HC-130P/N fleet and transitioning to the HC-130J.

LC-130H - The LC-130H operates on snowfields in remote areas of the Polar Regions in support of the National Science Foundation (NSF). To keep the aircraft up-to-date, several modification efforts are underway including eight bladed propellers and T-56 3.5 engine modification. The ANG is working with the NSF to support a pod-based scientific payload capability.

C-130 Special Mission
2020 Weapons and Tactics Conference

Critical Capabilities List

EC-130J

- Distributed Mission Operations Simulator
- Federated Defensive System Unit
- Link 16
- Multi-Mission Package – Heavy Onboard Diagnostic Equipment
- Emergency Equipment Storage

HC-130J

- Modernized Joint Tactical Data Link
- On-board Secure Global Connectivity
- Precision Geolocation and Identification of Isolated Personnel
- Increased Survivability in Contested Environments
- Distributed Mission Operations Simulator

LC-130H

- Self-Protection
- Propulsion System Upgrades
- Updated Avionics/Instrumentation and Associated Training Devices
- Global Communications System
- Polar Construction Skiway Team Equipment/Gear

Essential Capabilities List

EC-130J

- "Slick" Modification to Multi-Mission Payload – Heavy
- Multi-Mission Payload – Internal for Slick Aircraft
- Multi-Mission Payload – External for Slick Aircraft
- Multi-Mission Payload – Heavy Diagnostic Equipment for All Seven Aircraft
- Airborne Mission Networking – Permanent Modification

HC-130J

- Fixed Wing Personnel Extraction System
- Synthetic Aperture Radar/Ground Moving Target Indicator
- Intelligence Collection Systems
- Upgraded Defensive Systems Suite

LC-130H

- Digital Audio Interphone Communication System
- High-Speed Ramp and Door
- Center Wing Box Replacement Program
- High-Frequency Radios with SELCAL
- Radar Upgrade

Desired Capabilities List

To save space, desired lists can be obtained upon request from NGB/A5.

EC-130J: DISTRIBUTED MISSION OPERATIONS SIMULATOR

1. Background. EC-130J aircrews require a Distributed Mission Operations Simulator. Aircrews are not able to meet their training requirements because they lack a co-located simulator. Without a simulator all currency, proficiency, and mission qualification training must be accomplished in the aircraft. Crews are required to travel for emergency procedures training, reducing crew availability and incurring significant travel cost. It permits refresher training integrated with the Combat Systems Officer (CSO) without incurring travel costs of 16 crews per year. Currently CSOs are on a waiver due to lack of resources. ANG EC-130J aircrews require an E/MC-130J Weapons Systems Trainer (WST) flight deck simulator. The E/MC-130J WST will provide training that can only be conducted in a simulator device, such as emergency procedures training, realistic threat defense, and deployment preparation route rehearsal. In addition, these devices can be used for currency, proficiency, and crew resource management. The EC-130J fleet needs one E/MC-130J simulator.

2. Program Details.

Quantity	Unit Cost	Program Cost
1 EC/MC-130J WST (3010)	**$30,261,000**	**$30,261,000**
Total		**$30,261,000**

EC-130J: LINK 16

1. Background. The ANG EC-130J requires a tactical data link to be interoperable with the active duty Air Force. Air Force Special Operations Command (AFSOC) aircraft operate under the legacy Situational Awareness Data Link system while the conventional Air Force operates utilizing Link 16. This disconnect between systems causes a lack of a Common Operating Picture (COP). Additionally, AFSOC required that all Special Operation Forces aircraft have Link 16 capabilities by August 2018. EC-130J aircraft do not meet this requirement. Link 16 will provide EC-130J aircraft full integration with the rest of the Air Force, providing a COP and safer passage in active battlespace. The EC-130J requires seven Link 16 systems to outfit the entire fleet.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,600,000**
7 Link 16 Radios (3010)	**$325,000**	**$2,275,000**
Total		**$4,875,000**

EC-130J: FEDERATED DEFENSIVE SYSTEM UNIT

1. Background. ANG EC-130Js requires a federated Defensive Systems Unit (DSU) capable of aligning with updated operational flight programs and the ability to rapidly dispense chaff and flares with an increased flare capacity. The DSU will allow the Combat Systems Officer (CSO) to dispense chaff, flare, or both with a single button push without the need to switch settings on the defensive systems master panel. The federated DSU will decrease EC-130J aircrews' operational risk while increasing crew resource management and enhancing overall mission success. The proposed DSU aligns the EC-130J with the AC/MC-130J fleet configuration, maximizing the interoperability between the active components and ANG aircrews within Air Force Special Operations Command. The 193rd Special Operations Wing requires four federated DSUs including two nose flare dispensers per aircraft to outfit the entire fleet.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,500,000**
4 Federated Defensive System Units (3010)	**$799,000**	**$3,196,000**
Total		**$5,696,000**

EC-130J: MULTI-MISSION PACKAGE – HEAVY ONBOARD DIAGNOSTIC EQUIPMENT

1. Background. The EC-130J requires a system to perform diagnostic testing and evaluation for Multi-Mission Payload – Heavy (MMP-H) upgrade. Currently, there is no way to verify the effectiveness and quality of MMP-H from the aircraft. Diagnostic equipment will provide onboard troubleshooting, mission flexibility maintenance, and pave the way for future spiral upgrades of MMP-H. The 193rd Special Operations Wing requires four communication electronic attack surveillance and reconnaissance (CEASAR) diagnostic kits for three EC-130J Commando Solo aircraft and one Part Task Trainer.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 CEASAR Kits (3010)	**$1,000,000**	**$5,000,000**
Total		**$5,000,000**

EC-130J: EMERGENCY EQUIPMENT STORAGE

1. Background. ANG EC-130J aircraft require emergency equipment storage bins installed on all Super J (SJ) aircraft to perform a variety of Specialized Air Mobility missions with unique cargo compartment reconfiguration. The location of the life support equipment on EC-130J aircraft creates undue wear-and-tear on equipment, affects passenger-carrying capabilities, and timeliness of Engine Running On-Load/Off-Load (ERO). Emergency equipment storage bins ensure life support equipment is stored safely and securely without hindering the ability to maximize passenger and cargo loads. Current EC-130J (SJ) configuration and flight regulations state that the required number of parachutes has to be equal to, or greater than, the number of aircrew members on the flight orders. Additionally, aircrew flight equipment regulations state that parachutes cannot be strapped to the current equipment racks on the aircraft due to weight and restraint limitations. When the emergency equipment is not stowed out of the way, ground time is increased during ERO procedures due to aircraft reconfiguration for follow on missions. Furthermore, the amount of passengers and/or cargo is decreased by one full pallet position. Finally, possible damage to emergency equipment can occur while relocating items within the cargo compartment of the aircraft, leading to higher sustainment costs. The EC-130J (SJ) require aircrew emergency equipment storage bins installed, similar to the design and location utilized on the aft right side of the MC-130J cargo compartment. The 193 Special Operations Wing requires eight emergency equipment storage bins (two per aircraft) to ensure all four EC-130J (SJ) aircraft are capable of maximizing carry capacity while expediting ERO procedures.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$20,000**
8 Emergency Equipment Bins (3010)	**$96,000**	**$768,000**
Total		**$788,000**

HC-130J: MODERNIZED JOINT TACTICAL DATA LINK

1. Background. ANG HC-130Js require the integration of multiple radios, data links, rescue devices, and defensive systems to keep the primary focus on safe and successful mission accomplishment and not electronic management. Multiple efforts in technological advancement have resulted in a task-saturated workload for HC-130 aircrews because those multiple efforts were accomplished independently. HC-130, HH-60, and Guardian Angels do not share a common operating picture due to the diverging nature of their respective situational awareness enhancement technology. These systems provide line-of-sight and beyond-line-of-sight interactive data communications between combat search and rescue task force assets across the range of military operations. This network should include, but is not limited to, Blue Force Tracker 2 (BFT 2), Link 16, and Automatic Dependent Surveillance-Broadcast (ADS-B) in combined into a single operating picture. One of each system is required for the 12 HC-130Js in the ANG.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3600)	**N/A**	**$9,000,000**
13 Software Definable Radio Suites (3010)*	**$250,000**	**$3,250,000**
13 Moving Map Display Group A Kits (3010)*	**$150,000**	**$1,950,000**
13 Moving Map Display Group B Kits (3010)*	**$1,000,000**	**$13,000,000**
13 BFT 2 Systems (3010)*	**$100,000**	**$1,300,000**
13 Link 16 Systems (3010)*	**$250,000**	**$3,250,000**
13 ADS-B Systems (3010)*	**$30,000**	**$390,000**
Total		**$32,140,000**

* Includes 10% spares.

HC-130J: ON-BOARD SECURE GLOBAL NETWORKED CONNECTIVITY

1. Background. ANG HC-130Js require secure, continuous, on-board connectivity over wide-band beyond-line-of-site (BLOS) systems. As the combat search and rescue coordinator role is advancing as an HC-130J capability, the requirement to communicate securely BLOS with multiple assets is critical. Currently, the HC-130J must rely on an outdated BLOS voice communication radio to receive and pass critical survivor information from command and control sources, delaying the recovery effort. Currently installed voice BLOS radios utilize a satellite constellation reaching end of life, rendering them obsolete. In order to maintain and improve our current voice and data BLOS capability, a replacement radio is required. With strictly BLOS voice capability, information flow to the Combat Search and Rescue Task Force (CSARTF) is severely limited and needs to be upgraded to fulfill the CSARTF's role in information superiority. In order for rescue forces to fully support information superiority operations, they require the ability to utilize secure internet while on board the aircraft. During domestic operations, the HC-130J requires situational awareness among civilian agencies with an on-board unclassified internet capability for data and video. The integration of both organic unencrypted and encrypted internet on-board allows for efficient information sharing across a digital network using Multi-User Internet Relay Chat, Secret Internet Protocol Router, Joint Worldwide Intelligence Communications System, and Non-Classified Internet Protocol Router architectures. One of each system and two ARC-210 Gen 6 radios are required for each of the 12 HC-130Js in the ANG. An additional three ARC-210 Gen 6 radios are required for each of the two HC-130J units.

2. Program Details.

Quantity	Unit Cost	Program Cost
ARC-210 Non-Recurring Engineering (NRE) (3010)	**N/A**	**$3,800,000**
30 ARC-210 GEN 6 Radios (3010)	**$220,000**	**$6,600,000**
Software Definable Radio NRE (3010)	**N/A**	**$9,000,000**
13 Software Definable Radio Suite (3010)*	**$250,000**	**$3,250,000**
13 Full Motion Video (3010)*	**$200,000**	**$2,600,000**
13 Internet On-Board (3010)*	**$300,000**	**$3,900,000**
Totals		**$29,150,000**

* Includes 10% spares.

HC-130J: PRECISION GEOLOCATION AND IDENTIFICATION OF ISOLATED PERSONNEL

1. Background. ANG HC-130Js require the ability to carry mission-specific capabilities including data link, sensors, communications, video downlinks, and electronic warfare payloads on external hardpoints without detrimental effects to baseline aircraft capabilities, specifically aerial refueling. The Outer Wing Station 430 (OWS 430) modification puts two additional stores positions on the HC-130J wings. Along with a retractable external arm, this allows for rapid open architecture agile adaptation of the HC-130J mission capabilities with reconfigurable pods. One system is required for each of the 12 ANG HC-130Js. Each of the 12 ANG HC-130Js require the OWS 430 modification and two retractable arms are needed for each of the three units. Additionally, twelve pods and a spare are needed for the HC-130J community.

2. Program Details.

Quantity	Unit Cost	Program Cost
13 Full Motion Video Systems (3010)*	**$200,000**	**$2,600,000**
Non-Recurring Engineering (NRE) Open Architecture Pod (3010)	**N/A**	**$5,000,000**
13 Open Architecture Pods (3010)*	**$2,000,000**	**$26,000,000**
OWS 430 NRE (3010)	**N/A**	**$10,000,000**
12 OWS 430 Sets (3010)	**$2,000,000**	**$24,000,000**
6 Retractable External Arm Modifications (3010)	**$1,000,000**	**$6,000,000**
Total		**$73,600,000**

* Includes 10% spares.

HC-130J: INCREASED SURVIVABILITY IN CONTESTED ENVIRONMENTS

1. Background. ANG HC-130Js require a robust self-defense capability to perform combat rescue in a hostile environment in a peer-to-peer conflict. In order to operate in a high threat environment, the HC-130J requires a radio frequency (RF) jammer, digital radar warning receiver for improved radar detection capability, and must leverage improving technology to incorporate the newest chaff expendables to defend against a radar guided threat. A federated defensive system, with pilot, co-pilot, and Combat System Officer (CSO) dispense switches, will decrease HC-130J operational risk while improving crew resource management and enhancing overall mission success. Three Dimensional (3D) audio capability is required to integrate the audio warnings from a missile warning system, hostile fire indicator, and radar warning receiver with communication and mission equipment. Integrating the Virtual Electronic Combat Training System (VECTS) allows crews to prepare for combat missions using a virtual threat overlay during flight. These capabilities will immediately improve crew and aircraft safety and survivability through enhanced situational awareness and improved training. One system is required for each of the 12 HC-130Js in the ANG.

2. Program Details.

Quantity	Unit Cost	Program Cost
RF Jammer Non-Recurring Engineering (NRE) (3010)	**N/A**	**$5,000,000**
13 RF Jammers (3010)*	**$5,000,000**	**$65,000,000**
ALR-69A NRE (3010)	**N/A**	**$15,000,000**
13 ALR-69A (3010)*	**$700,000**	**$9,100,000**
Upgraded Chaff NRE (3010)	**N/A**	**$2,000,000**
13 Pilot/CSO Rapid Dispense Kits (3010)*	**$5,000,000**	**$65,000,000**
3D Audio NRE (3010)	**N/A**	**$2,000,000**
13 VECTS (3010)*	**$1,300,000**	**$16,900,000**
Total		**$187,800,000**

* Includes 10% spares.

SIMULATION: HC-130J DISTRIBUTED MISSION OPERATIONS SIMULATOR

1. Background. ANG Rescue Wings located in New York, California, and Alaska require a dedicated high-fidelity HC-130J Distributed Mission Operations (DMO) flight simulator to support special mission aircrew training. There are no Weapon System Trainers (WST) provided, planned or funded at operational ANG rescue wings. The WST will provide Air Force Instruction 11-series Volume 1 training capability regardless of weather or aircraft availability facilitating a high level of aircrew readiness. Three HC-130J DMO simulators are required to meet the demands of the ANG.

2. Program Details.

Quantity	Unit Cost	Program Cost
3 HC-130J WSTs (3010)	**$27,500,000**	**$82,500,000**
3 MILCON Projects (3830)	**$8,500,000**	**$25,500,000**
Total		**$108,000,000**

LC-130: SELF-PROTECTION

1. Background. ANG LC-130H fleet requires a common carry open-architecture mission pod (OAMP) capable of supporting the networked architecture and flexible enough to be quickly modified to address contested environments. LC-130H aircraft have zero missile-launch detection and no ability to detect, degrade, or defeat infrared (IR) man-portable air defense systems. For the nation's only arctic airlift contingency aircraft to survive in modern combat, LC-130H aircraft require a radar warning receiver, with geolocation ability, and capable of processing signals in a dense radio frequency (RF) environment that automatically directs countermeasures to defeat those threats. To integrate the OAMP into aircraft systems, LC-130Hs require a robust, secure tactical data link (TDL). TDL provides a command and control link and maximizes aircrew situational awareness with beyond-line-of-sight capabilities. TDL also provides critical real-time information to the LC-130H aircrews such as friendly aircraft position, weather conditions, hostile threat locations, and will enable integration through podded solutions. Operations in the polar regions require ARC-210 Generation 6 radios with Mobile User Objective System satellite communications capabilities. The open-architecture mission pod will provide additional capacity for electronic attack/electronic protection, standoff acquisition, assessment of drop zones/landing zones (through a targeting pod), and beyond-line-of-sight communication with ground force commanders. All 10 LC-130Hs require the MAF open-architecture protection platform.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 MAF Common Carry Pods (3010)	**$2,000,000**	**$10,000,000**
10 LC-130 LAIRCM Group A Kits (3010)	**$1,500,000**	**$15,000,000**
10 LC-130 LAIRCM Group B Kits (3010)	**$3,000,000**	**$30,000,000**
10 LC-130 Next-Generation RF Group A Kits (3010)	**$120,000**	**$1,200,000**
10 LC-130 Next-Generation RF Group B Kits (3010)	**$775,000**	**$7,750,000**
10 LC-130 ALR-69A Kits (3010)	**$500,000**	**$5,000,000**
10 LC-130 Hard Point Installations (3010)	**$330,000**	**$3,300,000**
RTIC Non-Recurring Engineering (3600)	**N/A**	**$400,000**
10 RTIC Hardware Kits (3010)	**$560,000**	**$5,600,000**
10 ARC-210 GEN 6 Radios (3010)	**$220,000**	**$2,200,000**
Total		**$80,450,000**

LC-130: PROPULSION SYSTEM UPGRADES

1. Background. ANG LC-130Hs require increased performance, efficiency, and reliability. The LC-130H fleet has ski-equipped landing gear to enable landings and takeoffs on snow and ice. The present method to takeoff from deep snow field runways requires Jet Assisted Take-Off (JATO) rocket motors, which are no longer produced. Current operations require increased performance, efficiency, and reliability, which highlight the need for a comprehensive propulsion upgrade to the LC-130H fleet. The LC-130s have already received the NP2000 modification and have completed two Operation Deep Freeze deployments. However, the LC-130s still require the 3.5 engine modification to complete the propulsion upgrade. Upgrading the T-56 engine with the Rolls Royce 3.5 modification, with redesigned compressors and turbines, increases engine life-cycle, improves fuel economy, and improves aircraft availability. All 10 ANG LC-130H aircraft require this final phase of the propulsion modernization.

2. Program Details.

Quantity	Unit Cost	Program Cost
40 3.5 Engine Installs (3010)	**$1,200,000**	**$48,000,000**
Total		**$48,000,000**

LC-130: GLOBAL AIRSPACE COMPLIANT AVIONICS/INSTRUMENTATION AND ASSOCIATED TRAINING DEVICES

1. Background. The ANG LC-130H fleet requires updated avionics to ensure continued global airspace access. LC-130Hs face severe sustainment challenges with current avionics and cockpit instrumentation and will be out of compliance with Communications, Navigation, and Surveillance/Air Traffic Management (CNS/ATM) mandates if not modernized. Additionally, tactical night operations continue to suffer from non-Night Vision Imaging System (NVIS) compliant lighting. To eliminate critical sustainment issues due to Diminishing Manufacturing Sources and to meet required mandates and Air Force Instructions, this modernized cockpit will include: a multifunction engine instrument display system, automatic dependent surveillance-broadcast capability, enhanced vision system, NVIS compatibility, and a modern flight management system with a global positioning system (GPS) approach and polar navigation capabilities. Updated avionics address CNS/ATM mandates and increase operational efficiency by opening up airspace routes with stringent navigational requirements and allow the use of GPS approaches. An enhanced vision system capable of seeing through low weather conditions, such as a white-out, will increasing aircrew safety and operational effectiveness. An NVIS-compatible and modernized glass cockpit reduces crew workload, lowers maintenance costs, and increases capability and sustainability to operate safely at night. To produce a fully NVIS compliant aircraft, all L1 (H2) and L1A (H2.5) aircraft must receive the NVIS baseline time compliant technical orders that modify the side panels and center console or find other solutions (light emitting diodes) for NVIS compatible lighting. There are six LC-130H aircraft that need these TCTOs completed. All 10 ANG LC-130H aircraft require avionics upgrades.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$50,000,000**
10 Avionics Kit (3010)	**$5,700,000**	**$57,000,000**
10 Enhanced Vision Systems (3010)	**$250,000**	**$2,500,000**
6 NVIS TCTO Kits (3010)	**$50,000**	**$300,000**
10 NVIS Kits (3010)	**$465,000**	**$4,650,000**
Total		**$114,450,000**

LC-130: GLOBAL COMMUNICATIONS SYSTEM

1. Background. ANG LC-130Hs require a hard-wired Iridium voice, text, and data system with an external flush-mount antenna, capable of secure communication. The LC-130H uses a portable Iridium-based phone system that is functional but lacks the robustness and reliability necessary to operate in extreme environments. Remote LC-130H operating locations, especially polar mission support, require long-range beyond-line-of-sight communications. Satellite communication is limited at extreme latitudes and High-Frequency radios are unreliable during periods of high solar flare activity. A communication system such as the Iridium network is necessary for weather, air traffic control, automatic position reporting, and command and control to increase safety of flight. The current configuration of suction cup window-mounted antennas have poor reception and the sextant port antenna needs to be frequently removed for celestial navigation. The Coast Guard has a federated system they paid to develop that can be adapted for use on the LC-130s. All 10 ANG LC-130Hs require hardwired Iridium flight deck communications upgrades.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$1,000,000**
10 Flight Deck Communications Upgrade (3010)	**$220,000**	**$2,200,000**
Total		**$3,200,000**

LC-130: POLAR CONSTRUCTION SKIWAY TEAM EQUIPMENT / GEAR

1. Background. ANG LC-130Hs require equipment for the polar construction skiway team (PCST) and the ski landing area control officer (SLACO) team. These teams are required to forward deploy to remote areas, establish a forward operating base, and construct a skiway to support LC-130H operations. The PCST is subject to harsh arctic conditions and requires specialized gear for survival. Additionally, specialized equipment is required to prepare the landing surface, on ice or snow, for a ski equipped aircraft. Extreme cold weather life sustaining gear such as cold weather tents, clothes, generators, heaters, cooking equipment, and communications equipment are required for the survival of the team. The team consists of 20 personnel, any member of which could be tasked with supporting the PCST. This requires all crew members and maintenance personnel to be issued the same highly specialized extreme cold weather clothing. To be able to successfully build a skiway, equipment such as snowmobiles, groomers, flagging, ice/snow measuring tools, general hand tools, overt/covert lights, and remote refueling operations equipment are needed. Before this UTC was formalized, the 109AW funded this equipment through unfunded requests, which is unsustainable. A formal sustainment program needs to be established to maintain all gear and equipment in good working order.

2. Program Details.

Quantity	Unit Cost	Program Cost
PCST Equipment	**N/A**	**$300,000**
210 Extreme Cold Weather Clothing Kits	**$2,000**	**$420,000**
SLACO Equipment	**N/A**	**$200,000**
50 Extreme Cold Weather Clothing Sustainment Kits	**$2,000**	**$100,000**
Total		**$1,020,000**

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E-8C, C-32B, and C-40C

- **Robust "Sensor-To-Shooter" Command and Control Battle Management**
- **Wide-Area Ground, Littoral, and Maritime Surveillance/Tracking**
- **ANG E-8 Unit Provides 100% of the Total Fleet**

E-8C: The E-8C Joint Surveillance Target Attack Radar System is the world's premier wide-area surveillance moving target indicator, airborne, manned battle management, and command and control aircraft. It brings a unique combination of robust communication and real-time surveillance to air, ground, and surface domains. The aircraft's capability to find, fix, track, and orient shooters to air, ground, and surface targets of interest allows friendly forces to respond rapidly to a changing battlefield environment. Through continued investment in modernization, the E-8C will remain vital to joint force combat operations well into the future.

The ANG operates and maintains 16 E-8C's and one E-8(T)C. They have accrued more than 135,000 combat hours over Kosovo, Iraq, Afghanistan, and Libya. The E-8C has been deployed continuously, 24 hours per day, 365 days per year, for 18 years, providing simultaneous battle management, command and control, intelligence, surveillance, and reconnaissance supporting all six combatant commanders.

C-32B: The C-32B provides dedicated rapid response worldwide airlift to the Commander, United States Special Operations Command, in support of the US Government domestic and overseas crisis response activities.

C-40C: The C-40C provides worldwide distinguished visitor transportation for Congressional, Department of Defense, Air Force, and National Guard missions. The primary mission of the C-40 is to ensure passenger safety and comfort while providing the utmost in reliability.

E-8C, C-32B, and C-40C
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Critical Capabilities List

E-8C

- Counter-Unmanned Aircraft Systems Cueing and Identification
- Increased Commercial/Military Beyond-Line-of-Sight Internet Bandwidth Capacity
- Fifth-to-Fourth Generation Communications Gateway
- Aircraft Engine Replacement
- Bandwidth Efficient Common Datalink

C-32B

- Enhanced Flight Vision System
- Satellite-Based Augmentation System

C-40C

- Self-Contained COVID-19 Testing Capability
- Expand High-Speed Data Capacity
- Aircraft Communication Addressing and Reporting System and Controller-Pilot Data Link Communications Avionics Upgrade
- Large Aircraft Infrared Countermeasure System Replacement
- Satellite-Based Augmentation System

Essential Capabilities List

E-8C

- Hypatia Integration
- Secure Bandwidth Efficient - Common Data Link
- Joint Worldwide Intelligence Communications System Top Secret/Sensitive Compartmented Information Internet and Chat Central Computer and Console Integration
- Global Positioning System Time-of-Day, Auto Time-of-Day, Second Generation Anti-Jam Tactical Ultra High-Frequency Radio for North Atlantic Treaty Organization upgrade to HAVEQUICK
- Radar System Modernization

C-32B

- None

C-40C

- None

Desired Capabilities List

E-8C

- Self-Defense Suite
- Bridge/Relay/Civilian Support
- Blue Force Tracker 2
- Secure Voice Over Internet Protocol
- Moving Target Indicator Classification Device; Machine Aided Radar Target Identification

C-32B

- None

C-40C

- None

E-8C: COUNTER-UNMANNED AIRCRAFT SYSTEM CUEING AND IDENTIFICATION

1. Background. ANG E-8C Joint Surveillance Target Attack Radar System (JSTARS) requires an electronic intelligence (ELINT) system capable of detecting emissions from unmanned aircraft systems (UAS), to include both the aircraft and the remote controllers. This system will provide an organic capability to aid in the detection and identification of UAS-type targets in a contested, degraded environment. The E-8C lacks the capability to positively identify objects of interest detected by onboard sensors. This ELINT capability enables accurate characterization of detected objects in the joint battlespace and provides decision quality data to the operator for the timely application of military options. It will be used to cue other sensors for faster acquisition of target information. This integrated capability will also aid in a target recognition, threat awareness, and informed command and control of the battlespace. Each of the 16 E-8C aircraft requires an ELINT identification (ID) system. In addition, it needs to be incorporated into each of the three associated aircrew training devices.

2. Program Details.

Quantity	Unit Cost	Program Cost
ELINT ID System Non-Recurring Engineering (3010)	**N/A**	**$24,800,000**
18 ELINT Kits (3010)*	**$1,500,000**	**$27,000,000**
3 Simulated ELINT Kits for Training Systems (3010)	**$250,000**	**$750,000**
Total		**$52,550,000**

* Includes 10% spares

E-8C: FIFTH-TO-FOURTH GENERATION COMMUNICATIONS GATEWAY

1. Background. ANG E-8C Joint Surveillance Target Attack Radar System (JSTARS) requires the capability to act as a communications gateway, bridging the 5th to 4th Generation (Gen) fighter data link interoperability gaps. Current 4th Gen data link participants, to include fighters, bombers, and attack aircraft, cannot receive information from 5th Gen fighters, which forces the aircraft to perform combat operations without essential information and lacking situational awareness. By collecting and disseminating F-22 In-Flight Data Link and F-35 Multi-function Advanced Data Link information through an E-8C "524" communications gateway, which would convert the 5th Gen data to 4th Gen Link 16 messages, all Link 16 enabled aircraft will be able to utilize data received from 5th Gen aircraft, creating a significantly more accurate common operating picture. Additionally, improved situational awareness will greatly increase the efficiency of E-8C JSTARS battle management, target prioritization/cross-cueing, and improve accountability within their command and control area of responsibility. Each of the 16 E-8C aircraft requires a "524" gateway, which also needs to be incorporated into each of the associated aircrew training devices.

2. Program Details.

Quantity	Unit Cost	Program Cost
"524" Gateway Non-Recurring Engineering (3010)	**N/A**	**$28,500,000**
18 "524" Gateways (3010)*	**$2,000,000**	**$36,000,000**
3 Simulated "524" Gateways for Training Systems (3010)	**$100,000**	**$300,000**
Total		**$64,800,000**

* Includes 10% spares

E-8C: INCREASED COMMERCIAL / MILITARY BEYOND-LINE-OF-SIGHT INTERNET BANDWIDTH CAPABILITY

1. Background. ANG E-8C Joint Surveillance Target Attack Radar System (JSTARS) aircraft require increased beyond-line-of-sight (BLOS) bandwidth on available commercial and military networks. The E-8C JSTARS is rapidly running out of available onboard communications capacity. This forces the aircrew to reduce or shutdown communication channels to ensure others remain sustainable. Increasing the onboard BLOS bandwidth solves these challenges and allows the aircrew to continuously exploit multi-intelligence fusion tools, remotely piloted aircraft feeds, and satellite communications networks. An increase in bandwidth upload and download speed enhances the organic capabilities of the aircrew to detect patterns of life and anomalies within large volumes of geospatial data. This will save aircrew time by helping to organize complex mission data into cohesive products quickly. Expanding connectivity throughput will also enable aircrew to overlay hundreds of analyst intelligence layers onto a single operating picture. Each of the 16 E-8C aircraft requires increased bandwidth. Additionally, it needs to be incorporated into each of the three associated aircrew training devices.

2. Program Details.

Quantity	Unit Cost	Program Cost
BLOS Non-Recurring Engineering (3010)	**N/A**	**$21,400,000**
18 BLOS Kits (3010)*	**$1,000,000**	**$18,000,000**
3 BLOS Kits for Training Systems (3010)	**$200,000**	**$600,000**
Total		**$40,000,000**

* Includes 10% spares

E-8C: AIRCRAFT ENGINE REPLACEMENT

1. Background. ANG E-8C Joint Surveillance Target Attack Radar System (JSTARS) aircraft require new engines. The current TF33-102C engines are unique to the E-8C and are the biggest reliability problem and aircraft availability shortfall for JSTARS. Upgrading JSTARS with refurbished JT8D-219 engines will provide improved fuel economy, quicker climb, higher mission altitudes improving radar range, the ability to use shorter runways, compliance with international noise and emission standards, and enhanced reliability and maintainability. To meet Federal Aviation Administration Level D flight simulator certification standards, an instrumented flight test series may be required. The ANG needs one engine shipset (four engines, engine pods, and pylons) for each of its 16 E-8C and one E-8(T)C aircraft, plus two spare shipsets to cover local and deployed locations.

2. Program Details.

Quantity	Unit Cost	Program Cost
JT8D Non-Recurring Engineering (3010)	**N/A**	**$55,000,000**
19 JT8D Shipset Mods (3010)*	**$27,350,000**	**$519,650,000**
Incorporation of JT8D in Training Systems (3010)	**N/A**	**$15,000,000**
Total		**$589,650,000**

* Includes 10% spares

E-8C: BANDWIDTH EFFICIENT COMMON DATALINK

1. Background. ANG E-8C Joint Surveillance Target Attack Radar System (JSTARS) requires the capability to provide a Situational Awareness Data Link (SADL) gateway for USAF, ANG, and other SADL-equipped users to include special operations forces (SOF). In many E-8C areas of responsibility, no SADL gateway is available, which prevents SADL users from receiving critical information broadcast over Link 16. SADL is an integral part of ANG F-16 and A-10 digital communications capabilities, is used by several ground forces, and is key to the execution of multiple counter-air and counter-land missions. To better integrate close air support, dynamic interdiction, combat search and rescue, and non-traditional intelligence, surveillance, and reconnaissance aircraft and SOF personnel, gateways are needed to provide a conduit for data and information sharing, enabling battlespace visualization between Link 16 and SADL participants for air-to-surface and air-to-air missions. Additionally, the SADL gateway will increase the efficiency of E-8C JSTARS battle management and enhance accountability within areas of responsibility. Each of the 16 E-8C aircraft requires a SADL gateway. Additionally, it needs to be incorporated into each of the three associated aircrew training devices.

2. Program Details.

Quantity	Unit Cost	Program Cost
SADL Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
18 SADL Kits (3010)*	**$375,000**	**$6,750,000**
3 Simulated SADL Kits for Training Systems (3010)	**$50,000**	**$150,000**
Total		**$11,900,000**

* Includes 10% spares

C-32B: ENHANCED FLIGHT VISION SYSTEM

1. Background. The ANG C-32B mission requires an enhanced flight vision system (EFVS) to enable operations with reduced weather minimums. The EFVS increases situational awareness and safety during operations in weather and periods of low visibility. The EFVS package includes a heads-up display (HUD) fused with an enhanced vision system. The HUD is a means to provide all primary flight display information to the pilot, increasing pilot situational awareness, and decreasing pilot workload. This technology is commercially available and approved by the Federal Aviation Administration in a Supplemental Type Certificate for Boeing 757 installation and operation. One system is required for each of the two C-32Bs as well as spare parts for the system.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 EFVS Kits (3010)	**$5,500,000**	**$11,000,000**
Spare Parts (3010)	**$1,000,000**	**$1,000,000**
Total		**$12,000,000**

C-32B: SATELLITE-BASED AUGMENTATION SYSTEM

1. Background. The ANG C-32B mission requires a Satellite-Based Augmentation System (SBAS) to increase the reliability and accuracy of GPS operations. SBAS enables satellite-based approaches to precision minimums and ensures full compliance with Automatic Dependent Surveillance-Broadcast mandates for global operations by 2020. Additionally, this system will reduce the C-32B's reliance on ground-based navigational aids for terminal area guidance. One system is required for each of the two C-32Bs as well as spare parts for the system.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$4,500,000**
2 SBAS Kits (3010)	**$4,500,000**	**$9,000,000**
Spare Parts (3010)	**$500,000**	**$500,000**
Total		**$14,000,000**

C-40C: SELF-CONTAINED COVID TESTING CAPABILITY

1. Background. ANG C-40Cs require self-contained COVID testing capability. ANG C-40s must be able to travel anywhere in the world at any time. Most locations are not US Military airfields and the crew and passengers are subject to standard entry requirements of the host nation. Most countries require a negative COVID test before entry will be allowed. Often tests must occur within 48-72 hours of arrival. This can be difficult to accommodate due to travel times and customer itineraries. ANG C-40Cs need their own ability to administer a COVID test and receive the results as rapidly as possible. Self-contained testing kits require no additional training and results are usually available in 20 minutes. This capability will allow C-40Cs to continue to operate during the pandemic while providing the highest levels of customer service. All ANG C-40Cs will require one kit, plus additional kits for spares and squadron use.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 Self-Contained COVID Testing Kits (3010)	**$25,000**	**$125,000**
Total		**$125,000**

C-40C: EXPAND HIGH-SPEED DATA CAPACITY

1. Background. ANG C-40Cs require a high-speed data system for seamless, worldwide satellite-based communications, and internet connectivity. This will enable the C-40C fleet to meet time-critical and persistent passenger mission requirements. Users from the highest levels of US Government and Military routinely travel via the C-40C with limited communications to conduct time-critical business. The current equipment does not meet current technological needs for conducting business while airborne. All three ANG C-40s require upgraded high-speed data systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
3 Upgraded High-Speed Data Systems (3010)	**$5,000,000**	**$15,000,000**
Total		**$25,000,000**

C-40C: AIRCRAFT COMMUNICATION ADDRESSING AND REPORTING SYSTEM AND CONTROLLER PILOT DATA LINK COMMUNICATIONS

1. Background. ANG C-40Cs require upgraded Aircraft Communication Addressing and Reporting System (ACARS) and Controller Pilot Data Link Communications (CPDLC) for data link systems which sends messages between an aircraft and an operator's ground-base through various radio links. The current C-40C ACARS requires replacement due to obsolescence issues with component repairs starting in 2020. ACARS provides worldwide clear calling capability and is the primary means for unsecured calls to the flight deck and passengers. The FAA has mandated required avionics for aircraft using US Domestic Enroute CPDLC services. Currently, the C-40C does not meet these requirements. The aircraft's Communications Management Unit and Digital Radio must be upgraded to align with current FAA requirements. If not satisfied, the aircraft will not be allowed to fly in congested airspace, no longer report via ACARS, lose beyond-line-of-sight capability, and lose command and control capability. Furthermore, aircraft will be limited to flying below Flight Level 290. This will decrease safety margins as aircraft are forced to fly lower than optimal altitudes, which increases fuel cost and creates more enroute fuel stops. The ANG requires one upgraded ACARS/CPDLC per airframe plus one spare.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
4 Upgraded ACARS/CPDLC Systems (3010)	**$2,000,000**	**$8,000,000**
Total		**$13,000,000**

C-40C: LARGE AIRCRAFT INFRARED COUNTERMEASURE SYSTEM REPLACEMENT

1. Background. ANG C-40Cs require upgraded Large Aircraft Infrared Countermeasure Systems (LAIRCM). C-40Cs rely on the LAIRCM system for self-defense in contested airspace. The current LAIRCM system requires replacement due to component obsolescence by 2025. Current CONOPS and aircraft minimum equipment listings require a functional LAIRCM system. Without an upgraded LAIRCM system, the C-40C will not be capable to perform its primary mission of transporting required distinguished visitors around the world. All ANG C-40Cs require an updated LAIRCM system.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$12,000,000**
3 Upgraded LAIRCM Systems (3010)	**$2,000,000**	**$6,000,000**
Total		**$18,000,000**

C-40C: SATELLITE-BASED AUGMENTATION SYSTEM

1. Background. ANG C-40Cs require a satellite-based augmentation system (SBAS) to ensure travel anywhere in the world at any time. The C-40 does not currently possess the ability to fly GPS approaches to localizer minimums. Wide Area Augmentation System/Localizer Performance with Vertical Guidance (WAAS/LPV) increases safety with tighter navigation tolerances and increased capabilities including lower approach minima. WAAS provides a SBAS which increases availability and accuracy in position reporting in all phases of f1ight. WAAS/LPV enables aircraft to fly precision approaches into airports that do not have an instrument landing system (ILS). The US has already decommissioned a large number of ILSs in favor of the more cost-efficient LPV. More countries are acquiring LPV capabilities including European Nations, China, Japan, India, and Russia. The WAAS service is interoperable with other regional SBAS services including those operated by Japan, Europe, and India. ANG C-40Cs require three SBAS for the fleet.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**$1,500,000**	**$1,500,000**
3 SBAS (3010)	**$3,000,000**	**$9,000,000**
Total		**$10,500,000**

F-15

- **Air Dominance**
- **Homeland Defense**
- **ANG F-15 Units Provide 58% of the Total Fleet**

The F-15C Eagle has been the backbone of our nation's Air Superiority fleet for over 30 years and will continue to be a key asset. ANG F-15C units provide 31 percent of the nation's Aerospace Control Alert (ACA) fighters, spanning five alert sites in the continental United States. These alert sites provide 24-hour homeland defense. Continued full data link interoperability gives F-15C/Ds the required capability to combat the advanced threat, providing combatant commanders essential air superiority and homeland defense options.

In FY20, ANG F-15s deployed overseas on Theater Security Packages to Europe, Southwest Asia, and the Pacific in support of Combatant Commander taskings, ensuring continued American air dominance presence in contested airspace throughout the areas of responsibility. Additionally, ANG F-15s deployed to provide ACA for POTUS and other special taskings. Finally, ANG F-15C squadrons also took part in joint & international exercises including Checkered Flag, Red Flag, Vigilant Shield, Frisian Flag, Thracian Star, Sentry Aloha, and Sentry Savannah.

Over half of USAF F-15C combat capability resides within the Air National Guard, which possesses 39% of all air superiority assets available for Air Expeditionary Forces (AEF) commitments and ACA tasking. The ANG also operates the USAF's only F-15C formal flying training unit, where all active and reserve component F-15C pilots are trained.

Modernization and sustainment programs are vital to improving aircraft capabilities for both overseas contingency operations and homeland defense. These upgrades recapitalize and repair long-range combat identification and air superiority kill chains, while drastically increasing survivability in contested environments. These programs include the MIDS-J data link, multi-spectral search and track technologies, electronic warfare and self-protection, a modern integrated cockpit, and high-fidelity simulator upgrades that replicate the latest threats.

F-15
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Critical Capabilities List

- Data Link Interoperability
- Multi-Spectral Search/Track/Identification/Target
- Full-Spectrum Electronic Warfare
- Modernized Cockpit via Upgraded Displays/Integrated Communications Suite
- High-Fidelity Distributed Mission Operations-Capable Simulators with Modern Threat Replication

Essential Capabilities List

- Program Support for Joint Mission Planning System and Common Mission Debrief Program
- Realistic Training Opportunities

Desired Capabilities List

- Simulation Training Device Upgrade
- Beyond-Line-of-Sight Data Transfer Station

F-15: DATA LINK INTEROPERABILITY

1. Background. ANG F-15s require full secure data link interoperability to ensure safety-of-flight, continued lethality during combat operations, and effective command and control specifically during homeland defense missions. Legacy Link-16 crypto will expire at the end of the calendar year 2021 per National Security Agency mandates. When this occurs, any aircraft equipped with a legacy Link-16 terminal and outdated, unusable crypto will not have fighter data link (FDL). FDL is a key enabler of United States airpower and is a mandatory equipment item for Combatant Command employment in any Area of Responsibility worldwide. Link-16 age-out (without replacement) is a significant DoD-wide capability gap. For the F-15C in particular, only a certain subset of designated "Platinum" or long-term Eagles are slated to receive the Advanced Data Core Processor-II (ADCP-II) or central computer upgrade. That modification also comes with the modern Multifunctional Information Distribution System – Joint Tactical Radio System (MIDS-JTRS, more simply known as "MIDS-J"). The MIDS-J terminal replaces the legacy FDL line-replaceable unit. Due to ADCP-II program funding reductions, only 101 F-15Cs (of the 120 planned "Platinum" Eagles) are slated to receive the ADCP-II and MIDS-J upgrades, which will place 19 F-15Cs permanently "out of the link" and render them combat ineffective. All of these 19 aircraft reside or will reside in ANG squadrons. To ensure that all 120 long-term "Platinum" Eagles are fully combat-capable, 19 ADCP-II & MIDS-J kits are required to complete the upgrade program.

2. Program Details.

Quantity	Unit Cost	Program Cost
19 F-15C ADCP-II Conversion Kits (3010)	**$500,000**	**$9,500,000**
19 F-15C MIDS-J Conversion Kits (3010)	**$500,000**	**$9,500,000**
Total		**$19,000,000**

F-15: MULTI-SPECTRAL SEARCH/TRACK/IDENTIFICATION/TARGET

1. Background. ANG F-15s require multi-spectral search/track/identification/target systems and a functional, enhanced AN/ALQ-128 Electronic Warfare Warning Set (EWWS) on all 105 combat-coded aircraft. These capabilities will supplement on-board threat detection, identification, and tracking as part of a time-synchronized, integrated function of the existing sensor systems for detection and weapons cueing. Adversary aircraft and integrated air defense networks employ sophisticated detection and electronic attack methods that complicate F-15C employment and leave the Eagle vulnerable to attack. Infrared Search and Track (IRST) capabilities for forward-deployed and homeland defense missions require 20 pods at each of the five ANG combat-coded squadrons. Due to Tactical Electronic Warfare System (TEWS) sustainment cancellation, funding to update the ALQ-128 with modernized software and hardware interfaces was not initiated to ensure ALQ-128 compatibility with Active Electronically Scanned Array (AESA)-equipped aircraft. This oversight resulted in a major degradation of the F-15 kill-chain that will not be corrected with Eagle Passive Active Warning Survivability System installation. System functional capability must be immediately incorporated into all 105 ANG combat-coded F-15Cs to restore vital combat identification capabilities.

2. Program Details.

Quantity	Unit	Program Cost
IRST Pod Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
100 IRST Pods (3010)	**$3,500,000**	**$350,000,000**
ALQ-128 Non-Recurring Engineering (3010)	**N/A**	**$50,000,000**
105 ALQ-128 EWWS (3010)	**$500,000**	**$52,500,000**
Total		**$462,500,000**

F-15: FULL-SPECTRUM ELECTRONIC WARFARE

1. Background. The proliferation of advanced adversary aircraft, sophisticated anti-aircraft missile systems, and other integrated air defense systems pose a significant threat to F-15 survivability. F-15s require a full-spectrum electronic warfare suite that autonomously and automatically detects, identifies, and locates radio frequency (RF) threats. The system should deny, degrade, deceive, disrupt, and defeat RF, electro-optical, and infrared threat systems in highly-contested environments. The Eagle Passive Active Warning Survivability System (EPAWSS) was designed to replace the functionally obsolete and unsupported Tactical Electronic Warfare System to enhance situational awareness and survivability against enemy threats and was slated for installation on combat-coded ANG F-15Cs. In place of a service life extension or sufficient funding for EPAWSS, multiple individual interim EW systems are immediately required to enhance F-15 survivability in the short-term. These interim solutions should include: integrated digital radar warning receiver (RWR); internal or external (podded) digital radio frequency memory (DRFM) electronic attack (EA); and advanced Fiber-Optic Towed Decoy (FOTD) systems. Interim EW initiatives require a digital RWR on all 135 F-15C/D aircraft. Internal DRFM upgrades would be for all 105 combat-coded aircraft; external DRFM EA pods would only require 40 rotatable assets. All 105 ANG combat-coded Eagles must be equipped with re-usable FOTD systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
150 F-15 Digital RWR (3010)*	**$1,000,000**	**$150,000,000**
115 F-15 Internal DRFM EA (3010)*	**$1,000,000**	**$115,000,000**
40 F-15 DRFM EA Pods (3010)*	**$2,000,000**	**$80,000,000**
F-15 FOTD Non-Recurring Engineering (3010)	**N/A**	**$5,500,000**
115 F-15 FOTD Systems (3010)*	**$100,000**	**$11,500,000**
Total		**$362,000,000**

* Includes 10% spares

F-15: MODERNIZED COCKPIT VIA UPGRADED DISPLAYS / INTEGRATED COMMUNICATIONS SUITE

1. Background. ANG F-15C/Ds require a cockpit technical refresh to enhance combat capability/effective command and control, improve flight safety, and enhance performance by reducing physiological stressors. The F-15 has experienced steady growth in capability due to modernization of sensors, weapons, and other mission systems, but the displays/controls and communication, navigation, and identification (CNI) functionality in the F-15 are based on outdated 1970s technology. Fully utilizing the F-15 weapon system requires a complex pilot vehicle interface that imposes an extremely demanding workload on the pilot, limiting effectiveness and presenting a safety concern. In addition, the lack of cockpit layout standardization across the fleet imposes an undue training burden, particularly the Replacement Training Unit at Klamath Falls; these aircraft are still in need of Vertical Situation Display Replacement attack displays. Satellite communication was added to the F-15 but did not include a centralized up-front control (UFC) as planned. The F-15 requires a commercial-off-the-shelf (COTS) UFC to control 3 radios in one place that also has growth potential to integrate additional CNI, datalink, and select mission data control functions. The F-15 also requires a three-dimensional (3D) audio system that allows the pilot to spatially separate and process multiple radio frequencies and directional self-protection warning tones. The legacy helmet-mounted display (HMD) system is outdated, physiologically damaging, and reliant on night vision goggles (NVGs) that present a safety concern. The F-15 requires an advanced HMD system that provides a safer, more capable helmet with binocular wide field-of-view and integrated night vision in order to do away with NVGs. All of these upgrades enhance mission execution and flight safety in real-world and training environments by reducing workload and physiological stress while increasing a pilot's 3D situational awareness of the battlespace. ANG requires one attack display upgrade for 25 F-15Cs and two for 14 F-15Ds. ANG requires 150 UFC and 150 3D Audio kits to outfit all 135 ANG F-15s. ANG requires non-recurring engineering to integrate a COTS advanced HMD into the Suite 9+ baseline, and 150 Advanced HMDs to support the entire ANG F-15 fleet, plus spares.

2. Program Details.

Quantity	Unit Cost	Program Cost
60 F-15 Attack Display Upgrades (3010)*	**$200,000**	**$12,000,000**
150 Up-Front Control (3010)*	**$50,000**	**$7,500,000**
150 3D Audio Kits (3010)*	**$100,000**	**$15,000,000**
Advanced HMD Non-Recurring Engineering (3010)	**N/A**	**$20,000,000**
150 Advanced HMDs (3010)	**$200,000**	**$30,000,000**
Total		**$84,500,000**

* Includes 10% spares

F-15: HIGH-FIDELITY DMO CAPABLE SIMULATORS WITH UPDATED THREAT REPLICATION

1. Background. ANG F-15s require the ability to participate in networked, high-fidelity simulators with a wide variety of aircraft types and squadrons around the globe in real-time against modern threats. Current ANG F-15 simulator network connectivity is limited to specific squadrons and types of aircraft. Additionally, the current simulated threat has been vastly outpaced by the real-world threat, relegating simulator training to more of a procedural exercise as opposed to a training opportunity against an advanced adversary. Additionally, ANG simulators have been limited in their ability to fully replicate fielded aircraft tactical systems. For example, Joint Helmet Mounted Cueing System (JHMCS) and night vision goggle (NVG) capabilities are not replicated in the current simulators, so the only way for F-15 pilots to train with these systems is during actual (and limited) sorties. High-fidelity DMO-capable simulators would allow ANG F-15 squadrons to fully train for their assigned missions and develop advanced tactics against a constantly improving baseline adversary. Higher-quality simulators that fully match the configuration of the Eagles on ANG flight lines would also allow F-15 squadrons to simulate real-world combat deployments with other package assets before deployment, allowing a full force-integration rehearsal against the latest threat aircraft and weapons systems in a representative geographical location and environment. Each of the six ANG F-15C units requires a simulator upgrade.

2. Program Details.

Quantity	Unit Cost	Program Cost
Simulator Threat Replication Enhancement (3010)	**N/A**	**$5,000,000**
6 F-15C JHMCS and NVG Simulator Systems (3010)	**$250,000**	**$1,500,000**
Total		**$6,500,000**

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F-22

- **Air Dominance**
- **Homeland Defense**
- **ANG F-22 Units Provide 11% of the Total Fleet**

The Air Reserve Component (ARC) flies and maintains F-22s at all 3 F-22 basing locations. The ANG has two F-22 classic associate units and one operational F-22 squadron. Aerospace Control Alert (ACA) support is provided by ARC F-22s flying out of Alaska, Hawaii, and Virginia. For the past 5 consecutive years, ARC F-22 pilots, maintainers, and aircraft have participated in combat operations in support of Operation INHERENT RESOLVE as well as participated in several major exercises. In addition to combat and exercise operations, ARC F-22s play an essential role in Operational Test (OT) and training future F-22 pilots at the F-22 Formal Training Unit (FTU).

Primary ANG F-22 modernization focuses on common configuration and modernization to counter technological advances made by near peer competitors. Enhancements in fuel and communication systems will allow F-22s to maintain air dominance at longer ranges from support assets. Improved GPS capabilities and a helmet-mounted display will increase the F-22's distinct first-shot, first-kill advantage.

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Critical Capabilities List

- Cockpit Global Positioning System Signal Repeater
- External Multi-Communication Node
- Helmet-Mounted Display
- Data Link Improvements
- Beyond-Line-of-Sight Communications

Essential Capabilities List

- Improved Simulator Capabilities
- Accurate Training for Peer Threats
- Combat Identification Improvements
- Leverage F-35 Capabilities and Technologies
- Common Countermeasure Dispensers and Controllers For F-22 and F-35 Aircraft

Desired Capabilities List

- New Integrated Forebody and RADAR Improvements
- Engine Upgrades
- Common Configuration
- Low-Observable Reduction and Sustainment Improvements

F-22: COCKPIT GLOBAL POSITIONING SYSTEM SIGNAL REPEATER

1. Background. ANG F-22s require Global Positioning System (GPS) cockpit repeater kits as a backup means of GPS-based navigation. Various tactical aircraft are already utilizing Electronic Flight Bag (EFB) tablets in the Central Command area of responsibility under local commander authority for use during combat sorties. USAF F-15E and US Navy F/A-18E/Fs use these tablets for navigational situational awareness, but also for blue force tracking; often this tablet technology is the only tool available to discriminate between friendly and hostile locations during dynamic targeting scenarios. Air Combat Command is currently resourcing EFBs for use in F-22 aircraft; however, the F-22 cannot receive GPS signals in the cockpit due to proprietary canopy characteristics. A lack of GPS signal reception in the cockpit limits the EFB usage as a digital repository of flight information publications. To utilize the EFB as a backup means of GPS based navigation and in cases of various electrical failures, the F-22 requires a repeater of the aircraft's received GPS signal in the cockpit for all 20 ANG F-22 aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
22 GPS Repeater Kits (3010)*	**$5,000**	**$110,000**
Total		**$110,000**

* Includes 10% spares

F-22: EXTERNAL MULTI-COMMUNICATION NODE

1. Background. ANG F-22s require an external multi-communication node. US Indo-Pacific Command has outlined a requirement for combat air force (CAF) platforms to demonstrate and execute combat operations in austere locations utilizing flexible self-contained multifunctioning units that will complicate enemy targeting of tactical forces. Agile combat employment (ACE) or adaptive basing are the terms most often used to describe these operations. There are significant challenges associated with agile forces receiving and sending communications in contested and austere locations while maintaining a small logistical footprint. There are currently several commercial off-the-shelf communication nodes that would provide encrypted satellite voice, messaging, and internet services enhancing CAFs ability to execute ACE communications with limited to no modifications. ANG F-22s require five communication nodes to execute these operations.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 Multi-Communication Nodes (3010)	**$200,000**	**$1,000,000**
Total		**$1,000,000**

F-22: HELMET-MOUNTED DISPLAY

1. Background. ANG F-22 pilots require a night vision compatible, color helmet-mounted display (HMD). Multiple simulations and an operational utility assessment conducted by the 422nd Test and Evaluation Squadron demonstrated that using an HMD provides a distinct first-shot, first-kill advantage. Although this advantage applies primarily to within-visual-range engagements, the HMD also substantially increases situational awareness during beyond-visual-range intercepts. HMD technology provides the capability to cue and verify off-boresight sensor and weapon information through the display of weapons employment zones and visual cues of target and friendly aircraft locations. Originally conceived as a weapons cueing system, the HMD has evolved into a force multiplier because of its ability to enhance situational awareness during all phases of flight and across all mission sets. For example, the HMD provides threat information visual cues while the pilot is "eyes-out" of the cockpit, warning of dangers, and providing critical information to allow the pilot to maneuver the aircraft away from terrain or threats. Similarly, F-22s tasked with identifying targets of interest during homeland defense missions would be better able to quickly and efficiently visually locate and identify small aircraft or unmanned systems. Lack of an HMD limits the lethality of the F-22 and puts the aircraft at a disadvantage in certain situations against less formidable and capable aircraft. The acquisition of an HMD for each ANG F-22 pilot will greatly increase the lethality and survivability of the F-22.

2. Program Details.

Quantity	Unit Cost	Program Cost
Helmet Mounted Display Non-Recurring Engineering (3010)	**N/A**	**$41,000,000**
50 Helmet Mounted Displays (3010)*	**$300,000**	**$15,000,000**
Total		**$56,000,000**

* Includes 10% spares

F-22: DATA LINK IMPROVEMENTS

1. Background. ANG F-22s require improvements to data link infrastructure to improve interoperability with differing platforms. The F-22 has a very capable intra-flight data link system. The F-35 also has a very capable, but incompatible intra-flight data link system. In the future, both aircraft will be able to transmit and receive a Link-16 data link. However, a majority of the high-quality data available within F-22/F-35 formations will not be passed over Link-16. Upgrading the F-22 data link will allow more F-22 formation members to receive high-quality data and will allow for more F-22/F-35 data link interoperability. All 20 ANG F-22s require an updated data link capability.

2. Program Details.

Quantity	Unit Cost	Program Cost
Data Link Hardware Non-Recurring Engineering (3010)	**N/A**	**$69,000,000**
22 Data Link Kits (3010)*	**$2,000,000**	**$44,000,000**
Total		**$113,000,000**

* Includes 10% spare

F-22: BEYOND LINE-OF-SIGHT COMMUNICATION

1. Background. The F-22 requires a communication system capable of beyond-line-of-sight (BLOS) function. As the air and surface threat advances, command and control assets are required to be further from the fight. As these ranges increase, secure communication that relies on line-of-sight becomes significantly less reliable. Installing a system capable of allowing F-22s to transmit and receive secure voice communications over the horizon will allow higher situational awareness while fighting against the current and future threats. All 20 ANG F-22s require BLOS communication capability.

2. Program Details.

Quantity	Unit Cost	Program Cost
BLOS Hardware Non-Recurring Engineering (3010)	**N/A**	**$47,000,000**
22 BLOS Communication Hardware Kits (3010)*	**$100,000**	**$2,200,000**
Total		**$49,200,000**

* Includes 10% spares

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F-16

- **Close Air Support/Interdiction/Precision Strike**
- **Suppression/Destruction of Enemy Air Defenses**
- **Homeland Defense**
- **ANG F-16 Units Provide 37% of the Total Fleet**

ANG F-16s are engaged around the globe in operations including NOBLE EAGLE, IRAQI FREEDOM, INHERENT RESOLVE, ENDURING FREEDOM, and NEW DAWN. Since 2003, ANG F-16Cs have fulfilled many of CENTCOM's precision-guided munitions and close air support (CAS) taskings, including convoy escort, dedicated infrastructure defense, border patrol, and raid support. The ANG operates 332 Block 25/30/32/40/42/50/52 F-16C/Ds. The ANG F-16 aircraft make up 56% of the nation's Aerospace Control Alert (ACA) fighter force and provide a near-constant presence in operational theaters conducting CAS and armed reconnaissance. Capability enhancements to the Block 40/42 and Block 50/52 aircraft make them the Air Force's only 4th Generation suppression of enemy air defenses (SEAD)-capable aircraft.

Modernization efforts are underway to improve ANG F-16s by fielding affordable systems with secure line-of-sight and beyond-line-of-sight communication suites with 3-Dimensional audio, smart displays with data processing capability, advanced helmet-mounted target cueing for air and ground weapons employment, enhanced self-protection suites, and improved radar performance and reliability.

F-16
2020 Weapons and Tactics Conference

Critical Capabilities List

F-16CM (Block 40/42/50/52)

- Radar Providing Low-Observable Detection, Air-to-Air and Air-to-Ground Electronic Protection/ Electronic Attack, and Combat Identification Capability
- Rapidly Adaptable, Automated Digital Electronic Warfare Suite Capable of Detecting, Precisely Geolocating, and Protection from Radio Frequency and Infrared Threats
- Targeting Pod with High-Definition Interface, and Displays
- Lightweight, Color, Night-Compatible Helmet-Mounted Display
- Multi-Band, Secure Beyond Line-of-Sight Radio with 3-Dimensional Audio

F-16C (Block 25/30/32)

- Radar Providing Low-Observable Detection, Air-to-Air and Air-to-Ground Electronic Protection/ Electronic Attack, and Combat Identification Capability
- Rapidly Adaptable, Automated, Digital Electronic Warfare Suite Capable of Detecting, Precisely Geolocating, Protection From, and Attack of Modern Radio Frequency and Infrared Threats
- Advanced Datalink with Link 16 Capability Supporting Growth for 5th and 4th Generation Fighter Interoperability in a Contested and Degraded Joint Operational Environment
- Navigation System Capable of Operating in Global Positioning System Denied Environments
- Multiple User Objective System Beyond Line-Of-Sight Radio with Three-Dimensional Audio

Essential Capabilities List

- Proliferation and Sustainment of Concurrent High-Fidelity Ready Aircrew Program Quality Simulators at the Unit Level
- Organic Ability to Complete a Beyond Visual Range Passive Kill Chain Outside of the Radio Frequency Spectrum Against Modern Airborne Threats
- Advanced Data Link Capability with Tri-Service Interoperability Between 4th and 5th Generation Aircraft to Include Broadband Uplink
- Modern Digital Cockpit Displays that Feature a Reliable Standby Attitude and Heading Reference System with an Interdependent Battery Back-up as well as more Detailed RWR Information
- Tactical Autopilot with Auto-throttle, and an Advanced Flight Control Computer Capable of Integrating with Weapons Delivery

Desired Capabilities List

- In an effort to save space, desired lists can be obtained upon request from NGB/A5.

F-16: RADAR PROVIDING LOW-OBSERVABLE DETECTION, AIR-TO-AIR AND AIR-TO-GROUND ELECTRONIC PROTECTION/ELECTRONIC ATTACK, AND COMBAT IDENTIFICATION CAPABILITY

1. Background. All ANG F-16 aircraft require Active Electronically Scanned Array (AESA) radar to execute tasked missions effectively. AESA radars provide the capability to detect and track multiple airborne targets of interest in dense civilian air traffic environments. AESA radars will improve ANG F-16s capability to perform close air support, surface attack, and defensive counter-air. AESA radars can perform detection, tracking, communication, and jamming functions in multiple directions simultaneously. Additionally, AESA radars eliminate several components associated with mechanical radars, significantly improving reliability and maintainability costs. The survivability and lethality of the F-16 will diminish without the inherent capability and reliability of an AESA radar. 230 remaining ANG F-16s are requiring an AESA radar.

2. Program Details.

Quantity	Unit Cost	Program Cost
Radar Phase II and III Non-Recurring Engineering (3010)	**N/A**	**$25,000,000**
230 Radar Upgrades (3010)	**$2,114,943**	**$486,436,890**
Total		**$511,436,890**

F-16: RAPIDLY ADAPTABLE, AUTOMATED, AND DIGITAL ELECTRONIC WARFARE SUITE CAPABLE OF DETECTING, PRECISELY GEOLOCATING, PROTECTION FROM, AND ATTACK OF MODERN RADIO FREQUENCY AND INFRARED THREATS

1. Background. ANG F-16 aircraft require a robust integrated electronic attack suite to counter current and future radars. All ANG F-16 aircraft electronic warfare (EW) suites are comprised of a series of EW equipment designed in the 1980s, which are incapable of providing adequate defensive situational awareness and countermeasures against some present and most future radar systems. Today, both systems suffer from sustainment issues and have significant capability issues against modern threat systems. The attributes of this integrated suite shall incorporate an upgraded radar warning receiver (RWR), a digital radio frequency memory upgraded electronic attack (EA) pod, a pylon missile warning system (MWS), and the ALQ-213 legacy electronic combat (EC) integration system. The F-16 fleet has two legacy analog RWRs (ALR-69 and ALR-56M) and two legacy analog EA pods (ALQ-131 and ALQ-184). All require sustainment and digital-based performance upgrades. The ALQ-213 EC integration system is installed on all F-16 Block 30/32 aircraft, but it must be installed on the remaining 30 F-16 Block 40/42/50/52, of which 174 have been procured. F-16s will remain at risk to many current and all advanced threat systems resulting in areas of denied access, significantly impacting the pilot's ability to survive, accomplish assigned missions, and meet combatant commander requirements.

2. Program Details.

Quantity	Unit Cost	Program Cost
ALR-69A Non-Recurring Engineering (3010)	**N/A**	**$25,000,000**
332 ALR-69A Upgrades (3010)	**$600,000**	**$199,200,000**
EA Pod Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
70 EA Pod Upgrades (3010)	**$1,320,000**	**$92,400,000**
ALQ-213 Non-Recurring Engineering (3010)	**N/A**	**$15,000,000**
30 ALQ-213 Kits (3010)	**$160,000**	**$4,800,000**
MWS Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
70 MWS Sets (3010)	**$1,100,000**	**$77,000,000**
Total		**$433,400,000**

F-16CM: TARGETING POD WITH DIGITAL HIGH-DEFINITION INTERFACE AND DISPLAYS

1. Background. All ANG F-16 aircraft require a center display unit (CDU) and modern multi-function displays (MFDs) to transfer imagery with ground controllers, fully utilize advanced targeting pod image quality, improve available processing power, and replace aging flight instruments. The ability to transfer data and exploit digital targeting pod video is critical throughout the broad spectrum of F-16 missions, including close air support, time-sensitive targeting, and homeland defense. Coupling CDU and MFDs with broadband uplink information will allow aircrew to broadcast high-definition real-time data to enable decision-makers and expedite the kill chain. Furthermore, the CDU contains additional processing capacity that allows for manipulating data external to the aircraft operational flight program (OFP). This additional processing capacity provides pilots with the ability to insert mission planning data pre-mission while opening low-cost pathways to integrate new capabilities without the costly and time-consuming process of changing the aircraft OFP software. Pilot-selectable display options will provide electronic primary instrument flight displays (attitude, performance, and navigation) when required. A total of 280 MFDs and 20 CDU kits remain to outfit the complete ANG fleet.

2. Program Details.

Quantity	Unit Cost	Program Cost
CDU Non-Recurring Engineering (NRE) (3010)	**N/A**	**$5,000,000**
20 CDU Kits (3010)	**$400,000**	**$8,000,000**
MFD NRE (3600)	**N/A**	**$5,000,000**
280 MFD Kits (3010)	**$50,000**	**$14,000,000**
Total		**$32,000,000**

F-16CM: LIGHTWEIGHT, COLOR, NIGHT-COMPATIBLE HELMET-MOUNTED DISPLAY

1. Background. ANG F-16 Block 40/42/50/52 require modern helmet-mounted displays (HMD) that are compatible with night vision devices. F-16 pilots are limited by the inability to rapidly cue sensors, build battlespace awareness, and safely operate in a night environment. Currently, pilots must choose between cueing or night vision. Helmet solutions combining these capabilities are required to fight near-peer adversaries in the modern battlespace. A modern HMD should also include a multi-color capability, display a large volume of symbols, and utilize a reliable spatial tracking system. Additionally, the helmet should be lightweight and ergonomic with a neutral center of gravity that reduces strain on the pilot's neck and back. 154 kits remain to outfit the complete fleet.

2. Program Details.

Quantity	Unit Cost	Program Cost
Helmet-Mounted Display Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
154 Helmet Mounted Display Kits (3010)	**$90,000**	**$13,860,000**
Total		**$18,860,000**

F-16: MULTI-BAND, SECURE LINE-OF-SIGHT/BEYOND-LINE-OF-SIGHT RADIOS WITH THREE-DIMENSIONAL AUDIO

1. Background. ANG F-16s require simultaneous secure line-of-sight (SLOS) and beyond-line-of-sight (BLOS) communications incorporating three-dimensional (3D) audio. Current upgrades to all ANG F-16s provide SLOS and BLOS communications through the installation of one ARC-210 radio. The ARC-210 modification provides an improved ability to securely communicate with ground forces and command and control (C2) nodes but does not allow simultaneous operations on SLOS/BLOS frequencies. Aerospace Control Alert (ACA) and combat theater operations require simultaneous SLOS/BLOS communications to maintain contact with both C2 nodes and friendly forces concurrently. A second ARC-210 allows growth to extended data and image transfer when linked to an advanced display. The combination of two ARC-210s plus a legacy radio (three radios total) allows in-theater communications on a C2 frequency, a secure tactical frequency with ground forces, and an intra-flight frequency. In the Homeland Defense (HLD) mission, this radio configuration enables monitoring C2, air traffic control, and intra-flight frequencies simultaneously. The integration of noise-canceling and directional (3D) audio simplifies the interpretation of simultaneous radio calls by spatially separating aural warning and radio signals and provides angular cueing to ground and air threats when used in conjunction with a helmet-mounted cueing system. These capabilities are critical to operations in remote areas, dense threat environments, and dynamic HLD missions. All 332 ANG F-16 aircraft require these modifications.

2. Program Details.

Quantity	Unit Cost	Program Cost
BLOS Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
332 BLOS Radios (3010)	**$150,000**	**$49,800,000**
3D Audio Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
332 3D Audio Upgrades (3010)	**$125,000**	**$41,500,000**
Total		**$101,300,000**

F-16C+: ADVANCED DATA LINK WITH LINK-16 CAPABILITY SUPPORTING GROWTH FOR 5TH AND 4TH GENERATION FIGHTER INTEROPERABILITY IN A CONTESTED AND DEGRADED JOINT OPERATIONAL ENVIRONMENT

1. Background. All ANG F-16 aircraft require Link 16 data link capability to employ in the current operational environment effectively. Legacy Situational Awareness Data Link equipment has proven inadequate due to a lack of currently fielded support infrastructure, frequency band constraints, and Joint Interface Control Cell support. The transition of F-16 Block 25/30/32 aircraft to Link 16 will allow seamless deployment, connectivity, and interoperability with the entire F-16 fleet. All ANG F-16s (Block 25/30/32/40/42/50/52) require growth in data link equipment to foster 5th to 4th generation aircraft data link communications. This current deficiency directly affects the combat capability and mission effectiveness of the five Block 30 units currently manning Aerospace Control Alert. All ANG pre-block F-16s need to be postured to interact with 5th generation aircraft through the acquisition of new data link equipment, or force package combat capability will be significantly degraded.

2. Program Details.

Quantity	Unit Cost	Program Cost
Data Link Non-Recurring Engineering (3010)	**N/A**	**$3,000,000**
192 Data Link Upgrades (3010)	**$200,000**	**$38,400,000**
Total		**$41,400,000**

F-16C+: NAVIGATION SYSTEM CAPABLE OF OPERATING IN GLOBAL POSITIONING SYSTEM DENIED ENVIRONMENTS

1. Background. ANG F-16 Block 25/30/32 aircraft require an update to the Embedded Global Positioning System (GPS) and Inertial Navigation System (EGI) to increase anti-jam and selective availability anti-spoofing module capability during all phases of the mission. The navigation equipment in the F-16 needs to operate with GPS accuracy in an increasingly contested electromagnetic environment. The design and operation of the current F-16 Block 30 EGI did not anticipate the current threat environment and its continued performance at the required operational level is at serious risk. EGI modernization is required on 30 remaining Block 25/30/32 F-16s.

2. Program Details.

Quantity	Unit Cost	Program Cost
Jam Resistant Navigational System Non-Recurring Engineering (3010)	**N/A**	**$2,000,000**
30 Jam Resistant Navigational Systems (3010)	**$155,000**	**$4,650,000**
Total		**$6,650,000**

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HH-60G

- **Combat Search and Rescue**
- **ANG HH-60 Units Provide 18% of the Total Fleet**

ANG Personnel Recovery (PR) helicopters and aircrew play a critical role in support of overseas contingency operations while responding to increasingly high demand for domestic operations. There are three ANG PR helicopter units and one ANG PR training unit associated with an active-duty unit.

In 2020, ANG Rescue Squadrons (RQS) deployed in support of Operation Octave Shield. The 129 RQS worked with several agencies to fight fires in Northern California. Additionally to this, HH-60Gs conducted numerous counter-drug missions throughout the state and supported search and rescue operations including a long-range recovery in the Pacific Ocean.

The 101 RQS performed multiple missions in support of both overseas and domestic operations. The 210 RQS held a 24-hour state-wide, rescue alert in Alaska resulting in 55 lives saved. The 188 RQS supported aircrew training for the 58 Special Operations Wing.

The HH-60G modernization priorities included smart multi-functional color display improvements and the acquisition of multiple data links. Additional upgrades focus on modernization of aircraft defensive systems and integration of a helmet-mounted heads-up display.

HH-60G
2020 Weapons and Tactics Conference

Critical Capabilities List

- Integrated Flight Deck with Handheld Device Interoperability
- Modernized Integrated Defensive Suite
- Helmet-Mounted Display
- External Store Pylons to Facilitate Emerging Mission Requirements
- Passive Remotely-Activated Geolocation for Contested Environments

Essential Capabilities List

- Comprehensive Mission Debrief Capability
- Virtual Reality Training Devices At Every Air Reserve Component Base
- Helicopter Underwater Egress Lighting
- Performance Based Navigation Certified Area Navigation
- Agile Combat Search And Rescue Basing Capability

Desired Capabilities List

- Improved Generators
- Aircrew Flight Equipment Enhancements
- Instrumentation Upgrade
- Helicopter Hovering In-Flight Refueling
- Improved Aircraft Hoist

HH-60G: INTEGRATED FLIGHT DECK WITH HANDHELD DEVICE INTEROPERABILITY

1. Background. ANG HH-60G aircrew requires an integrated flight deck with wireless handheld device (HHD) interoperability to fuse information from multiple sources into a common operating picture. This requires an open architecture on the HH-60G to enable digital interoperability and provide for access to aircraft derived information. To enable cross-platform communication, upgraded software definable radios will enable previously stove-piped communications channels to interoperate with various combat search and rescue (CSAR) weapon systems. This cross-waveform communications tool, to include cellular, ties civil response forces into traditional CSAR communications channels. To manage this information, the current smart multi-function color display (SMFCD) installed on ANG HH-60Gs needs to be fully integrated with multiple data feeds and devices. The capability to quickly access mission-essential data from one centralized display will enable HH-60G aircrews to reduce "heads down" time and vastly improve situational awareness. Secure internet protocol network data will enable aircrews to receive near real-time blue force tracker 2 (BFT2) data and text messaging from the battlefield. BFT2 is a modernized joint tracking system, which is compatible with situational awareness data link (SADL), Link 16, and provides beyond-line-of-sight interactive data communication between aviation assets and command and control. Automatic dependent surveillance-broadcast (ADS-B) is a cooperative surveillance technology that determines aircraft position, surrounding weather, and flight information. Link 16 is a tactical data link which enables digital situational awareness sharing. The modification will be required to load secure communications keys, IFF, and other fill data for all the above systems via the existing common fill panel (CFP). The ANG requires one of each device for each of the 18 HH-60Gs.

2. Program Details.

Quantity	Unit Cost	Program Cost
18 Software Definable Radio Suites (3010)	**$250,000**	**$4,500,000**
18 Full Motion Video Kits (3010)	**$200,000**	**$3,600,000**
18 BFT2 Kits (3010)	**$100,000**	**$1,800,000**
18 Link 16 Kits (3010)	**$120,000**	**$2,160,000**
18 ADS-B In/Out Kits (3010)	**$30,000**	**$540,000**
18 HHD NRE (3010)	**N/A**	**$200,000**
18 Wi-Fi HHD Interfaces (3010)	**$10,000**	**$180,000**
18 Universal Serial Bus HHD Interfaces (3010)	**$5,000**	**$90,000**
18 CFP Wiring Upgrade (3010)	**$5,000**	**$90,000**
Total		**$13,160,000**

HH-60G: MODERNIZED INTEGRATED DEFENSIVE SUITE

1. Background. ANG HH-60Gs require an integrated defensive suite that is capable of defeating infrared (IR) threats while providing aircrew with accurate and precise indications of radio frequency (RF) threat systems with an associated audio warning. The HH-60G requires the AAR-45 distributed aperture infrared countermeasure (DAIRCM) system to augment their limited IR expendables. To remain combat relevant, the HH-60G needs a digital radar warning receiver (RWR) with considerable processing power that can limit ambiguities and provide growth potential for geolocation or jamming of threats. Three-dimensional (3D) audio capability is also required to integrate the audio warnings from a missile warning system, hostile fire indicator, or RWR with communication and mission equipment. The 3D audio equipment will permit crews to rapidly return precise and immediate defensive fire, effectively suppressing or destroying the enemy threat, and will also provide the ability to quickly and correctly react to enemy RF threats to maximize survivability. Aircrews require training software integrated into the electronic warfare suite to prepare for combat. Including embedded training capability utilizing the currently fielded virtual electronic combat training system (VECTS) will allow crews to prepare for combat missions in a virtual threat overlay during a flight; providing the highest fidelity training possible. In total, the ANG requires one DAIRCM system, one RWR, and an ALQ-213 with 3D audio capability for each of its 18 HH-60G helicopters. All six personnel on each of the ANG's 18 HH-60Gs require a 3D audio kit. All ANG HH-60Gs require VECTS.

2. Program Details.

Quantity	Unit Cost	Program Cost
Defensive System Non-Recurring Engineering (NRE) (3010)	**N/A**	**$2,000,000**
18 5-Sensor DAIRCM (3010)	**$1,465,536**	**$26,379,648**
18 RWR (3010)	**$1,240,000**	**$22,320,000**
Directional Audio NRE (3010)	**N/A**	**$6,000,000**
108 3D Audio Kits (3010)	**$7,000**	**$756,000**
3 Unit Test Equipment (3010)	**$58,400**	**$175,200**
18 ALQ-213 w/3D Audio Kits (3010)	**$234,000**	**$4,212,000**
VECTS NRE (3010)	**N/A**	**$2,000,000**
18 VECTS (3010)	**$1,300,000**	**$23,400,000**
Total		**$87,242,848**

HH-60G: HELMET-MOUNTED DISPLAY

1. Background. ANG HH-60Gs require day and night, helmet-mounted heads-up display capability to significantly increase aircrew situational awareness (SA) and weapons employment, enhance terminal area search and rescue operations, speed overall internal communications during critical mission phases, and enable crews to safely land a helicopter in a degraded visual environment. Helmet mounted cueing system (HMCS) will allow all crewmembers to quickly build SA without the need for voice communication. Sensor and data link symbols are visible on the helmet-mounted display superimposed over the geographic location of friendly, hostile, and survivor positions. Additionally, the ability to display sensor pictures, hazards, terrain, and data link information while maintaining a heads-up posture will greatly enhance safety while flying in the low-level (<500ft) environment. The system should be NVG-compatible. The ANG requires one kit for each of the 18 aircraft, plus spares, and 40 helmet kits, plus spares, for each of the three HH-60G rescue squadrons. Additionally, to the helmets, a modern electro-optical/infrared (EO/IR) sensor is needed on the HH-60G to provide crews a better ability to operate in fog, snow, and dust while providing the capabilities for laser designation/spot track and IR pointer capability. An upgraded sensor is needed for each of the 18 HH-60Gs in the ANG as well as three spares.

2. Program Details.

Quantity	Unit Cost	Program Cost
20 HMCS Aircraft Kits (3010)*	**$335,294**	**$6,705,880**
132 HMCS Helmet Kits (3010)*	**$87,843**	**$11,595,276**
Total		**$75,351,156**

* Includes 10% spares

HH-60G: EXTERNAL STORE PYLONS TO FACILITATE EMERGING MISSION REQUIREMENTS

1. Background. ANG HH-60Gs require weapons modernization to provide reliable kinetic and non-kinetic defensive firepower to support various combat mission operations. The fielded systems have no capability for off-board sensing, electronic attack/electronic protection, or standoff weapons capabilities beyond 1500 meters. To mitigate risk to the combat search and rescue mission, the HH-60G needs external store pylons. This will provide a flexible system to allow commanders to tailor aircraft configurations to meet mission requirements and mitigate mission risk by employing proven podded capabilities that improve access, awareness, and armament. Additionally, external store pylons can carry pods that can be modernized at a much faster rate than integrated aircraft systems. One mount kit is required for each of the 18 ANG HH-60G aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
18 External Stores Mount Kits (3010)	**$100,000**	**$1,800,000**
Total		**$1,800,000**

HH-60G: PASSIVE, REMOTELY-ACTIVATED GEOLOCATION FOR CONTESTED ENVIRONMENTS

1. Background. ANG HH-60G units require the capability to communicate with and geolocate specialized friendly force tracking (FFT)/personnel recovery (PR) beacons, presently deployed across multiple combatant commands. This would provide an operationally layered find and fix capability in contested, degraded, and operationally limited environments. Currently, the HH-60G lacks the capability to actively or passively receive location information from fielded FFT/PR specialized beacons. Government-owned, and operationally tested, equipment is available for implementation as a roll-on/roll-off modification to the HH-60G. This equipment can receive and process location information via line-of-sight beacon reception on a host aircraft. The ability to easily change/replace this equipment also affords the HH-60G the flexibility to adapt to advancements and rapidly changing technology on the modern battlefield. One Geolocation Kit is required for each of the 18 HH-60Gs in the ANG.

2. Program Details.

Quantity	Unit Cost	Program Cost
18 HH-60G Geolocation Kits (3010)	**$25,000**	**$450,000**
Total		**$450,000**

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KC-135

- **Air Refueling**
- **Aeromedical Evacuation**
- **Airlift**
- **ANG KC-135 Units Provide 44% of the Total Fleet**

The KC-135 Stratotanker is Air Mobility Command's primary air refueling platform providing approximately 87 percent of air refueling in support of US, allied, and coalition military aircraft. The KC-135 supports deployment, employment, sustainment, and redeployment of joint forces across the full range of military operations, including nuclear warfare, routine military activities, and irregular warfare. The KC-135 is tasked to operate close to high-threat areas. Defensive systems are necessary to prevent shoulder-fired surface-to-air missile systems from destroying aircraft during takeoff, landing, and in low altitude flight over mountainous terrain. Tactical data link technologies and situational awareness displays that bring real-time threat information, as well as secure radio capability, greatly enhance KC-135 air refueling, airlift, and aeromedical evacuation missions.

KC-135
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Critical Capabilities List

- KC-135 Self-Protection
- Integrated Defensive Systems for Common Mobility Air Forces Mission Computer
- Automated, Hardened Position, Navigation, and Timing Solution
- Portable, Aircraft-Powered Ground Transfer Fuel Pump
- Aircraft/Aircrew Ground Cooling Capability

Essential Capabilities List

- Soft Basket Quick Connect Boom Drogue Adapter
- Low Probability of Intercept/Low Probability of Detection Directional Communications and Station Keeping Equipment
- Active Electronically Scanned Array Radar
- Emergency War Order In-flight Capable Auxiliary Power Unit
- Aircrew Head-mounted Situational Awareness Display

Desired Capabilities List

- Auto-throttles
- Large Consolidated Pilot Displays
- Multi-Layer Electronic Engine Instrument Displays
- Fuel Tank Fire Explosion Protection
- Communication Radios Two and Three Replacement

KC-135: KC-135 SELF-PROTECTION

1. Background. ANG KC-135s require self-defense capabilities to detect and defeat modern threats specifically designed to target large high-value airborne asset (HVAA). To survive HVAA threats, KC-135s require an open mission system compliant digital and physical backbone to execute processing at the forward edge by connecting the platform to joint all domain command and control architectures. KC-135s require onboard/off-board threat jamming, decoys, and kinetic/non-kinetic defense measures to defeat modern threats. A model, simulation, and analysis of the KC-135 incorporating AMC Pacing Threats will determine which systems drive mission failure and/or survivability. In accordance with National Defense Strategy defined competitors, mission modernizations must ensure overmatch including but not limited to: radio frequency (RF), infrared (IR) self-protection systems, expendables, jammers, and signals intelligence/electronic intelligence detection capability and data. Routine operations subject the KC-135 to increasingly hostile environments. To survive, KC-135s require a digital radar warning receiver (RWR) capable of processing signals in a dense RF environment and automatically direct countermeasures to degrade or defeat RF threats. The KC-135s require an IR countermeasure system that does not rely on pyrotechnic expendables to counter widely proliferated shoulder-fired IR man-portable air defense systems and other IR-guided weapons. The RF and IR countermeasures should be capable of being moved between aircraft; therefore, all 166 ANG KC-135s require digital RWR Group A kits, RF/IR Group A kits, and Large Aircraft Infrared Countermeasures (LAIRCM) Group A kits. ANG KC-135s require 38 modular LAIRCM Group B-kits to equip the 17 ANG KC-135 units, including four spares.

2. Program Details.

Quantity	Unit Cost	Program Cost
HVAA NRE (3010)	**N/A**	**$15,000,000**
166 LAIRCM Group A Kits (3010)	**$500,000**	**$83,000,000**
38 LAIRCM Group B Kits (3010)*	**$3,000,000**	**$114,000,000**
166 Digital RWR Group A Kits (3010)	**$800,000**	**$132,800,000**
38 Digital RWR Group B Kits (3010)*	**$500,000**	**$19,000,000**
Total		**$363,800,000**

KC-135: COMMON MOBILITY AIR FORCES MISSION COMPUTER

1. Background. ANG KC-135s require a robust, secure tactical data link (TDL). Recent combat operations highlighted the need for comprehensive, networked command and control (C2) throughout all operation theaters. TDL provides a C2 link and maximizes KC-135 aircrew situational awareness with beyond-line-of-sight and line-of-sight capabilities. TDL also provides critical real-time information to KC-135 aircrews, such as friendly aircraft position, weather conditions, and hostile threat locations. This increases the KC-135's ability to participate in the present-day network-centric battlespace effectively. TDL provides near-real-time monitoring of mission events, mission status, task completion, and resource status. It also enhances all participant aircraft's situational awareness, including tanker aircraft, receiver aircraft, and coalition network participants. Additionally, to complement the TDL a comprehensive Quick Reaction Handbook is required to address the aircraft's normal/abnormal operations. All 166 ANG KC-135s require TDL radios, processors, and a Quick Reaction Handbook.

2. Program Details.

Quantity	Unit Cost	Program Cost
166 Group A Kits (3010)	**$120,000**	**$19,920,000**
183 TDL Radios and Processors (3010)*	**$700,000**	**$128,100,000**
Quick Reaction Handbook (3010)	**$600,000**	**$600,000**
Total		**$148,620,000**

* Includes 10% spares

KC-135: AUTOMATED, HARDENED POSITION, NAVIGATION, AND TIMING SOLUTION

1. Background. ANG KC-135s require an automated hardened position, navigation, and timing (PNT) system integrated into the existing navigation equipment. ANG KC-135s fulfill almost 70% of the nuclear refueling mission. KC-135s require the ability to navigate oceanic airspace in a post-strike environment where traditional navigation aids and satellites would not be available. Astro-inertial navigation systems provide the greatest accuracy and a bounded position error over an extended use-time and distance. These systems are autonomous, passive, non-jammable, and automatic. All 166 ANG KC-135s require automated, hardened PNT systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$3,000,000**
166 PNT Kits (3010)	**$200,000**	**$33,200,000**
Total		**$36,200,000**

KC-135: PORTABLE, AIRCRAFT-POWERED GROUND TRANSFER FUEL PUMP

1. Background. ANG KC-135s require portable aircraft-powered ground transfer fuel pumps to onload/offload fuel in an adaptive basing scenario, post-nuclear recovery location, or forward deployed environment where ground support is unavailable. This capability provides combatant commanders with greater flexibility in staging KC-135s during contingency operations, natural disasters, and humanitarian support operations. Aircrews can fuel/defuel aircraft to support participating aircraft and vehicles in austere locations without the logistical challenges associated with conventional, over-the-road fuel delivery. All 166 ANG KC-135s require portable aircraft-powered ground transfer fuel pumps.

2. Program Details.

Quantity	Unit Cost	Program Cost
166 Ground Fuel Transfer Pumps (3010)	**$80,000**	**$13,280,000**
Total		**$13,280,000**

KC-135: AIRCRAFT / AIRCREW GROUND COOLING CAPABILITY

1. Background. ANG KC-135s require cockpit and cabin cooling during ground and low-level operations. Temperatures at deployed locations routinely result in cockpit temperatures of 140° F and cargo compartment temperatures of 170° F. Aircrews generally spend greater than one hour in these conditions, which is not conducive to mission accomplishment. Ground cooling carts are the primary method for temperature reduction. Ground cooling carts are removed before engine start and are not usable if mission delays occur. Roll-on/roll-off vapor cycle air conditioning units placed onboard can provide ground cooling. This system provides crews and aircraft a more robust operating capability, reduces crew fatigue, and minimizes unsafe temperature conditions. To further enhance the ground cooling capability, personnel water cooling systems are needed for KC-135 aircrews. These systems regulate aircrew body temperature by distributing cooled fluid through a combat thermal shirt. This system provides improved mission performance, decreases fatigue, and increases situational awareness. One hundred and two (102) aircraft ground cooling kits are required to provide a cooling capability for 60 percent of the ANG KC-135 fleet. Additionally, 1020 personnel water cooling systems are required to equip all aircrew members.

2. Program Details.

Quantity	Unit Cost	Program Cost
102 Ground Cooling Units (3080)	**$40,000**	**$4,080,000**
1020 Personnel Water Cooling Systems (3080)	**$3,000**	**$3,060,000**
Total		**$7,140,000**

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Logistics

Logistics activities support every Air National Guard mission area, and it ranges from aircraft maintenance and inventory management to traffic management and petroleum, oils, and lubricants management. Logisticians in the 54 states, territories, and the District of Columbia prepare for and execute worldwide contingency deployments and domestic emergency response. The logistics team is key to getting people and supplies where and when they need to be.

The ANG operates and maintains the oldest aircraft in the Air Force inventory. Aircraft support and test equipment are critical to daily maintenance operations at all ANG flying units. Much of the equipment used in testing aircraft systems is nearing or has surpassed the end of its designed useful life and is increasingly difficult to sustain and expensive to repair. The ANG functions at a prolonged high operations tempo, driving the need for efficient maintenance processes and robust supply chains.

Logisticians strive to reduce product lifecycle costs and the costs of logistics processes. Devices enhancing maintenance efficiency and safety while improving capabilities also improve aircraft availability, reduce operating costs, and enhance agile combat support. Equipment such as the maintenance inspection platforms and digital test equipment reduce aircraft downtime, allow logistics personnel to maintain a high rate of sortie generation, and ensure the longevity, relevance, reliability, and responsiveness of the aging fleet.

Logistics
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Critical Capabilities List

Support Equipment (SE)

- High Capacity Federal Aviation Administration-Approved Toilet (KC-135/C-130)
- Heavy Lift Device (Multi-MDS)
- Isochronal/Phase Stands (Multi-MDS)
- Vertical Fuel Tank Storage (CAF)
- Towbarless Towing Equipment (Multi-MDS)
- Cabin Pressure Tester (Multi-MDS)

Test Equipment (TE)

- Smart Weapons Armament Tester (Multi-MDS)
- Video Data Link Tester (Multi-MDS)
- Enhanced Wire Testing Capability (Multi-MDS)
- Thermal Imaging (Multi-MDS)

Essential Capabilities List

- Modern Structural Repair Equipment
- Environmentally Approved Parts Washer
- Large Flightline Generator (E8C)
- Intrinsically Safe Borescopes
- Modernized A-10 IAIS

Desired Capabilities List

- Improved Blade Fold Equipment
- Laser Corrosion Removal (Multiple Aircraft)
- Personal Cooling Systems
- Diesel Tester/Analyzer for Aerospace Ground Equipment (Multiple Aircraft)
- Portable Lightweight Stands (Multiple Aircraft)
- Modern Corrosion Control Equipment

SE: HIGH CAPACITY FEDERAL AVIATION ADMINISTRATION-APPROVED TOILET

1. Background. ANG KC-135 and C-130 aircraft require a toilet that meets mission requirements based on capacity, structural integrity, and/or intrinsically safe operation. The original legacy suitcase-style toilet's capacity level is inadequate and presents an overflow hazard when passengers are on long-duration flights. These toilets are susceptible to corrosion-causing leakage. The upgraded toilet must fit within the current allotted area, have a large waste capacity, and provide sanitary/low biohazard risks to accommodate aeromedical missions at a manageable cost. Higher capacity toilets are required for all 171 KC-135 and 150 C-130 aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
Higher Capacity Toilet Non-Recurring Engineering (3010)	**N/A**	**$15,000**
171 KC-135 Higher Capacity Toilet Assemblies (3010)	**$15,000**	**$2,565,000**
150 C-130 Higher Capacity Toilet Assemblies (3010)	**$15,000**	**$2,250,000**
Total		**$4,830,000**

SE: HEAVY LIFT DEVICE

1. Background. ANG C-130, KC-135, E-8C, and MQ-9 maintenance personnel require modernized equipment to remove and install engines and components, auxiliary power units, and flight control surfaces. The current processes to perform this maintenance requires increased man-hours to perform removal via other means safely. This heavy lifting device would be technical order compliant. Some C-130 units have recently acquired a device meeting this need. Aging engine components and increased flight hours cause a higher frequency of flight control surfaces, engine removal, and installation. One lifting device is required at each of the 21 ANG C-130 units, 17 KC-135 units, and five MQ-9 units.

2. Program Details.

Quantity	Unit Cost	Program Cost
21 C-130 Heavy Lifting Devices (3080)	**$200,000**	**$4,200,000**
17 KC-135 Heavy Lifting Devices (3080**)**	**$200,000**	**$3,400,000**
5 MQ-9 Heavy Lifting Devices (3080**)**	**$200,000**	**$1,000,000**
Total		**$8,600,000**

SE: ISOCHRONAL/PHASE STANDS

1. Background. The ANG requires A-10, F-15, F-22, C-17, C-40C and C-130J isochronal (ISO)/phase inspection stands. Aircraft maintenance is currently accomplished using a mix of antiquated inspection platforms, ladders, and B-series stands. These maintenance workaround activities do not meet Air Force Occupational Safety and Health Administration or Occupational Safety and Health Administration standards. Current inspection stands require frequent maintenance actions and numerous man-hours to maintain their serviceability. Modernized stands incorporate electric power, lighting, and pneumatics to the point of use, enabling maintainers to complete inspections and maintenance more effectively in a reduced time frame, leading to increased aircraft availability and enhanced mission effectiveness. By standardizing stands for maintenance activities, a smaller, more efficient supply chain with common parts and stock numbers can be established. The ANG requires two A-10, five F-15, one F-22, six C-17, one C-40C, 3 C-130J, and 3 KC-135 stands.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 A-10 Phase Stands (3080)	**$900,000**	**$1,800,000**
5 F-15 Phase Stands (3080)	**$900,000**	**$4,500,000**
1 F-22 Phase Stands (3080)	**$1,200,000**	**$1,200,000**
6 C-17 ISO Stands (3080)	**$1,200,000**	**$7,200,000**
1 C-40C ISO Stands (3080)	**$1,100,000**	**$1,100,000**
3 C-130J ISO Stands (3080)	**$1,200,000**	**$3,600,000**
3 KC-135 ISO Stands (3080)	**$1,200,000**	**$3,600,000**
Total		**$23,000,000**

SE: VERTICAL FUEL TANK STORAGE

1. Background: ANG fighter units require modernized fuel tank storage for their external fuel tanks. The fuel tanks are currently exposed to all types of weather and this environment increases corrosion, inspections, and maintenance. The vertical fuel tank storage system allows for fuel tanks to be stored in a covered enclosure. Storing tanks vertically drastically reduces the footprint. The ANG requires one vertical fuel storage tank at each of the 20 fighter wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
20 Storage Systems (3080)	**$750,000**	**$15,000,000**
Total		**$15,000,000**

SE: TOWBARLESS TOWING EQUIPMENT

1. Background. ANG flying wings require towbarless towing equipment capable of maneuvering aircraft in and out of hangars and/or hardened aircraft structures with "on the spot" turning capability. Aircraft positioning is currently accomplished by utilizing a full-size MB-4 tow tractor, or similar model, and a long tow bar that results in a high turn radius. Current equipment limitations do not allow for maximum hangar utilization when sheltering aircraft during severe weather events. ANG units need compact towing equipment, not requiring a tow bar for maneuvering aircraft in areas with limited space. The ANG requires two sets of towbarless aircraft towing equipment for each of the 78 flying wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
156 Towbarless Aircraft Towing Sets (3080)	**$75,000**	**$11,700,000**
Total		**$11,700,000**

SE: ADVANCED CABIN PRESSURE TESTER

1. Background. ANG aircraft logistics units require advanced cabin pressure testers. As technology advances, aircraft testing equipment is also advancing. There are numerous advanced equipment testers on the market. Additionally, there are several advanced testers in use at the depot level, but units are not funded to purchase the new technology. The advanced cabin pressure tester operates using common shop-air and replaces current larger testers, which are primarily diesel-driven. A low-decibel tester enables audible air leak-detection, which current diesel and electric test systems do not provide. Moreover, the cabin pressure tester would not require additional power sources. Additionally, advanced cabin pressure tester equipment is significantly lighter and more compact in size, which will decrease the Aerospace Ground Equipment footprint while enabling a smaller storage space for logistics/deployment purposes. Finally, the advanced cabin pressure tester gives better testing reliability and increased efficiency. This type of tester is compatible with F-16 and A-10 aircraft. The ANG requires three test sets for each of the 5 F-16 units and one A-10 unit.

2. Program Details.

Quantity	Unit Cost	Program Cost
18 Cabin Pressure Test Sets (3080)	**$48,000**	**$864,000**
Total		**$864,000**

TE: SMART WEAPONS ARMAMENT TESTER

1. Background. The ANG requires a common armament tester to replace existing equivalents that are obsolete and costly to repair. A modernized model will retain basic test capabilities, provide complete interaction with the aircraft weapons bus, and perform operational checks of multiple breaches simultaneously. A modernized tester will provide capabilities to emulate smart weapons on stations and test advancements in modern missiles. This equipment will be used to troubleshoot and maintain stores, tanks, racks, adapters, and pylons. This hand-held tester will provide the capability to verify the condition of critical aircraft circuitry in an energized state. The tester shall have the capability to perform active and automated tests that exercise the full weapons launch/release functionality, provide visual cues of aircraft response, and display the test results through a digital display. The improved armament tester shall contain all mission design series-specific accessories necessary to perform all the functions listed as system requirements on the aircraft. A total of 43 armament testers are required to support all ANG fighter aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
43 Armament Circuit Preload Test Set (3080)	**$30,000**	**$17,250,000**
Total		**$17,250,000**

TE: VIDEO DATA LINK TESTER

1. Background. ANG A-10 and F-16 wings require video data link testers. Currently, A-10 and F-16 Avionics Specialists do not have the capability to verify the operation of the targeting pod (TGP) video data link (VDL). The need for VDL test equipment is critical to ensure 100% mission capability/reliability of the TGP VDL. ANG A-10 and F-16 maintenance personnel require video data link testers to allow maintainers to accurately and effectively troubleshoot and repair all TGP and VDL systems. The ANG requires one video data link tester for each A-10 and F-16 wing.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 ANG A-10 Video Data Link (3080)	**$40,000**	**$160,000**
12 ANG F-16 Video Data Link (3080)	**$40,000**	**$480,000**
Total		**$640,000**

TE: ENHANCED WIRE TESTING CAPABILITY

1. Background. ANG requires modernized wire analysis capability to rapidly and accurately troubleshoot aircraft wiring while the systems are active. The requirement is for a portable, ruggedized analyzer designed to test/analyze cables and monitor system signals while in an active state to identify signal loss or degradation. Additionally, the device should be capable of placing a load on the system under test to identify partial shorts or opens in the signal path. The tester's embedded software must enable users to save and recall bus topology, test data, and historical references that can be used later for preventative maintenance and prognostics of an airframe's numerous wiring systems. Device software should also measure signal strength, determine line loss, and find the distance to the fault. The required system should be useable on all ANG platforms after proper integration. The ANG initially requires two testers at each of its 78 flying wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non Recurring Engineering (3080)	**N/A**	**$600,000**
156 Wire System Analyzers (3080)	**$65,000**	**$10,400,000**
Total		**$11,000,000**

TE: THERMAL IMAGING

1. Background. ANG aircraft maintenance units require thermal imaging devices to facilitate improved diagnostic capabilities for aircraft environmental, electrical, and mechanical systems. Current testers measure system functionality at either the input or output with no ability to identify faults occurring in valves, relays, ducting, pumps, or other transition points. Thermal imaging provides the capability to observe valves and relays opening and closing, identify leaks occurring in submerged or hard to reach ducts and lines, and monitor pump functionality during operation. Additionally, thermal imaging reduces aircraft downtime by reducing the maintenance actions typically required to remove components for bench or pressure checks. There are currently numerous commercial off the shelf solutions that can be used across multiple mission design series and maintenance functional areas. The ANG requires three thermal imaging devices at each of the 78 ANG flying wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
234 Thermal Imaging Devices (3080)	**$22,000**	**$5,148,000**
Total		**$5,148,000**

Airborne Intelligence, Surveillance, and Reconnaissance

MC-12W – The MC-12W is assigned to the 137th Special Operations Wing and tasked to support U.S. Special Operations Command directed missions. The MC-12W aircrews are specifically trained to support special operations ground forces through the find, fix, finish, exploit, and analyze model. Aircrews train, brief, support, advise, and assist special operations forces (SOF) elements from the ground assaulter to SOF Commanders while executing across the full spectrum of SOF mission sets, manned intelligence, surveillance, and reconnaissance (ISR), and fires.

RC-26B California Condor – The RC-26B provides manned (ISR) and incident awareness and assessment capability with 11 aircraft, operating out of 10 different states for maximum continental United States coverage.

Airborne Intelligence, Surveillance, and Reconnaissance 2020 Weapons and Tactics Conference

Critical Capabilities List

MC-12W

- Airborne Mission Network Link 16
- Onboard Android Team Awareness Kit and Mobile Ad Hoc Network radio integration
- Second Full-Motion Video Sensor
- Five-Blade Propellers
- Synthetic Aperture Radar / Moving Target Indicator

RC-26B

- Avionics Modernization
- Common Mission System Configuration
- Full Spectrum Video / Data Communication Distribution
- Multispectral All-Weather Detection Capability with Dismount Moving Target Indicator
- Dual Next Generation Electro-Optical Infrared System

Essential Capabilities List

MC-12W

- Selective Availability Anti-Spoofing Module Global Positioning System
- Improved Inertial Navigation System
- Combat Systems Officer / Tactical Systems Operator Aircraft Oxygen System Integration
- Combat System Officer / Tactical Systems Operator Aircraft Intercom Integration for Traffic and Ground Collision Avoidance Systems

RC-26B

- Block 20 Technical Refresh
- Next Generation Electro-Optical / Infrared System
- Modernized Signals Intelligence A-Kit
- Full Crew Distributed Mission Simulator
- Dragoon Technical Refresh

Desired Capabilities List

MC-12W

- Improved Ku Spread Spectrum Antenna
- Cockpit Voice Recorder Cutout Adjustment
- Left Pilot Mission System Access
- Improved Right Pilot Mission System Controls

RC-26B

- Ability to Operate in Contested, Degraded, and Operationally Limited Environment
- Helmet-Mounted Visual Cueing Integration with Mission Management System
- Three-Dimensional Audio System
- Auxiliary Fuel Tanks
- Broad Aperture Green Laser

MC-12W: AIRBORNE MISSION NETWORK

1. Background. ANG MC-12W aircraft require an onboard tactical data link (TDL) radio, with associated hardware and antennas, to employ across multiple areas of responsibility. MC-12Ws lack the means to establish and maintain direct TDL communications with command and control, tactical agencies, and other TDL users. TDLs are used to share aircraft position, targeting data, sensor points of interest, cursor-on-target data, and target-track information derived from various intelligence sources via an airborne network. The lack of onboard TDL slows the kill chain, delays effects for supported commanders, and poses a safety risk with regard to aircraft position and airspace deconfliction. Lack of direct information sharing with other TDL participants degrades overall situational awareness. The system must be roll-on / roll-off capable. Each of the 13 ANG MC-12W aircraft require one Link 16 radio.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$3,000,000**
13 Link 16 Radio A-Kits (3010)	**$100,000**	**$1,300,000**
13 Link 16 Radio B-Kits (3010)	**$250,000**	**$3,250,000**
Total		**$7,550,000**

MC-12W: ONBOARD ANDROID TEAM AWARENESS KIT AND MOBILE ADHOC NETWORK RADIO INTEGRATION

1. Background. MC-12W crews currently face a significant gap in training and operational capability by having no ability to digitally integrate with nearly all supported Special Operations Forces (SOF) ground units via Android-based, handheld tablet devices connected via a multi-channel, network-enabled handheld (carry on/off) radio. This lack of capability induces several friction points while supporting friendly forces, especially in concealed, cluttered, or urban environments, as well as during operations in which friendly forces must maintain a low-visibility profile. Comparatively inexpensive, readily available, commercial off-the-shelf (COTS) solutions exist now to bridge this gap and drastically increase MC-12W tactical situational awareness and overall combat capability. This three-part solution consists of the Android device, the Android Team Awareness Kit (ATAK) software, and a handheld radio that enables ad-hoc network architecture for receipt, transmission, and relay capabilities of both data- and voice-enabled waveforms.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,000,000**
13 Link 16 Radio A-Kits (3010)	**$50,000**	**$650,000**
13 Link 16 Radio B-Kits (3010)	**$200,000**	**$2,600,000**
Total		**$5,250,000**

MC-12W: SECOND FULL MOTION VIDEO SENSOR

1. Background. ANG MC-12W units require an additional electro-optical/infrared (EO/IR) sensor to meet the highly demanding intelligence, surveillance, and reconnaissance (ISR) tasks required by combatant and task force commanders. The ANG MC-12W mission heavily relies on the ability of the crews to see the smallest details on the ground from miles away. Currently, the MC-12W is outfitted with a single MX-15DiD sensor on each aircraft. While this allows the MC-12W to complete a wide range of ISR tasks, it is extremely limited in fidelity and flexibility. An added system will double the amount of area to be seen by MC-12W crews and provide a substantial amount of situational awareness to the commanders on the battlefield. ANG MC-12Ws require a second roll-on/roll-off capable sensor for 13 aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,500,000**
13 EO/IR Sensors (3010)	**$1,500,000**	**$19,500,000**
Total		**$22,000,000**

MC-12W: FIVE-BLADE PROPELLERS

1. Background. The ANG MC-12 requires five-blade propellers with installation and testing. Due to the MC-12 continually operating at its maximum gross weight with a high amount of drag due to add-on mission equipment, it is constantly at a performance disadvantage. This often means carrying less fuel, which translates to less time on station and less mission capability to combatant commanders. New propellers will offer a substantial performance increase, mitigating these losses. In FY18, ANG purchases six sets of new propellers, but funding was not provided for installation and flight testing. These brand new propellers currently reside in storage at Will Rogers ANG Base, Oklahoma, waiting to be installed and flown. ANG MC-12s require six additional five-blade propeller sets along with installation and flight testing for all acquired sets to outfit all 13 aircraft with a spare set.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$4,000,000**
6 Five-Blade Propeller Sets (3010)*	**$500,000**	**$2,500,000**
Total		**$6,500,000**

*includes 10% spares.

MC-12W: SYNTHETIC APERTURE RADAR / MOVING TARGET INDICATOR

1. Background ANG MC-12Ws require a synthetic aperture radar (SAR) for ground moving target indication, dismounted moving target indication, coherent change detection, and maritime search capabilities. A moving target indicator will greatly enhance the MC-12Ws ability to find and fix personnel and vehicles during reduced or obscured visibility conditions, such as clouds, fog, or smoke. This would allow the MC-12W to offer a far greater degree of support and flexibility to ground commanders, and would bring the MC-12W to the forefront of manned tactical ISR assets. SAR would not replace the MX-15DiD; rather, this would both allow continued FMV support during missions with limited or no visibility of the ground, and provide a backup while offering additional mission capabilities to the existing visual sensor. The SAR must allow cross-cueing between an EO/IR sensor and generated targets, ideally utilizing the MC-12W Mission Management System. Each of the 13 ANG MC-12W require this upgrade.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
13 Synthetic Aperture Radars (3010)	**$2,000,000**	**$26,000,000**
Total		**$36,000,000**

RC-26B: AVIONICS MODERNIZATION

1. Background. ANG RC-26s require cockpit modernization to deploy worldwide and operate in the National Airspace System. It is estimated the ANG RC-26 fleet may start grounding in FY21 due to non-availability of parts and diminished manufacturing source. Global Positioning System (GPS), electronic flight information system displays, Flight Management System (FMS), as well as the navigation and communication radios need to be modernized to comply with Federal Aviation Administration (FAA) 2020 NextGen and the International Civil Aviation Organization (ICAO) Communication, Navigation, and Surveillance / Air Traffic Management mandates. The navigation radios do not have frequency modulation immunity, leaving the aircraft vulnerable to congestion and potentially unsafe aircraft operations when flying terminal area approaches and departures. Modern avionics, to include a new FMS, modern displays, an updated and certified GPS system, night vision goggle compatibility, and upgraded radios are necessary to enable the aircraft to operate within all foreign and domestic airspace safely, and to comply with FAA/ICAO mandated navigation/communication requirements. All 11 ANG RC-26B aircraft require avionics modernization.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$3,200,000**
11 Avionics Shipsets (3010)	**$1,850,000**	**$20,350,000**
Total		**$23,550,000**

RC-26B: COMMON MISSION SYSTEM CONFIGURATION

1. Background. ANG RC-26Bs require a common fleet hardware and software configuration. The 11 RC-26B aircraft operate in two different configurations: six Block 25R and five Block 20s which lack common mission equipment. Split configurations create inefficient aircraft and manpower utilization in addition to the training and planning difficulties brought about by the acute capability differences between aircraft. A common Mission Management System (MMS) with Electro-Optical / Infrared (EO/IR) High Definition (HD) full-motion video sensor, expanded Integrated Communications System (ICS), upgraded VHF/UHF LOS/SATCOM radios with upgraded antennas, and a self-protection system will bring the RC-26B Block 20 to a common configuration with Block 25R aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,000,000**
5 Block 25R Shipsets (3010)	**$1,500,000**	**$7,500,000**
5 MMS (3010)	**$200,000**	**$1,000,000**
5 Self Protection Systems (3010)	**$400,000**	**$2,000,000**
Total		**$12,500,000**

RC-26B: FULL SPECTRUM VIDEO / DATA COMMUNICATION DISTRIBUTION

1. Background. ANG RC-26Bs require the ability to off-board high definition, full motion video (FMV), and data beyond line-of sight (BLOS). Current Line of Sight (LOS) systems need to be upgraded due to obsolescence, lack of encryption, and unavailability of parts. Modernizing the RC-26B fleet of 11 aircraft with this capability will allow the aircraft to provide data connectivity and FMV to the most remote user in both domestic response and contingency operations.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$1,500,000**
11 BLOS Antenna and Installation Kits (3010)	**$1,000,000**	**$11,000,000**
11 LOS FMV Kits (3080)	**$500,000**	**$5,500,000**
Total		**$18,000,000**

RC-26B: MULTISPECTRAL ALL-WEATHER WIDE-AREA IMAGERY AND MOVING TARGET INDICATOR

1. Background. ANG RC-26s require a multispectral all weather detection capability for wide area imagery with dismount moving target indication (DMTI), coherent change detection, and maritime search capabilities. A moving target indicator will greatly enhance the RC-26Bs ability to find and fix personnel and vehicles. This capability is needed during border operations, maritime interdiction, and search and rescue missions. It will also enable operations in low-visibility where a traditional Electro-Optical/Infrared (EO/IR) sensor would be ineffective. The new system must allow cross-cueing between an EO/IR sensor and generated targets, ideally utilizing the Block 25R mission management system. Each of the 11 ANG RC-26s require this upgrade.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
11 Synthetic Aperture Radars (3010)	**$2,000,000**	**$22,000,000**
Total		**$32,000,000**

RC-26B: DUAL NEXT GENERATION ELECTRO-OPTICAL INFRARED SYSTEM

1. Background. The RC-26B fleet requires a dual next generation electro-optical infrared (EO/IR) system. The RC-26B fleet currently operates two aircraft configurations (Block 20 and Block 25) each with a single EO/IR Full Motion Video (FMV) sensor. Current Combatant Commanders require distinct dual EO/IR FMV sensor capability from each platform. Simultaneous targets will be followed providing increased security and safety for ground elements and supply enhanced intelligence gathering and ground operation safety. A laser designator provides executable capability to complete target exploitation. Dual sensors with laser designation capability are the threshold for current battlefield commanders and provide a common configuration across more than one ISR asset and similar capabilities for war planners and operations. Current mission requirements dictate a comprehensive integrated dual High Definition sensor capability throughout all theaters of operation, including domestic operations. In effect, you will double aircraft ISR capability, therefore all 11 RC-26Bs require next generation EO/IR systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,300,000**
11 EO/IR Systems (3010)	**$1,200,000**	**$13,200,000**
Total		**$15,500,000**

Global Integrated Intelligence, Surveillance, and Reconnaissance

Intelligence – Intelligence, Surveillance, and Reconnaissance (ISR) production centers are the analytical engines behind timely environment characterization and in-the-moment awareness to enable decisions and action. ANG production enterprises include the following:

Distributed Common Ground System (DCGS) - With seven locations, DCGS sites process, exploit, and disseminate near real-time intelligence derived from U-2, RQ-4, and MQ-9 sensors for combatant commands, component numbered air forces, and national command authorities.

Targeting – Nine squadrons at six locations provide federated intermediate and advanced target development, battle damage assessments, collateral damage estimates, and analytical assessment for steady-state planning and contingency operations.

Cyber ISR – Enables operations across air, space, and cyber domains. Seven sites across the country create all-source products derived from digital network intelligence.

ISR Integration - Unit level intelligence supports 23 Mission Design Series weapons systems across 143 ANG units and imbeds with other mission sets to tailor intelligence for Air Tasking Order execution and integration.

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Critical Capabilities List

- High-Performance Workstations
- Multi-Domain Network Communications Kit
- Cyber ISR Part Task Trainer
- Open Architecture Artificial Intelligence-Driven Common Operating Picture
- Augmented Reality for Unmanned Aircraft System Feed

Essential Capabilities List

- Publicly Available Information (PAI) Toolkit Access
- Distributed Training Operations Servers (DTC) to Enable Realistic Mission Training
- Joint Targeting Cycle (JTC) Simulation Capability
- Advanced Geospatial Information Systems (GIS) Suite for targeting workflow
- Environmental Fatigue Mitigation Techniques for MQ-9/Distributed Common Ground Station (DCGS) Units

Desired Capabilities List

- Virtual Target Modeling for Enabling Offensive Cyber Operations and Other Non-Lethal Fires
- Redundant Power Supplies for Targeting Units
- Multi-National Information Sharing Cross-Domain Integration - Mission Partner Environment
- Virtual Reality Training and Mission Planning Tool
- Cognitive Performance Training Tool

INTELLIGENCE: HIGH-PERFORMANCE WORKSTATIONS

1. Background. The ANG Intelligence Surveillance and Reconnaissance (ISR) enterprise requires more processing power to fuse multiple-intelligence data effectively. The current workstations available to the ANG ISR enterprise do not have the capacity to run available government off-the-shelf applications without significantly slowing down and/or freezing the system. Thick client workstations and graphic processing units (GPUs) will allow units to utilize applications and capacity for future growth for targeting fully, Distributed Common Ground System (DCGS), and Remotely Piloted Aircraft (RPA). 157-unit level intelligence organizations and 65 ISR organizations require workstations/GPUs for on-going analysis usage.

2. Program Details.

Quantity	Unit Cost	Program Cost
222 Thick Client Workstations with GPU (3080)	**$7,000**	**$1,554,000**
Total		**$1,554,000**

INTELLIGENCE: MULTI-DOMAIN NETWORK COMMUNICATIONS KIT

1. Background. ANG personnel recovery/combat search and rescue and tactical airlift unit-level intelligence (ULI) organizations lack the ability to independently access multi-domain intelligence to provide decision enabling information to the warfighter in agile combat employment (ACE) during contested and degraded operations. To meet ACE style tasking, the fight on joint worldwide intelligence communications system initiative, and align with the distributed intelligence combat element concept of operations, ULI requires a multi-domain network communications kit. This kit must also have primary, alternate, contingency, and emergency communication mediums and a standalone power capability with redundant backup. It must have a high volume beyond-line-of-sight satellite communications, simultaneous secure high-frequency/very high-frequency voice and data, tactical data link integration, and cellular voice and data. Changes to the tactical combat environment, the unpredictability of operating location, and mission tasking are driving ULI organizations to operate in remote locations with minimal infrastructure. ULI organizations require five kits to be used as a proof of concept before being fielded to all organizations.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 Equipment Chassis (3080)	**$230,000**	**$1,150,00**
5 Secure Voice and Data Encryption Devices (3080)	**$40,000**	**$200,000**
5 Ka/Ku/X-Band SATCOM Dishes (3080)	**$300,000**	**$1,500,000**
5 HF/VHF Radios (3080)	**$30,000**	**$150,000**
5 Link-16 Radios (3080)	**$50,000**	**$250,000**
5 IBS Radios (3080)	**$32,000**	**$160,000**
5 LTE Router (3080)	**$1,000**	**$5,000**
60 High-Powered Solid-State Laptops (3080)	**$5,000**	**$300,000**
5 Solar, Battery, Generator Power Solutions (3080)	**$20,000**	**$100,000**
Total		**$3,815,000**

INTELLIGENCE: CYBER ISR PART TASK TRAINER

1. Background. ANG cyberspace intelligence, surveillance, and reconnaissance (ISR) units require the ability to conduct individual and collective training for members on Cyber ISR tasks. Training associated include initial qualification training (IQT), joint qualification requirement (JQR) and remedial training. The part task trainer-cyber (PTT-C/ISR) system is a training solution that allows analysts and intelligence personnel to familiarize themselves with the mission, weapons systems and threat environments. The PTT-C/ISR provides hands-on training for critical skills required to operate in a team environment and support ISR operations. The PTT-C/ISR provides an individual training and skills assessment suite allowing personnel to train on specific tasks. Additionally, the system integrates into the Virtual Interconnected Training Environment (VITE) learning management system and allows for collective training with other kinetic/non-kinetic mission areas inside of the simulator environment. The PTT-C/ISR uses pre-defined individual challenges and events to limit potential compromise of scenarios in a training environment. The system is maintained locally and can connect to other VITEs, persistent cyber training environment cloud, allows personnel to connect to the PTT-C/ISR and is managed through an intuitive administration page. The system must not require a recurring licensing or subscription fee to operate, and will focus on work role training requirements and readiness; prepping personnel to execute in the team construct within VITE and during operational missions. Each of the six Cyberspace ISR units require one PTT-C/ISR and one VITE/PTT-Cyber ISR.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Part Task Trainer-Cyber ISR (3080)	**$492,000**	**$2,952,000**
1 VITE/PTT-Cyber ISR (3080)	**$851,000**	**$851,000**
Total		**$3,803,000**

INTELLIGENCE: OPEN ARCHITECTURE ARTIFICIAL INTELLIGENCE DRIVEN COMMON OPERATING PICTURE

1. Background. The ANG remotely piloted aircraft (RPA) intelligence units currently conduct combat operations for several theater level unified commands and lack the needed common operating picture (COP) to achieve optimal mission results. The current lack of a COP for RPA intelligence results in a duplication of effort and wasted man-hours due to each unit not sharing information, assessments, and products. RPA intelligence requires a multilayer interoperable cloud-based COP. This COP should also serve as the next-generation tactical situation display for RPA intelligence operators and feature narrow artificial intelligence (AI), which will increase analytic outputs. This allows for collaborative efforts between ANG RPA intelligence operators and feature cutting edge AI/machine intelligence in accordance with the next-generation ISR dominance flight plan and national defense strategy. This COP should allow for predictive analysis of enemy activity, shorten the find, fix, track, target, engage, assess the process, and increase platform survivability. This COP should also be automated into a cross-domain solution for both unclassified and classified networks, and be interoperable with the distributed common ground station open architecture enterprise and inject information into other intelligence community tools. This COP should also feature open architecture to modify the system as data streams, technologies, and operations evolve. The ANG requires a multilayer interoperable cloud-based COP.

2. Program Details.

Quantity	Unit Cost	Program Cost
1 Multilayer Interoperable Cloud-Based COP (3080)	**$7,500,000**	**$7,500,000**
Total		**$7,500,000**

INTELLIGENCE: AUGMENTED REALITY FOR UNMANNED AIRCRAFT SYSTEM FEED

1. Background. Remotely piloted aircraft (RPA) intelligence requires augmented reality to overlay threat and situational awareness data to crew members. Intelligence operators working in RPA squadron operations centers do not currently have a capability to overlay threat or situational awareness data on the pilot or sensor operator's heads up displays (HUD). This results in lengthy, and at times confusing, threat and target identification for the pilot and sensor operator. Augmented reality allows for increased situational awareness to RPA aircrew and customers, increasing survivability by providing real-time threat information overlaid onto the full-motion video feed. This capability also provides increased situational awareness on targets, reducing the find, fix, track, target, engage, and assess (F2T2EA) timeline, which allows for increased lethality of the RPA enterprise. This matching of human and machine interface is in line with the Next-Generation ISR Dominance Flight Plan and the National Defense Strategy. The ANG requires one RPA kit for each of the 35 ground control stations.

2. Program Details.

Quantity	Unit Cost	Program Cost
35 RPA Kits (3080)	**$100,000**	**$3,500,000**
Total		**$3,500,000**

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Special Warfare

- **Combat Search and Rescue**
- **Special Operations**
- **ANG Guardian Angel Units Provide 30% of the Total Force**
- **ANG Special Tactics Units Provide 25% of the Total Force**
- **ANG Tactical Air Control Party Units Provide 38% of the Total Force**

Special Warfare is a new nomenclature, replacing Battlefield Airmen. Special Warfare refers to the following three mission design series and will result in structural changes to those squadrons over the next three years.

The ANG has three Guardian Angel squadrons consisting of Combat Rescue Officers and Pararescue Jumpers. Their mission is to execute personnel recovery of downed and injured aircrew members by providing recovery and emergency medical treatment necessary to stabilize and evacuate injured personnel.

The ANG has two Special Tactics squadrons comprised of special tactics teams: quick-reaction, deployable special operations units, uniquely organized, trained, and equipped to conduct joint special operations and sensitive recovery missions. Special tactics combat controllers, pararescue jumpers, and special reconnaissance provide quick-reaction command and control, Close Air Support (CAS), and casualty recovery.

The ANG has 16 tactical air control party (TACP) squadrons in two operations groups. TACPs provide airspace integration and terminal attack control of CAS firepower against enemy ground targets. TACPs also provide the planning and employment of assets, in full-spectrum combat, supporting the US Army ground combat units. They establish and maintain command, control, and communications of all combat air assets, including the integration of surface-to-surface and air-to-surface fires.

Special Warfare
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Critical Capabilities List

Guardian Angel

- Combat Survivability Suite
- Marksmanship Trainer
- Human Performance Optimization
- Maritime Operations Modernization
- Battlespace Mobility

Special Tactics

- Small Unmanned Aircraft System Modernization
- Modernized Aerial Cargo Delivery
- Extreme Cold Weather Package
- Tactical Communications Suite
- Austere Airfield Operations Kit

Tactical Air Control Party

- Fully Integrated Situational Awareness
- Mobile Communications Packages
- Broad Spectrum Battlefield Identification
- Air Force Special Warfare small arms and light weapons accessories
- Light Tactical Battlefield Vehicular Equipment

Essential Capabilities List

Guardian Angel

- Maritime Support Package
- Mountain Warfare Equipment
- Small Arms/Indirect Fire Enhancement
- Fixed-Wing Recovery System
- Digital Integration Suite

Special Tactics

- Reconnaissance Modernization Suite
- Information Share Server Suite
- Diver's Underwater Navigation and Sonar Modernization
- Mobile/Deployable Preservation of the Force and Family Suite
- CONEX Deployable Diver Decompression Chamber

Tactical Air Control Party

- Human Performance Optimization Program Establishment
- Vehicle-agnostic Communication Suite
- Vehicle-mounted Laser Range Finder/Laser Target Designator
- AN/GRC-259 Stryker Remote Capability
- Environmental Personal Protection System

Desired Capabilities List

In an effort to save space, desired lists can be obtained upon request from NGB/A5.

GA: COMBAT SURVIVABILITY SUITE

1. Background. ANG Guardian Angel (GA) requires modernization of the combat survivability suite, which includes a target enhancement suite, buoyant body armor, modern water communications upgrades, and next-generation helmet systems. Hydrophobic plate carriers are needed for missions in the maritime environment; current armor systems are not maritime-compliant. Modern water communications devices capable of clear communication between team members in all maritime environments are also needed. One GA combat survivability system, including one hydrophobic plate carrier; one neutral buoyancy plate set; magnetic induction communication devices; chemical, biological, radiation, and nuclear environment (CBRNE) suit and breathing device with a spare training suit; and a next-generation modular helmet, are necessary for each of the 200 ANG GAs.

2. Program Details.

Quantity	Unit Cost	Program Cost
200 Magnetic Induction Communication Devices (3080)	**$5,000**	**$1,000,000**
200 Hydrophobic Plate Carriers (3080)	**$1,500**	**$300,000**
200 Neutral Buoyancy Plate Sets (3080)	**$2,000**	**$400,000**
200 Next-Generation Modular Helmets (3080)	**$2,000**	**$400,000**
200 Enhanced CBRNE Suits (3080)	**$1,000**	**$200,000**
200 PAPR Mask/Blower Sets (3080)	**$1,000**	**$200,000**
200 Enhanced CBRNE Training Suits (3080)	**$500**	**$100,000**
Total		**$3,600,000**

GA: MARKSMANSHIP TRAINER

1. Background. ANG Guardian Angel (GA) and Special Tactics (ST) teams require a modular indoor containerized range (MICR) that will provide a fully enclosed zero surface danger zone and vertical danger zone environment allowing personnel to train and qualify safely 365 days a year, day and night regardless of external environmental conditions. Guardian Angel units' tasking and mobilization status require them to maintain their weapons qualifications currencies as a readiness baseline. Additionally, GA units have a weapon employment (WE) requirement from the ACC mandated ready angel program (RAP) Tasking Memorandum. This WE RAP requirement is intended to improve and track small arms combat proficiency and goes well beyond basic AF Group A qualification and currency. The WE RAP includes live-fire immediate action drills (IAD), close quarters combat (CQC), and target discrimination training. ST units also have extensive pre-deployment small arms training mandated by SOCOM. The modular ranges must be able to support these Special Warfare specific live-fire training standards. To meet these readiness and training requirements, GA and ST units require a multilane range with firing lanes that extend beyond the Combat Arms standard of 25 meters, with 100m lanes being ideal. The ranges must-have sections that allow for lateral movement to facilitate live fire IADs. The ranges must be rated up to .50 caliber to allow training on all unit assigned and UTC tasked GA and ST weapon systems. The ranges must meet the Air Force engineering technical letter (ETL) 11-18: Small Arms Range Design and Construction. Modular ranges may be scaled to meet each GA and ST units' host Wings' space requirements. Each of the three GA squadrons require a Modular Small Arms Range, and one of the two ST squadrons still requires a Modular Small Arms Range.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 Small Arms Ranges (3080)	**$8,000,000**	**$32,000,000**
Total		**$32,000,000**

GA: HUMAN PERFORMANCE OPTIMIZATION

1. Background. ANG Guardian Angel (GA) and Tactical Air Control Party (TACP) require rehabilitation and recovery equipment to support emerging human performance optimization (HPO) programs and associated trainers. Special Warfare Airmen have long lacked progressive methods of fitness, rest, and rehabilitation of injuries and combat fatigue sustained while executing or training for missions consistent with other special operations forces weapon systems. Injuries and combat fatigue negatively impact the health and readiness of the BA weapon systems and result in excessive and unnecessary lost work-days and subsequently impact mission-ready status. The current medical system does not provide a detailed initial medical screening for special operations operators, nor does it address past injuries and structural concerns. Each of the three GA squadrons requires 2 sensory deprivation pods, 3 cranial electrotherapy devices, 1 infrared recovery unit, 1 anti-gravity cardio rehabilitation unit, 1 athlete data management software system, and 1 low-impact cardio unit. Each of the 14 TACP squadrons requires 60 tailored Human Performance Programs, 60 vital sign monitoring systems, 60 vital fluid monitoring systems, and 60 full body performance kits.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Sensory Deprivation Pods (3080)	**$30,000**	**$180,000**
9 Cranial Electrotherapy (3080)	**$1,100**	**$9,900**
3 Infrared Saunas (3080)	**$4,820**	**$14,460**
3 Anti-Gravity Rehabilitation Treadmills (3080)	**$100,000**	**$300,000**
3 Athlete Data Management Software Packages (3080)	**$15,000**	**$45,000**
3 Rotating Stairmill Systems (3080)	**$10,000**	**$30,000**
840 HPO Programs (3080)	**$315**	**$264,600**
840 Vital Sign Monitoring Systems (3080)	**$3,600**	**$3,024,000**
840 Vital Fluid Monitoring Systems (3080)	**$7,500**	**$6,300,000**
840 Full Body Performance Kits (3080)	**$995**	**$835,800**
Total		**$11,003,760**

GA: MARITIME OPERATIONS MODERNIZATION

1. Background. ANG Guardian Angel (GA) and Special Tactics (ST) personnel require open ocean maritime operations equipment. GA needs a hard hulled boat (HHB) or rigid-hulled inflatable boat (RHIB), air-droppable by C-130s, capable of supporting up to 4 litter patients and 6-8 operators, propeller-driven, compatible with GA communications equipment, and equipped with forward-looking infrared, sonar, and radar. Existing Joint and GA maritime equipment does not meet the current combatant command (COCOM) requirements for the personnel recovery (PR) mission, presenting a significant risk to the mission and friendly forces. Current unit type code-tasked maritime mobility is primarily filled by inflatable boats with significant limitations. Modernization requirements include rapidly-deployable, air-droppable, defensible, hard-hulled watercraft that are open-ocean and littoral-capable to support PR training and operations. Current mission sets require GA to operate in the open ocean in extreme environmental conditions without direct support for several days. COCOM requirements also require GA to have organic defensive capability. This platform requires a modular mounting system capable of supporting crew-served weapons and other accessories. Each of the three GA squadrons require three HHB/RHIB boats, three delivery platforms, and associated equipment parachutes. Both ST squadrons require one HHB/RHIB boat, one delivery platform, and associated equipment parachutes. Additionally, each of the five squadrons require four Advanced Rescue Craft and two Towable Support Inflatables per HHB/RHIB.

2. Program Details.

Quantity	Unit Cost	Program Cost
11 HHB/RHIB with Trailers (3080)	**$500,000**	**$5,500,000**
11 Aerial Delivery Platforms (3080)	**$250,000**	**$2,750,000**
11 Equipment Parachute Packages (3080)	**$76,000**	**$836,000**
20 Advanced Rescue Craft (3080)	**$20,000**	**$400,000**
22 Towable Support Inflatables (3080)	**$7,500**	**$165,000**
Total		**$9,651,000**

GA: BATTLESPACE MOBILITY

1. Background. ANG Guardian Angel (GA) and Special Tactics (ST) teams require an air-droppable light tactical all-terrain vehicle (LTATV) class system that can be deployed with operators on board straight into powered canopy flight. GA and ST teams currently have the ability to air-drop vehicles and equipment but are significantly limited by current air-drop methods and equipment and inhibited by the capability of currently fielded vehicles once on the ground. The system must be deployable from existing military aircraft without a separate pallet and modification to the aircraft. The vehicle must be able to be reset for air-drop in the field and transport one or more litter patients. It must be able to transition repeatedly between powered flight and driving. The system must support a mounted automatic weapon and team organic weapons both in-flight and on the ground. It must be able to change canopies, in the field, to facilitate varied flight performance parameters based on mission requirements. The system should be modular to facilitate changing equipment and payloads in the field to meet mission requirements. This modular equipment may include navigation aids, communications, situational awareness, automated flight controls, and visual augmentation equipment, including electro-optical (EO) / infrared (IR) sensors. These tactical systems should have reduced noise and visual signatures and be field maintainable at the operator level. Each of the three GA units requires three LTATVs, six reusable air-drop kits, six non-airdrop canopies, and three EO/IR sensors. Both ST units require two LTATVs, four reusable air-drop kits, four non-airdrop canopies, and two EO/IR sensors.

2. Program Details.

Quantity	Unit Cost	Program Cost
13 Air-Droppable LTATVs Capable of Powered Canopy Flight (3080)	**$400,000**	**$5,200,000**
26 Reusable Air-drop Kits (3080)	**$300,000**	**$7,800,000**
26 Non-Airdrop Canopies (3080)	**$20,000**	**$520,000**
13 EO/IR Sensors (3080)	**$100,000**	**$1,300,000**
Total		**$14,820,000**

ST: SMALL UNMANNED AIRCRAFT SYSTEM MODERNIZATION

1. Background. ANG Special Tactics (ST) squadrons require capability for current and emerging small unmanned aircraft system (sUAS) wartime operations. As commercial sUAS continues to improve faster than military technology, constant modernization of tactics and procedures, increased payloads, loiter time, cameras, and transmitter/receiver (radio) are needed to remain scalable and upgradeable with the current and future battlefields. While sUAS can easily be employed throughout each of the ST core competencies, the ST Unmanned Roadmap states the overall goal is to focus ST investments in unmanned systems and technologies to meet the prioritized capability needs of the warfighter. The ANG requires four sUAS Micro kits, two sUAS Class 1 kits, and 1 sUAS Class 2 kit for each of the two ST units and one sUAS Class 1 kit for each of the 14 Tactical Air Control Party units.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 sUAS Class 2 kits (3080)	**$1,200,000**	**$2,400,000**
18 sUAS Class 1 kits (3080)	**$400,000**	**$7,200,000**
8 sUAS Micro kits (3080)	**$10,000**	**$80,000**
Total		**$9,680,000**

ST: MODERNIZED AERIAL CARGO DELIVERY

1. Background. ANG Special Tactics (ST) and Guardian Angel (GA) squadrons require aerial delivery equipment and parachutes as well as personal parachutes. Containers and parachutes for equipment and parachute equipment release assemblies need to be updated to fit the vast scope of mission sets. High-mount equipment conversion for military free fall (MFF) harnesses must be accomplished on both new and existing MFF parachute systems to create transparency in training and improve safety on equipment jumps. Panoramic night vision devices (NVD) provide a greater field of view and improve depth perception. Short-wave infrared (SWIR) clip-on systems should be utilized in conjunction with NVDs to view SWIR strobes on jumpers. Jumpmaster-specific tablets are vital to building situational awareness for the Jumpmaster and the team executing the mission by providing moving map, real time position to jumper release point. Both of the ANG ST squadrons and all three ANG GA squadrons each require 40 T-10 disposable parachutes, 20 G-12 disposable parachutes, 12 sets of panoramic night-vision goggles, an 8-ring equipment conversion for MFF harnesses, 12 SWIR clip-on devices, a parachute equipment release assembly, four aerial cargo delivery systems, six Android Tactical Assault Kit (ATAK) tablets, and 100 SWIR strobes.

2. Program Details.

Quantity	Unit Cost	Program Cost
200 T-10 Disposable Parachutes (3080)	**$200**	**$40,000**
100 G-12 Disposable Parachutes (3080)	**$1,800**	**$180,000**
60 Panoramic Night-Vision Devices (3080)	**$40,000**	**$2,400,000**
14 Tandem Parachute Systems (3080)	**$22,660**	**$317,240**
5 8-Ring Equipment Conversion for MFF Harnesses (3080)	**$400,000**	**$2,000,000**
60 SWIR, Clip-On Devices (3080)	**$14,750**	**$885,000**
5 Parachute Equipment Release Assemblies (3080)	**$50,000**	**$250,000**
20 Aerial Cargo Delivery Systems (3080)	**$20,000**	**$400,000**
30 ATAK Tablets (3080)	**$800**	**$24,000**
500 SWIR Strobes (3080)	**$400**	**$200,000**
28 Vigil EAD (3080)	**$3,300**	**$92,400**
14 Butler Recovery Systems (3080)	**$10,080**	**$141,120**
Total		**$6,929,760**

ST: EXTREME COLD WEATHER PACKAGE

1. Background. ANG Special Tactics (ST) and Guardian Angel (GA) units require vehicles and protective equipment to operate in extreme cold weather environments. This modernized equipment includes shelters and sustainment for up to 36 personnel, mobility platforms capable of carrying one to four personnel, and tools required to establish and maintain ski landing areas. Over the past decades, ST's ability to conduct global access, personnel recovery, and precision strike missions in the arctic has severely atrophied. Modernized equipment and training are required to revive ST and GA's arctic capability. Both ANG ST units and all three ANG GA squadrons require a mobility platform, a sustainment package, and a personal performance equipment package.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 Mobility Platforms (3080)	**$90,000**	**$450,000**
5 Sustainment Packages (3080)	**$81,000**	**$405,000**
5 Personal Performance Equipment Packages (3080)	**$152,000**	**$760,000**
Total		**$1,615,000**

ST: TACTICAL COMMUNICATIONS SUITE

1. Background. ANG Special Tactics (ST) squadrons require communication kits for current and emerging wartime operations. As commercial communications continue to improve faster than military technology, constant modernization of end-user devices, cabling, and integration solutions are needed to remain compatible with the battlefield. Integration of battle-tracking technology is needed to be modular through all vehicle types (aircraft, tactical vehicles, and watercraft) to allow the warfighter to travel through and integrate with any transportation medium. Communication kits consist of radios, antennae, push-to-talks, headsets, power and data management hubs, and a small light-weight, high-capacity power solution. Communication kits must meet waterproof requirements while being ruggedized, dirt/dustproof, and meet electromagnetic and security requirements. This must also be scalable and upgradeable to keep up with morphing technology. An individual must communicate from aircraft, tactical vehicles, and maritime vehicles, transitioning in minimal time with minimal burden for quick-action. Each of the two ST squadrons requires 130 communications operations kits and 20 transportable communications kits, and two modular gateway solution kits.

2. Program Details.

Quantity	Unit Cost	Program Cost
260 Communication Operations Kits (3080)	**$13,000**	**$3,380,000**
40 Transportable Communication Kits (3080)	**$44,500**	**$1,780,000**
4 Modular Gateway Solution Kits (3080)	**$218,000**	**$872,000**
Total		**$6,032,000**

ST: AUSTERE AIRFIELD OPERATIONS KIT

1. Background. ANG Special Tactics (ST) squadrons require light-weight, quiet, compact, and durable assault zone equipment. The Federal Aviation Administration mandates automated dependent surveillance-broadcast (ADS-B) compliance by January 1, 2020. An ADS-B transponder receiver is required to assure the safety of flight and aircraft deconfliction in austere circumstances. A man-portable cellular network bubble can guarantee connectivity and data sharing in an assault zone environment. Lastly, accurate measuring equipment that can function in a global positioning system (GPS) denied environment can complement existing ST equipment. Access teams lack the ability to autonomously survey, secure, surveil, maintain, and defend their operational area. Each of the two ST squadrons require 100 assault zone marking panels, four ADS-B transponder receivers, five electric-assisted bicycles with trailers, two man-portable cellular towers, three short-wave infrared (SWIR) spectrum assault zone marker kits, three automated compact light guns, two ground density measurement equipment sets, two category 1 (Cat 1) coordinate derivation devices, 100-day SWIR/thermal heads-up eyepieces, and three survey data collection equipment sets.

2. Program Details.

Quantity	Unit Cost	Program Cost
200 Assault Zone Marking Panels (3080)	**$250**	**$50,000**
8 ADS-B Transponder Receivers (3080)	**$500**	**$4,000**
10 Electric Assisted Bicycles and Trailers (3080)	**$5,500**	**$55,000**
4 Man-Portable Cellular Towers (3080)	**$200,000**	**$800,000**
6 SWIR Spectrum Assault Zone Marker Kits (3080)	**$20,000**	**$120,000**
6 Automated, Compact Light Guns (3080)	**$10,000**	**$60,000**
4 Ground Density Measurement Equipment (3080)	**$150,000**	**$600,000**
4 Cat 1 Coordinate Derivation Devices (3080)	**$40,000**	**$160,000**
200 Day SWIR/Thermal Heads-Up Eyepieces (3080)	**$750**	**$150,000**
6 Survey Data Collection Equipment Sets (3080)	**$300,000**	**$1,800,000**
Total		**$3,799,000**

TACP: FULLY INTEGRATED SITUATIONAL AWARENESS

1. Background. Tactical Air Control Party (TACP) dismounted Joint Terminal Attack Controllers (JTAC) require a system to conduct digitally aided close air support (DACAS) with a low probability of intercept and low probability of detection (LPI/LPD). To do this, JTACs require a handheld system capable of interfacing with multiple airborne platforms through Link 16. The system must be light-weight, J-Voice capable, and able to interface with situational awareness kits. To interface with the Link 16 radio, JTACs require a light-weight android-based end-user device to display mission-critical data during dismounted operations. This complete DACAS system must have all required plug-ins and cables to ensure interoperability between the end-user device and the Link 16 radio. Finally, JTACs utilizing this DACAS system requires a server to facilitate a common operating picture and information sharing. ANG has previously procured 224 situational awareness kits and 124 handheld Link 16 radios for distribution to operational squadrons. Due to a change in operational utility of the situational awareness kit, ANG TACPs require an additional seven situational awareness kits, and 23 handheld Link 16 radios, and one server instance for each of the 14 operational squadrons. ANG TACPs also require five situational awareness kits with Link 16 radios at the ANG JTAC qualification school and two each at the two air support operations groups. Additionally, enterprise licensing for Link 16 host software is required for system interoperability.

2. Program Details.

Quantity	Unit Cost	Program Cost
117 Situational Awareness Kits (3080)	**$14,000**	**$1,638,000**
219 Handheld Link 16 Radios (3080)	**$35,000**	**$7,665,000**
14 Servers (3080)	**$140,000**	**$1,960,000**
1 Enterprise Link 16 Host Licensing (3080)	**$4,000,000**	**$4,000,000**
Total		**$15,263,000**

TACP: MOBILE COMMUNICATIONS PACKAGES

1. Background. ANG Tactical Air Control Party (TACP) requires a vehicle agnostic, modular, and scalable command, control, communications, computers, intelligence, surveillance, and reconnaissance capability. TACPs at all echelons currently lack the organic ability to reach necessary networks beyond-line-of-sight during combat operations. Additionally, TACP lacks a vehicle agnostic solution for their current communications systems for TACP maneuver and TACP command and control. The system must be rapidly deployable with minimal time required for communications to be established. Systems requirements vary in capabilities depending on the echelon supported, giving only what is needed at the corresponding level. TACPs require two tactical network systems with authorization to connect and provide network backbone, two mission application packages with associated software and licenses to maintain ATO requirements, and a datalink network gateway with joint range extension applications protocol-C (JREAP-C) capability at each of the two Air Support Operations Center (ASOC) squadrons. Each of the 14 Air Support Operations Squadron (ASOS) units require six-vehicle agnostic communication systems and one lower echelon network system per 7FVVF Unit Type Code (UTC-27 total UTCs). This capability will allow vehicle agnostic, modular, and scalable TACP command and control required in a combat environment and support ASOC leap operations, brigade level jump tactical operations center (TOC), and tactical command post (TAC) operations in a rolling battlefield.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 Tactical Network Systems (3080)	**$369,000**	**$1,476,000**
4 Mission Application Package (3080)	**$305,000**	**$1,220,000**
4 Data Link Network Gateways (3080)	**$219,000**	**$876,000**
162 Vehicle Agnostic Communication Suites (3080)	**$62,000**	**$10,044,000**
27 Lower Echelon Network Systems (3080)		
Total		**$18,806,000**

TACP: BROAD SPECTRUM BATTLEFIELD IDENTIFICATION

1. Background. ANG Tactical Air Control Party (TACP) Joint Terminal Attack Controllers (JTAC) require the ability to self-drive target locations with a packable sensor that can elevate to 10K ft. above ground level and provide infrared (IR) and coded laser marking/designation capability at no less than 2 km slant range. The system must also be tetherable to TACP vehicles on the move and simple to control with minimal hardware. Additionally, the JTAC also requires the ability to determine target location day/night with a compact device capable out to 5 km for the dismounted JTAC and a slightly larger/tripod-mounted device capable of ranging targets over 10 km with the ability to calculate target location error category one coordinates for the JTAC in the overwatch. Both laser range finding devices must be interoperable with existing Special Warfare digitally aided close air support systems. The JTAC also requires the capability to observe multiple 1064 nanometer coded lasers out to 6 km simultaneously to determine the pulse repetition frequency code during target correlation. Lastly, JTACs require the ability to mark a target with non-pulsed 1064 nm and 1550 nm lasers in a small form factor for dismounted operations. Each of the 14 operational TACP squadrons require one quadcopter aerial device with a sensor, 21 small light-weight laser range finders, and 21 long-range multi-spectrum laser range finders with advanced tripod, 21 compact infrared/laser/overt marking devices, and 21 compact laser spot search cameras.

2. Program Details.

Quantity	Unit Cost	Program Cost
14 Quadcopter Based Aerial Vehicle (3080)	**$250,000**	**$3,500,000**
304 Compact IR/Coded Laser Camera (3080)	**$37,000**	**$11,248,000**
14 Multi-spectral Sensor Module (3080)	**$200,000**	**$2,800,000**
304 Compact IR/Coded Laser Marking Device (3080)	**$49,000**	**$14,896,000**
21 Short Range Laser Range Finder (3080)	**$5,000**	**$105,000**
21 Long Range Multi-Spectrum Laser Range Finder (3080)	**$80,000**	**$1,680,000**
21 Advanced Tripod (3080)	**$40,000**	**$840,000**
Total		**$35,096,000**

TACP: AIR FORCE SPECIAL WARFARE SMALL ARMS AND LIGHT WEAPONS ACCESSORIES

1. Background. ANG Tactical Air Control Party (TACP) and Guardian Angel (GA) operators require a common small arms/light weapons attachment program to conduct their assigned missions across the full spectrum of conflict. ANG TACP and GA require accessories for their primary and secondary weapons systems that increase their survivability and lethality within all environments. These attachments were agreed upon within the HAF/A3S led 2020 AF Special Warfare Lethality Working Group. This list is already approved attachments from the Special Operations Peculiar Modification (SOPMOD) program. ANG TACP and GA require one modular/scalable carbine accessories package, one modular/scalable pistol accessories package per authorized operator.

2. Program Details.

Quantity	Unit Cost	Program Cost
837 Modular Scalable Carbine Accessories (3080)	**$7,153**	**$5,986,998**
837 Modular Scalable Pistol Accessories (3080)	**$1,310**	**$1,096,470**
Total		**$7,083,468**

TACP: LIGHT TACTICAL BATTLEFIELD VEHICULAR EQUIPMENT

1. Background. Special Warfare (SW) operators require ultra-light tactical vehicles to conduct highly mobile maneuvers within an urban and extreme off-road environment. SW requires the ability to rapidly traverse adverse terrain to support movements for air-to-ground support and personnel recovery. This requires an ultra-light tactical vehicle that can transport four personnel, maneuver in small urban streets, and overcome blocking debris. These vehicles must use diesel fuel and have the ability to mount crew-served weapons. Ultra-light tactical vehicles are in the process of being fielded in every echelon on the battlefield with sister services, requiring ANG SW to be equipped with and trained on this vehicle. Eight systems for each of the 14 Air Support Operations Squadrons, four systems for both Special Tactics Squadrons, six for each of the three Guardian Angel Squadrons, and two for the 137th Combat Training Flight are required.

2. Program Details.

Quantity	Unit Cost	Program Cost
140 Ultra-Light Tactical Vehicles (3080)	**$110,000**	**$15,400,000**
Total		**$15,400,000**

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MQ-9

- **Persistent Attack**
- **ANG MQ-9 Units Provide 13% of the Total Fleet**
- **ANG MQ-9 Units Support 54% of Theater Combat Air Patrol Missions**

The MQ-9 Remotely Piloted Aircraft (RPA) comprise the largest Major Weapons System community in the Air Force. The MQ-9 Reaper is a medium-to-high altitude, long-endurance, remotely piloted system. Because of its robust weapons payload capacity and long-endurance, the MQ-9's primary mission is to prosecute time-sensitive targets using precision targeting to find, fix, and destroy or disable those targets. The aircraft employs up to four laser-guided AGM-114 Hellfire missiles and/or four GBU-12 / GBU-38 / GBU-49 / GBU-54 500-pound precision-guided bombs. The MQ-9's secondary mission is to act as an intelligence, surveillance, and reconnaissance asset, employing multiple sensors to provide real-time data to commanders and intelligence specialists at all levels.

In addition to supporting their individual state requirements, ANG units fly combat missions 24 hours a day, 365 days a year in every major combat theater. The ANG manages flight training operations at two locations and supports test and evaluation at a third. Five launch and recovery element sites can support continuation training and support to Domestic Operations over the continental United States. In 2019, the Reaper flew over 500 hours in support of wildfire fighting operations. ANG MQ-9 crews, equipment, and maintenance personnel were credited with saving two California towns from wildfires by detecting and real-time reporting unanticipated wildfire movements.

MQ-9
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Critical Capabilities List

- Multi-Spectral Targeting System Resolution and Computing Improvements
- Minimal Latency Tactical Data Link and Communications Pod
- Infrared/Radio Frequency Self-Protection and Defeat
- Edge Processing for Artificial Intelligence/Machine Learning
- Agile Remote/Split Operations Plus Multi-Domain Dissemination

Essential Capabilities List

- Air and Ground-Based Detect and Avoid
- Contested Denied Operations Survivability/Enabler with Miniature Air-Launched Vehicle/ Expendables
- Deployable Launch and Recovery Element and Squadron Operations Center with Multi-Intelligence Smart Processing
- Launch and Recovery Element Aircraft Simulator
- Debrief System

Desired Capabilities List

- Range and Payload Enhancements
- Cockpit Human-Machine Interface (HMI) Improvements
- Multi-Aircraft Operation via Airborne Distributed Control Network
- Link to Heads-Up Display Augmented Reality Integration
- Weather Tolerance and Situational Awareness

MQ-9: MULTI-SPECTRAL TARGETING SYSTEM RESOLUTION AND COMPUTING IMPROVEMENTS

1. Background. ANG MQ-9 aircraft require an upgrade to the Multi-Spectral Targeting System (MTS) for deep-look, find, and fix effects required in Great Power Competition areas. Currently, the MTS maximizes the physical limits of the aperture, meaning that further resolution enhancements would require physical changes to the system in the form of aperture changes or an increase in the power of image post-processing to utilize state-of-the-industry techniques. An updated electronics unit (EU), called the Sensor Open Systems Arch (SOSA), provides the computational power to dramatically improve combat identification and enable artificial intelligence/machine learning algorithms to run on the sensor data inside the MTS. This EU upgrade provides a significant and much-needed improvement in the MQ-9s passive find/fix capability, filling one of the Combat Air Force's critical capability gaps in that area. Militarized systems in emission control or highly mobile systems executing emit-and-move tactics are still susceptible to passive find/fix tactics utilized by the MQ-9 MTS. Upgrading the EU in the MQ-9 MTS adds situational awareness to the joint force while mitigating an acceptable level of risk where required. Each of the 36 ANG MQ-9 aircraft will require one MTS SOSA Electronic Unit.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$9,000,000**
36 MTS SOSA Electronic Units (3010)	**$200,000**	**$7,200,000**
Total		**$16,200,000**

MQ-9: MINIMAL LATENCY TACTICAL DATA LINK AND COMMUNICATIONS POD

1. Background. ANG MQ-9 aircraft require a podded tactical data link (TDL) radio, with associated hardware and antennas, to employ across multiple areas of responsibility (AOR). MQ-9s lack the means to establish and maintain direct TDL communications with command and control, tactical agencies, and other TDL users. TDLs are used to share aircraft position, targeting data, sensor points of interest, cursor-on-target data, and target-track information derived from various intelligence sources via an airborne network. The lack of a TDL capability onboard the aircraft slows the kill chain, delays effects for supported commanders, and poses a safety risk for deconflicting aircraft airspace. Lack of direct information-sharing with other TDL participants degrades overall situational awareness. A new system must be compatible with all current data link architectures in both domestic and combat AORs, include Enhanced Position Location Reporting System (EPLRS), Situational Awareness Data Link (SADL), and Link 16 with gateway capable software. Each of the 36 ANG MQ-9 aircraft will require one Link 16 radio, SADL radio, and a pod.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$3,000,000**
36 Link 16 Radios (3010)	**$150,000**	**$5,400,000**
36 ELPRS/SADL Radios (3010)	**$50,000**	**$1,800,000**
36 Pods (3010)	**$100,000**	**$3,600,000**
Total		**$13,800,000**

MQ-9: INFRARED, RADIO FREQUENCY, SELF-PROTECTION, AND DEFEAT

1. Background. ANG MQ-9 aircraft require a defensive package suite that provides the ability to detect radar frequency (RF), Infrared (IR), and laser threat systems and employ countermeasures to defeat these systems from initial detection through missile launch. MQ-9s lack the ability to detect any surface-to-air and air-to-air threats. Even if another platform detected these systems, the MQ-9 has no ability to defend against these threats. As a result, the MQ-9 cannot conduct needed missions in areas where these threat systems are prevalent. The system for the MQ-9 must be able to provide jamming for RF, IR, and laser threats as well as countermeasures to defeat the system once a missile is launched. Ideally, this system will not decrease the available weapons loadout and require minimal interaction from aircrew. Each of the 36 ANG MQ-9 aircraft will require one defensive package suite.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering	**N/A**	**$10,000,000**
36 PIDS Pylon Sets	**$2,000,000**	**$72,000,000**
Total		**$82,000,000**

MQ-9: EDGE PROCESSING FOR ARTIFICIAL INTELLIGENCE / MACHINE LEARNING

1. Background. ANG MQ-9 aircrew require the ability to quickly locate, identify, and distribute targets in a contested or denied environment. This limitation creates follow-on effects for the entire kill chain when trying to rapidly find, fix, and engage targets in a high threat environment. Due to advances in machine learning and edge computing, the ability exists to automate target identification by correlating multiple onboard sources of information such as the targeting pod and synthetic aperture radar, then distributing those targets via the data link architecture to Squadron Operations Centers (SOCs). This technology not only enhances the MQ-9s capabilities on the battlefield it also accelerates the rest of the forces' ability to identify and engage targets in one of the most dynamic and difficult environments. The ANG MQ-9 community requires 20 artificial intelligence/machine learning computers, one for each of the 17 SOCs and an additional three for podded capabilities to demonstrate airborne processing and automated functions. These computers are required to meet size, weight, and power constraints of being carried in podded systems onboard the aircraft and must provide processing power capable of hosting artificial intelligence cognitive functions. In addition, the ANG requires 17 installation hardware kits, 12 for combat, and five for unclassified SOCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$3,000,000**
20 Artificial Intelligence/Machine Learning Computers (3010)	**$30,000**	**$600,000**
17 Installation Hardware Kits (3010)	**$100,000**	**$1,700,000**
Total		**$5,300,000**

MQ-9: AGILE REMOTE SPLIT OPERATIONS PLUS MULTI-DOMAIN DISSEMINATION

1. Background. ANG MQ-9 units require Agile remote split operations (RSO) plus to ensure the survivability of MQ-9 airframes, ground control stations (GCS), and personnel. To accomplish critical missions, a Ku-band satellite communications link must be present and operational. Every unit has a fixed RSO capability within their server rooms, which allows the GCS to communicate with a satellite Earth terminal subsystem anywhere in the world via internet protocol. The single point of failure with this intricate network is the hardware's location in a fixed facility. If that fixed facility is damaged in any way, the ability to conduct operations is severely hindered or stops altogether. Agile RSO+ provides the solution to this problem in the form of a modular server room, hardened and placed inside a mobile GCS shell. This mobile server room will serve all MQ-9 Guard units. It has the ability to be unplugged, picked up, and moved anywhere in the world at a moment's notice. Agile RSO+ will be an asset to all units, providing a stopgap in fixed facility degradation due to local natural disaster. It will also allow units to complete a technical refresh of their server rooms with little to no effect on contingency operations. Additionally, it would be available for large force exercises to provide a combat representative capability with the ability to move information and full-motion video out of the cockpit in real-time. The ANG requires one RSO+ mobile server room to support the MQ-9 enterprise.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$2,400,000**
1 RSO+ Mobile Server Room (3010)	**$300,000**	**$300,000**
Total		**$2,700,000**

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Operational Training Infrastructure and Ranges

- **Operational Training Environments**
- **Range Infrastructure**

This tab supports two components: Operational Training Infrastructure (OTI) and Ranges. The first tab component is a key facet of readiness training. Operational Training Infrastructure (OTI) elements such as the ANG's Distributed Training Operations Center (DTOC) provide persistent networks, modeling and simulation expertise, and operational support for daily Distributed Mission Operations (DMO) training. DMO links a wide array of simulators at ANG, Air Force Reserve, Active Component units, and other Services, preparing warfighters for combat in joint and coalition environments.

This portfolio effectively exposes our forces to realistic, sufficiently dense, and advanced threat capability live training environments while protecting our 5th generation weapon systems' capabilities and tactics.

Air Combat Command released its Enterprise Range Plan, the second tab component. As part of this plan, the ANG's OTI requires realistic, static, multispectral target surrogates to replicate real-world complex target sets and realistic full-spectrum electronic warfare emitters to replicate an Integrated Air Defense System environment. These are complemented by a Digital Radio Management System, Link 16, updated range radios, and a training data link management system.

Operational Training Infrastructure and Ranges
2020 Weapons and Tactics Conference

Critical Capabilities List

Operational Training Infrastructure

- Air Reserve Component Network Connectivity Across the Air Reserve Components
- Networked Radio Solutions
- Networked Live-Virtual-Constructive-Operational Training Data Link Solution
- Common Debrief System for Distributed Live and Synthetic Mission Operations
- Air National Guard Operating Location

Ranges

- Air Combat Maneuvering Instrumentation
- Persistent Training Data Link Network and Radio Frequency Communications Suite for Enhanced Live-Fly Training
- Realistic Integrated Electronic Warfare Threat Emitters
- High-Fidelity Surrogate Targets
- Updated Air-to-Ground Weapon Scoring System

Essential Capabilities List

Operational Training Infrastructure

- LVC-OT Distributed Mission Operations Network Nodes that Facilitate Integrated Training with Joint Weapons Systems
- LVC-OT Cross-Domain Solutions for Persistent, Integrated Distributed Mission Operations Training Across Different Security Levels.
- LVC-OT Synthetic Entity Interaction with Live Weapon System Sensors and Capabilities Integrated Into the Blended Live and Synthetic Training Environment
- LVC-OT Contested and Degraded Operations Tools for Synthetic Environments that Provide Realistic, Physics-Based Effects Into the Virtual Training Environment
- LVC-OT Live and Synthetic Training Environment Common Operating Picture Displaying Fused Information From Multiple Sources and Protocols

Ranges

- Ground-based Electronic Attack System Compatible with Currently Fielded Threat Emitters

Desired Capabilities List

To save space, desired lists can be obtained upon request from NGB/A5.

OPERATIONAL TRAINING INFRASTRUCTURE: AIR RESERVER COMPONENT NETWORK CONNECTIVITY ACROSS THE AIR RESERVE COMPONENTS

1. Background. ANG requires additional connections to the Air Reserve Component (ARC) Network (ARCNet). To expand the ARC distributed training network, additional sites will require portals to connect to ARCNet. Currently, there are 40 units connected to ARCNet, this is insufficient for ARC Mission Design Series (MDS) to maintain their annual training requirements. Adding additional connectivity for units will increase the ability for more units to participate in Distributed Mission Operations to provide realistic tactical synthetic training. This training allows members to maintain their annual Ready Aircrew Program (RAP) requirements. Distributed Training Operation Center portals must be acquired and placed at each unit to provide connectivity to ARCNet, which allows units to utilize simulated training, connections to other ARCNet users, and connectivity to other Air Force owned networks.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 Portals (3080)	**$40,000**	**$400,000**
Total		**$400,000**

OPERATIONAL TRAINING INFRASTRUCTURE: NETWORKED RADIO SOLUTIONS

1. Background. The ARC's operational training infrastructure requires a networked communications capability for live, virtual, and constructive training. One of the 13 lines-of-effort in the Air Force OTI 2035 Flight Plan is the fielding of a synthetic-to-live/live-to-synthetic training capability at live training ranges, distributed training centers (DTC), and operational units. The Air Combat Command Range Enterprise Plan intends to equip fighter wings and primary training ranges with a networked communications capability. There is no plan to provide this capability for other primary users of these ranges. A networked communications capability will allow users to communicate with live assets in any instrumented airspace. This will allow units to participate in live scenarios beyond-line-of-sight from the unit's location, effectively eliminating proximity as a factor that limits training with geographically separated units. This capability will also enable virtual entities to train with live assets operating in distributed airspaces. To achieve this capability, right-sized radio solutions will be procured and distributed to 11 ANG DTCs, command and control units, four A-10 units, and units conducting Joint Terminal Air Controller training.

2. Program Details.

Quantity	Unit Cost	Program Cost
15 Radio Solutions (3080)	**$50,000**	**$750,000**
Total		**$750,000**

OPERATIONAL TRAINING INFRASTRUCTURE: NETWORKED LIVE AND VIRTUAL CONSTRUCTIVE-OPERATIONAL TRAINING DATA LINK SOLUTIONS

1. Background. The ANG's Operational Training Infrastructure (OTI) requires a networked data link capability for live and virtual and constructive training. One of the 13 lines-of-effort in the Air Force OTI 2035 Flight Plan is the fielding of a synthetic-to-live/live-to-synthetic training capability at live training ranges, distributed training centers (DTC), and operational units. The Air Combat Command Range Enterprise Plan intends to equip fighter wings and primary training ranges with a networked datalink capability. There is no plan to provide this capability for other primary users of these ranges. A networked data link capability will allow users to conduct data link enabled training with live assets in any instrumented airspace. This allows units to participate in live scenarios beyond-line-of-sight from the unit's location, effectively eliminating proximity as a factor that limits training with geographically separated units. This capability will also enable unit-level constructive data link entity generation to bolster training scenarios with live assets operating in distributed airspaces. To achieve this capability, right-sized data link solutions will be procured and distributed to four A-10 units, and fourteen units conducting Joint Terminal Air Controller training.

2. Program Details.

Quantity	Unit Cost	Program Cost
18 Data link Solutions (3080)	**$200,000**	**$3,600,000**
Total		**$3,600,000**

OPERATIONAL TRAINING INFRASTRUCTURE: COMMON DEBRIEF SYSTEM FOR DISTRIBUTED LIVE AND SYNTHETIC MISSION OPERATIONS

1. Background. The ANG Distributed Training Operations Center (DTOC) requires to brief and debrief geographically separate units via a video teleconference system capable of mission recording and distributed playback. The debrief is the most valuable phase of both live and synthetic training missions. Mission playback facilitates debriefing, where errors and deviations are noted, instruction is given, and lessons learned are captured. A classified debrief system, dedicated to ANG distributed mission operation (DMO), allows the capture of live, virtual and constructive video sources for live viewing and mission playback. Finally, the debrief system should be compatible with the DMO network and Air Reserve Component Network. The DTOC requires three debriefing systems for scheduling flexibility and mission continuity.

2. Program Details.

Quantity	Unit Cost	Program Cost
3 Debrief Systems (3080)	**$200,000**	**$600,000**
Total		**$600,000**

OPERATIONAL TRAINING INFRASTRUCTURE: ANG OPERATING LOCATION

1. Background. The ANG's Distributed Training Operations Center (DTOC) requires increased capacity of event control centers (ECCs) through an ANG Operating Location (AOL). The DTOC denies events and decreases event sizes based on the limiting factor of the availability of ECCs. Denial and decreased event sizes mean that the ARC units are not receiving their distributed mission operations training needed to complete their annual training requirements. An additional ANG operating location would allow for increased offered events and large force exercises to be properly manned for timely and accurate scenario input to the trainee for tactical decision making.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 Training Area Workstations (3080)	**$500,000**	**$2,000,000**
Total		**$2,000,000**

RANGES: AIR COMBAT MANEUVERING INSTRUMENTATION

1. Background. The ANG ranges require expanded instrumentation training opportunities in the live environment that provides tracking data for threat emitter systems, and recording air and ground system interactions to provide after-action reviews (AAR). The P5 Combat Training System (P5CTS) is composed of a remote range unit (RRU), a live monitor system utilized at the range training officer (RTO) location, and an AAR system utilized at the squadron debriefing locations and training centers. The P5CTS has been deployed to less than half of the ANG locations that require the capability. To complete fielding to the remaining wings and training ranges, the ANG requires 14 RRUs, 21 RTO systems, 21 AAR systems. Additionally, the ANG requires a standard configuration of software and hardware to provide a common architecture for live training ranges to improve training and centralize modernization and sustainment. This configuration would provide a shared arrangement of range training systems and applications central to ACC's Enterprise Range Plan. It is composed of networks, servers, and workstations that consolidate training systems and software.

2. Program Details.

Quantity	Unit Cost	Program Cost
14 RRUs (3080)	**$400,000**	**$14,700,000**
21 RTO Systems (3080)	**$700,000**	**$8,610,000**
21 AAR Systems (3080)	**$410,000**	**$5,600,000**
Total		**$28,910,000**

RANGES: PERSISTENT TRAINING DATA LINK NETWORK AND RADIO FREQUENCY COMMUNICATIONS SUITE FOR ENHANCED LIVE-FLY TRAINING

1. Background. The ANG operational training infrastructure (OTI) enterprise requires realistic, standardized, full-spectrum, and immersive data link and radio communication systems. The ANG continues to have shortfalls in standardized communication and data link systems at the critical nodes in the range training infrastructure. The OTI enterprise consists of the flying squadrons, primary training ranges, live mission operations centers, training centers, and forward operating locations. Acquisition of the digital radio management system (DRMS), Link 16, situational advanced data link (SADL), range radios, and a training data link management system with man-in-the-loop data input capability will enhance ANG units' ability to accomplish realistic full-spectrum, multi-domain training. The ANG requires communication upgrades for four Combat Readiness Training Centers (CRTCs), 11 Primary Training Ranges (four co-located with CRTCs), and 23 fighter wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
34 Link 16 Radios (3080)	**$360,000**	**$12,240,000**
34 Data Link Management Systems (3080)	**$297,000**	**$10,098,000**
34 Range Radio Systems (3080)	**$240,000**	**$8,160,000**
34 DRMS (3080)	**$480,000**	**$16,320,000**
Total		**$46,818,000**

RANGES: REALISTIC INTEGRATED ELECTRONIC WARFARE THREAT EMITTERS

1. Background. ANG Operational Training Enterprise (OTE) requires realistic electronic warfare (EW) simulators to replicate an integrated air defense system (IADS) environment. High fidelity range emitters are needed to replicate an array of threat representative surface-to-air missile and anti-aircraft artillery systems in an IADS. Air Combat Command (ACC) is fielding EW threat emitters in concert with their Enterprise Range Plan (ERP) but will not fully fund the ANG OTE. The EW Server, which acts as the range training officer's link between the P5 Air Combat Training System and the threat systems, must be replaced to incorporate full-duplex joint threat emitter (JTE) linkage to the ranges with relevant simulations for the new threat systems. The threat emitter system version 2 (TRESv2) is integrated into the EW Server but still requires relevant flyout simulations. ACC is fielding these in concert with their ERP but will not fully fund all ANG ranges. ANG requires four advanced threat systems compatible with training requirements for both 4th and 5th generation aircraft, four EW servers, and 10 weapons flyout simulations to equip all four ANG EW ranges fully.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 Advanced Threat Systems (3080)	**$30,000,000**	**$120,000,000**
10 Weapons Flyout Simulations (3080)	**$1,000,000**	**$10,000,000**
4 EW Servers (3080)	**$100,000**	**$400,000**
Total		**$130,400,000**

RANGES: HIGH-FIDELITY SURROGATE TARGETS

1. Background. To meet Ready Aircrew Program tasking requirements, the ANG operational training infrastructure enterprise requires realistic, multispectral target surrogates to replicate real-world complex target sets. The ANG currently employs a variety of high and medium fidelity surrogate targets but still has shortfalls in realistic target acquisition and identification training. High-value complex target arrays are needed to mimic specific surface-to-air missile and anti-aircraft artillery sites and associated equipment. These arrays require the same characteristics as the actual entity to include visual footprint, density, and heat signatures. The ANG's electronic warfare (EW) training ranges require 15 high fidelity targets, associated with specific EW threat emitters and the remaining seven ANG Primary Training Ranges require additional 3 surrogates to provide training to advanced targeting systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
36 High-Fidelity Targets (3080)	**$500,000**	**$18,000,000**
Total		**$18,000,000**

RANGES: UPGRADED JOINT ADVANCED WEAPON SCORING SYSTEM

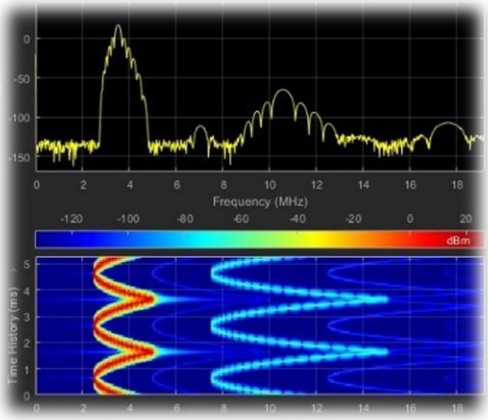
1. Background. ANG requires an upgrade to the tactical ordnance scoring system (TOSS). The TOSS system in place at ANG ranges no longer supports the expanding gamut of ANG training requirements. The Joint Advanced Weapon Scoring System (JAWSS) provides greater accuracy, night and day scoring capabilities, laser scoring, and strafe scoring capabilities. JAWSS also provides virtual reality imaging weapons training system (IWTS), no-drop weapon scoring, and automated remote feedback for home-station debrief. JAWSS consists of five systems: weapon impact scoring system; laser evaluation system-mobile; large-scale target sensor system; remote strafe scoring system, and the IWTS. The ANG also requires Battle Damage Assessment (BDA) coverage of unscored target areas for confirmation of on range releases and range safety. Each BDA system includes an 80’ tower with line-of-sight to the un-scored targets and Range Operations Center (ROC) with operator console, Tactical Area Safety Surveillance System, and radio frequency repeater. Each of the ANG’s 11 ranges will require one JAWSS capability one BDA Camera System.

2. Program Details.

Quantity	Unit Cost	Program Cost
11 WISS V5 Systems (3080)	**$640,000**	**$7,040,000**
11 BDA Camera Systems (3080)	**$415,300**	**$4,568,300**
Total		**$11,608,300**

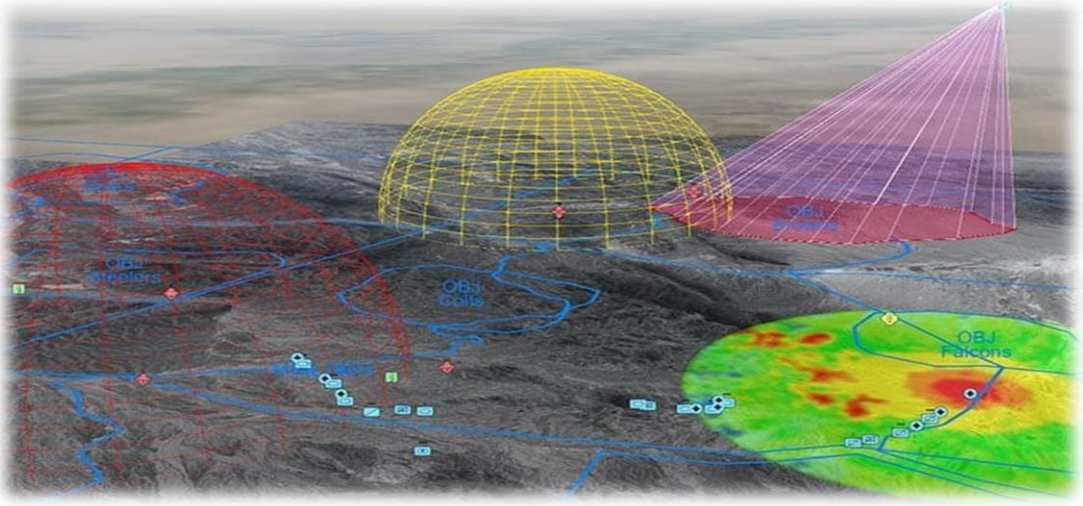
Space Operations

- **ANG Space Units Provide 40% of Military Satellite Communication C2**
- **Mobile and Fixed Missile Warning**
- **Space Electronic Warfare Operations**



Space Operations - The ANG contribution to United States Space Force (USSF) missions includes over 900 personnel within eight squadrons. Space capabilities support federal- and state-level agencies, USAF, the nuclear command and control community, and combatant commands.

Space units provide missile warning, space situational awareness, space intelligence, satellite communications, space electronic warfare capabilities to support operational, exercise, and planning activities along with other space support as requested. Air National Guardsmen participating in these missions draw upon skills from their related civilian careers. Specific missions assigned to ANG units include mobile, survivable missile warning, command and control of military strategic and tactical relay satellite constellation, space intelligence, and space electronic warfare to support exercises and operations. Execution of these activities occurs from the home station and deployed locations.



Space
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Critical Capabilities List

- Electronic Warfare Training Modernization
- Intel Threat Modeling & Simulation
- Electronic Warfare Operations Enhancement

Essential Capabilities List

- Space Test Range Live Capabilities & Multi-Domain Connectivity
- Non-Traditional Space Electronic Warfare Operations Upgrade & Integration
- Defensive Space Electronic Warfare Modernization & Integration
- Fully Remote Operations Capabilities Across Core Mission Platforms

Desired Capabilities List

- Small Form Factor Counter Communication System Capacity Expansion
- Fully Remote Operations Capabilities Across All Mission Platforms
- Multi-Aperture Phased Array Antenna Family

SPACE: ELECTRONIC WARFARE TRAINING MODERNIZATION

1. Background. ANG space control squadrons require the ability to conduct electronic warfare advanced training (AT) scenarios in a live, virtual, and constructive (LVC) environment from multiple distributed locations. Currently, the space control community has limited ability to conduct basic continuation training and cannot interface across multiple units for enterprise-level scenarios. Furthermore, the ability to conduct AT events is severely restricted by access to range personnel, bandwidth, support equipment, airlift, and exercise funding. A multi-domain LVC environment will help meet the mission-critical requirement to provide realistic threat-based training that integrates multiple space control units, allows flexible scheduling, and provides significantly increased AT throughput to meet requirements. The initial LVC hub will require a facility that can operate at the TS/SCI level to include sufficient environmental control, power, and space to house counter communication system, two Multi-Mission Platform-X (MMP-X) units, a Big Top trainer, eight Combined Advanced Network Emulators, web-based RF fundamentals trainer, live range enhancement suite, and all other required network connectivity equipment. Each of the four offensive space control squadrons require, two counter communication emulation laptops for unit level training capable of networking to the space training range, RF training lab suite, small form factor RF training range, and range integration and control suite. One additional RF training lab suite is required for the Combat Training Squadron (CTS).

2. Program Details.

Quantity	Unit Cost	Program Cost
10.2 Counter Communications System (3080)	**$5,700,000**	**$5,700,000**
Big Top Trainer (3080)	**$1,500,000**	**$1,500,000**
8 Combined Advanced Network Emulators (3080)	**$500,000**	**$4,000,000**
Network Equipment (3080)	**$500,000**	**$500,000**
8 Counter Communication Emulation Laptops (3080)	**$400,000**	**$3,200,000**
Web Based RF Fundamentals Trainer (3080)	**$750,000**	**$750,000**
5 RF Training Lab Suites (3080)	**$200,000**	**$1,000,000**
2 MMP-X (3080)	**$225,000**	**$450,000**
Live Range Enhancement Suite (3080)	**$2,000,000**	**$2,000,000**
Small Form Factor Training Range (3080)	**$2,000,000**	**$2,000,000**
Range Integration & Control Suite (3080)	**$3,000,000**	**$3,000,000**
Total	**$9,775,000**	**$24,100,000**

SPACE: INTEL THREAT MODELING AND SIMULATION

1. Background. ANG non-kinetic space targeting units require advanced target development tools to model high fidelity and accurate non-kinetic weapon effects. Space targeting units are tasked with developing non-kinetic space targeting solutions in support of target systems analysis and entity level (person, place, or thing) target development. The products take the form of analytical reports on target vulnerability and effects assessments that are not validated against any modeling or simulation data due to a lack of viable tools to model non-kinetic effects on any given target effectively. Current tools do not comprehensively assess complex scenarios of multiple partners and platforms working in sync against a complex target vulnerability. A common analysis and visualization tool incorporates the appropriate modules to enable Space Intel support to Space Electronic Warfare, Orbital Warfare, and Space Battle Management. This project will also require the necessary server space and development work to modify the Operational Persistence-Enabled Data Synthesis (OPEDS) tool be hosted on JWICS. Finally, the ability to store, organize, access, and disseminate targeting and all-source space intelligence data across multiple space warfighting functions will provide a vital linkage between the visualization, data fusion, and threat modeling space intelligence systems. The ANG space command and control squadron and five ANG intelligence squadrons require a Space Intel Analysis and Visualization Tool, Data Synthesis and Fusion Tool, and Dynamic Space Intelligence Repository to produce standardized, all source, space domain threat analysis.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Space Intel Analysis & Visualization Tools (3080)	**$1,200,000**	**$7,200,000**
6 Data Synthesis & Fusion Tools (3080)	**$1,100,000**	**$6,600,000**
6 Dynamic Space Intelligence Repositories (3080)	**$500,000**	**$3,000,000**
Total	**$2,800,000**	**$16,800,000**

SPACE: ELECTRONIC WARFARE OPERATIONAL EQUIPMENT MODERNIZATION

1. Background. ANG space control squadrons require Counter Communication System (CCS) hardware and software modifications to rapidly deploy electronic warfare support equipment. The current CCS is not compact or able to perform to combatant commanders' wartime requirements. Hardware footprint reduction should include a photonic hardware upgrade coupled with a software upgrade to support the utilization of additional antennas with the baseline CCS system and porting advanced capabilities onto a small form factor variant. Additionally, software upgrades are required to automate signal detection, characterization, and electronic positive identification for signals of interest. The four ANG space control squadrons require one Common platform graphics user interface, signal characterization monitor and hardware, four signal characterization kit, two operational use antennas, eight antennas for training for the space EW range, CCS automation hardware, mission automation, Space EW Translator, Data handling display and eight small form factor CCS and an antenna agnostic upgrade from CCS to facilitate decoupling the system software and hardware to enable the Antenna Families project.

2. Program Details.

Quantity	Unit Cost	Program Cost
Common Platform Graphics User Interface Upgrade (3080)	**$1,655,000**	**$1,655,000**
Signal Characterization Monitor and Hardware (3080)	**$560,000**	**$560,000**
4 Signal Characterization Kits (3080)	**$1,500,000**	**$6,000,000**
10 Antennas (3080)	**$900,000**	**$9,000,000**
Antenna Agnostic CCS Upgrade (3080)	**1,500,000**	**1,500,000**
CCS Automation Hardware (3080)	**$850,000**	**$850,000**
Mission Automation (3080)	**$5,544,000**	**$5,544,000**
Space EW Translator (3080)	**$2,700,000**	**$2,700,000**
Data Handling Display (3080)	**$250,000**	**$250,000**
8 Small Form Factor CCS (3080)	**$250,000**	**$2,000,000**
Total	**$6,665,000**	**$30,059,000**

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Cyberspace Operations

- **ANG Cyberspace Units Provide 15% of Cyber Mission Force Teams**
- **Network Warfare and Information Operations**
- **Defend DoD Networks, Systems, and Information**
- **Defend U.S. Homeland and National Interests Against Cyberattacks**
- **Provide Cyber Support to Military Operational and Contingency Plans**

The United States relies on the Internet, systems, and data of cyberspace for a wide range of critical services. Modern weapon systems, such as aircraft and satellites, have evolved into computers with wings and computers in orbit. They are filled with 4th and 5th generation technology and rely on the cyberspace domain to function. This reliance leaves the U.S. vulnerable in the face of dangerous cyber threats, as state and non-state actors plan to conduct disruptive and destructive cyberattacks on the networks of our critical infrastructure and steal U.S. intellectual property to undercut our technological and military advantage. ANG cyber operations units are postured for cyber deterrence and cyber defense, focusing on building cyber capabilities to defend warfighting capability and homeland/national interests against cyberattacks.

The ANG cyber operations force includes three cyber operations groups and twenty units. Cyber capabilities support federal- and state-level agencies, the Air Force, and combatant commands. Cyber units provide offensive and defensive cyberspace capability to support operational and planning activities and other cyberspace support as requested. Guardsmen participating in these missions draw upon skills from their related civilian careers. Specific missions assigned to ANG units include network vulnerability assessments, digital media and network analysis, and full-spectrum cyber warfare support in both exercises and operations. Execution of these activities occur from home station and national facilities through distributed operations.

Cyberspace Operations
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Critical Capabilities List

- Advanced Cyber Forensics Toolkit
- Automated Collaboration and Execution System
- Part Task Trainer – Industrial Control System
- Advanced Threat Training System
- Cloud Cyber Operations Platform

Essential Capabilities List

- Full Spectrum Information Warfare Capability
- Industrial Control System Attack Detection and Response
- Cyber Heads Up Display
- Open Source Internet Research Tool

Desired Capabilities List

- None

CYBER: ADVANCED CYBER FORENSICS TOOLKIT

1. Background. ANG cyberspace operations (CO) units require the ability to conduct rapid cyber forensics and reverse engineer advanced malware threats. Each Advanced Cyber Forensics Toolkit (ACFT) will include hardware and software to conduct advanced static and dynamic malware analysis and forensics on various equipment. This toolkit must allow collect information in a forensically sound manner from multiple types of hardware and software for mobile devices, computer workstations, and servers. To support this, the kit must include write blocking hardware, faraday isolation to prevent radio-frequency leakage, dedicated hardware to support password recovery, and software to create forensically sound images. To support dynamic and static analysis, the kit must support the creation of networked, virtual environments to analyze collected malware. This capability will allow CO units to conduct investigative analysis and attribute malicious cyber activity. The goal of the ACFT is to examine any digital medium in a forensically sound manner, to identify, preserve, recover, analyze, and report/present evidence about the digital information. This system must provide training and interoperate with existing mission systems. One AFCT is required for each of the 20 CO units.

2. Program Details.

Quantity	Unit Cost	Program Cost
20 ACFTs (3080)	**$400,000**	**$8,000,000**
Total		**$8,000,000**

CYBER: AUTOMATED COLLABORATION AND EXECUTION SYSTEM

1. Background. ANG cyberspace operations (CO) units require an automated collaboration and execution system to aid in cyber planning, briefing, execution, and debriefing (PBED). This system automates the PBED process and information sharing. During the planning phase, the collaboration and execution system will ingest all of the governing operational documents, cyber terrain, threat environments, and integrate with existing cyber weapon systems to collect telemetry. This information is synthesized into a heads-up display used to develop a plan during the briefing and execution phases. For execution, this system captures the activity that an operator performs and allows for significant events to be highlighted and reviewed. Additionally, this system displays a weapon system telemetry and uses machine learning to display system health analytics. The Automated Collaboration and Execution System (ACES) provides a way to review collected actions so operators can identify additional cyber tactics, techniques, and procedures (TTP) to be reviewed during a mission debrief. These TTPs can be saved into the system for future reference. Each of the 20 CO units require an automated collaboration and execution system.

2. Program Details.

Quantity	Unit Cost	Program Cost
20 ACES (3080)	**$250,000**	**$5,000,000**
Total		**$5,000,000**

CYBER: PART TASK TRAINER – INDUSTRIAL CONTROL SYSTEM

1. Background. ANG Cyberspace Operations (CO) units require training individual members on cyberspace tasks associated with initial qualification training (IQT) and remedial training. The Part Task Trainer-Cyber (PTT-C) system is a cost-effective training solution that allows CO and maintenance personnel to familiarize themselves with mission particular tasks, weapons systems operations, or industrial control systems (ICS). The PTT-C provides hands-on training for critical skills required to operate in a team environment and support CO. The PTT-C provides an individual training and skills assessment suite allowing personnel to train on specific tasks and identify areas needing improvement. Additionally, the system integrates a cognitive learning assessment to identify qualified candidates and their readiness to integrate into the cyber mission force. The PTT-C uses pre-defined individual challenges and events to limit the potential compromise of scenarios in a training environment. The system is maintained locally, allowing personnel to connect to the PTT-C, and is managed through an intuitive administration page. The system must not require a recurring licensing or subscription fee to operate. It will focus on work role training requirements and ICS readiness; prepping personnel to execute in the team construct within the Virtual Interconnected Training Environment (VITE) and during operational missions. The Cognitive Learning System (CLS) is a neurological feedback learning system that evaluates a cyber operator's comprehension and cognitive abilities. One Cognitive Learning System is required for the cyber enterprise and one PTT-C ICS for each of the 20 CO squadrons.

2. Program Details.

Quantity	Unit Cost	Program Cost
1 Cognitive Learning System (3080)	**$2,000,000**	**$2,000,000**
20 Part Task Trainer Industrial Control Systems (3080)	**$200,000**	**$4,000,000**
Total		**$6,000,000**

CYBER: ADVANCED THREAT TRAINING SYSTEM

1. Background. ANG cyberspace operations units need the ability to create complex training environments using advanced threat intelligence. The Advanced Threat Training System (ATTS) is highly adaptive and can replicate multiple types of networks, environments, and advanced adversary threats. This capability provides the flexibility to change from one environment to another rapidly and allow for hardware in the loop. This system integrates into a kinetic and non-kinetic operational training infrastructure environment. The system will provide visualization for commanders and decision-makers to determine if objectives are met. Additionally, ATTS allows for testing and utilization of classified tactics, techniques, and procedures and tools. The ATTS must be fully accredited and meet all Risk Management Framework requirements to operate up to TOP SECRET, and function without the requirement for a license, subscription fee, or internet connectivity. Each of the 20 cyberspace operations units require one ATTS.

2. Program Details.

Quantity	Unit Cost	Program Cost
20 ATTS (3080)	**$400,000**	**$8,000,000**
Total		**$8,000,000**

CYBER: CLOUD CYBER OPERATIONS PLATFORM

1. Background. ANG cyberspace operations (CO) units require an agile, minimal footprint, off-Department of Defense information network cloud based capability for executing Defense Support to Civil Authorities (DSCA) missions, domestic mission partner taskings, and State Partnership Program events. Cloud-based operations will prevent limited existing hardware from being "burned", near-instant software deployments and reduced operations and maintenance costs. Cloud-based systems are agile and allow adversary engagement from geographically separated locations while maintaining collaboration between operators and analysts. The ability to maneuver and engage from a cloud-based network will frustrate adversary intelligence, surveillance, and reconnaissance collection of Blue Force operations by obfuscating the defensive cyber operations presence. The Cloud-based solution will be matrixed across a minimum of three cloud service providers (CSP) utilizing internet protocol security tunnels or similar National Institute of Standards and Technology approved crypto tunneling. Cloud services are CSP agnostic to allow for maximum flexibility in matrixing the CSP solutions and provide rapid deployment and reconstitution in less than 30 minutes. A single Cloud Cyber Operations Platform can simultaneously support a single mission element or all 20 CO Squadrons, which is not currently possible with existing hardware.

2. Program Details.

Quantity	Unit Cost	Program Cost
1 Domestic Cyber Mission Systems Cloud (3080)	**$14,000,000**	**$14,000,000**
Total		**$14,000,000**

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Security Forces

- **ANG Security Forces Units Provide 7% of the Total Force**
- **Integrated Base Defense**
- **Combat Arms Support**
- **Law Enforcement**

Air National Guard security forces include over 7,755 defenders from all wings in each of the 54 states and territories. Security forces protect and support worldwide contingencies and home station installations.

The security forces missions include: installation access control, base defense, asset security, suspect apprehension and detention, high-risk vehicle inspections, heavy weapons support with military operations in urban terrain, mounted and dismounted individual and team patrols, convoy operations, detainee movement operations, personal security details, fly-away security, Raven tasking, close precision engagement teams, active shooter response, and weapons qualifications through combat arms.

Security Forces
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Critical Capabilities List

- Counter-Small Unmanned Aircraft System Defense Platform
- Modular Small Arms Ranges
- Climate Clothing System
- Improved Modular Ballistic Protection System
- Enhanced Communication and Hearing Protection System

Essential Capabilities List

- M18 Block II Kit (Optical Sight System, Illuminator and Holster)
- PVS-31C Systems
- Enhanced Explosives, Narcotics and Chemical Detections System
- Integrated Base Defense Sensor Fusion and Analytics System (Enhanced Base Defense Operations Center [BDOC])
- Individual First Aid Kit (IFAK)

Desired Capabilities List

- Personnel-Based Weight Distribution System
- Portable Intrusion Detection Sensor & Alarm Annunciator
- Vehicle Payload/Undercarriage Inspection System
- Directed-Radiation Less-Than-Lethal System (Laser Hailing and Signaling with requisite eye protection)
- Improved System for Access and Entry including Final Denial

SECURITY FORCES: COUNTER-SMALL UNMANNED AIRCRAFT SYSTEM DEFENSE PLATFORM

1. Background. ANG Security Forces requires implementation of a counter small unmanned aircraft system (C-sUAS) in order to defend vital installation assets. Presently, ANG lacks the capability to detect, identify, track, and defeat the most common small unmanned aircraft system (sUAS) threats. Currently, SF does not possess the equipment, the associated training, or the ability to detect and mitigate threats from sUAS. The employment of a system that is able to minimally detect sUAS platforms, identify platforms, and subsequently mitigate a threat sUAS, will enable SF to execute its integrated base defense mission and protect resources vital to national security. The system should identify most commonly known sUAS electronic signatures, be able to receive upgrades as technology matures and new sUAS platforms are released, and integrate into a common command and control system. C-sUAS will require redundant radar capability in order to detect sUAS platforms not currently catalogued. There are 27 remaining ANG locations requiring the platform.

2. Program Details.

Quantity	Unit Cost	Program Cost
27 C-sUAS Platforms (3080)	**$400,000**	**$10,800,000**
Total		**$10,800,000**

SECURITY FORCES: MODULAR SMALL ARMS RANGES

1. Background. ANG Combat Arms (CA) personnel need a Modular Indoor Containerized Range (MICR) that will provide a fully enclosed zero surface danger zone and vertical danger zone environment allowing personnel to train and qualify safely 365 days a year, day and night regardless of external environmental conditions. With the MICR, CA personnel will ensure all of the Air Force's assigned combat personnel, an average of over 250 personnel per installation, will receive weapons qualification training in a timely and cost-efficient manner. Additionally, personnel assigned to a deployable Unit Type Code must qualify once every three years to meet Category B requirements, resulting in a minimum 33 percent increase in personnel requiring scheduled weapons qualification. The ANG has 28 installations with a small-arms range and none are compliant with the updated UFC 479-2 for Small Arms Range Design and Construction. The need for a modular small arms range is magnified because out of the remaining 25 ranges, eight are permanently closed, and 17 others are in a state of degraded operations. Those degraded ranges are currently operating with waivers until repairs become too costly or waivers are withdrawn and they will be closed. The remaining installations lack organic range capability and must find offsite locations to train and qualify. For most ANG wings, this involves lengthy preparation and travel time for both CA personnel and ANG wings-member while also incurring a substantial cost for travel and/or range time. Currently, there are nine employed modular small arms ranges; 17 additional ranges will allow for weapons qualifications to continue while base Civil Engineers program for new ranges to be constructed using Military Construction.

2. Program Details.

Quantity	Unit Cost	Program Cost
17 Small Arms Ranges (3080)	**$4,500,000**	**$76,500,000**
Total		**$76,500,000**

SECURITY FORCES: CLIMATE CLOTHING SYSTEM

1. Background. ANG Security Forces require a modernized duty-specific all-weather layered climate clothing system to provide Defenders enhanced ability to adapt to demands ensuring performance and survivability in various environments. Defenders currently do not have an enterprise-wide solution to prevent extreme hot/cold weather-related injuries in all climate conditions. This requirement narrows a capability gap that presently exists and does not afford Defenders proper protection to their entire body, such as head, torso, lower body, and extremities. These systems must provide Defenders dexterity, mobility, and accessibility to required duty equipment. A multi-component and scalable climate clothing system allows Defenders to be equipped for current mission tasking and adapt to future operational environments. One layered climate clothing system is required for each Security Forces member.

2. Program Details.

Quantity	Unit Cost	Program Cost
7,755 Layered Climate Clothing Systems (3080)	**$3,100**	**$24,040,500**
Total		**$24,040,500**

SECURITY FORCES: IMPROVED MODULAR BALLISTIC PROTECTION SYSTEM

1. Background. ANG Security Forces (SF) requires modernized body armor to provide SF personnel with the capability to improve Defender survivability and reduce chronic life-long injuries. Defenders are subjected to prolonged duty periods and experience significant physical stressors compounded by the persistent wear of 35 pounds affixed to the shoulders and hips. Each pound of excess weight exerts approximately four pounds of additional pressure on the back, hips, knees, and ankles when walking; six pounds of additional pressure when climbing stairs; and eight pounds of additional pressure when running. As such, Defenders are prone to chronic lower back and hip injuries and experience the same at a rate that exceeds all career fields throughout the USAF, which has placed a detrimental impact on SF readiness. To preserve the already strained manpower in the SF field, armor must integrate with current SF duty gear programs of record to include lightweight front, back, and side plates and must be multi-hit capable to defeat the most prevalent threats on the battlefield to include enhanced performance/armor defeating rounds. Additionally, to prevent separate armor systems for garrison and deployment use, the armor system must protect the same standard of the Modular Scalable Vest. This includes a ballistic combat shirt, blast pelvic protector, deltoid, throat, neck, abdomen, and lower back protection, with a stand-alone concealable carrier. One individual body armor kit is required for each Security Forces member.

2. Program Details.

Quantity	Unit Cost	Program Cost
7,755 Individual Body Armor Kits (3080)	**$4,000**	**$31,020,000**
Total		**$31,020,000**

SECURITY FORCES: ENHANCED COMMUNICATION AND HEARING PROTECTION SYSTEM

1. Background. ANG Security Forces requires an improved modular communications and hearing protection system. This system must adapt to current and future handheld communications equipment, feature noise-canceling, and be both gas mask and helmet-compatible in a low-profile inner ear configuration. The system must protect hearing to the level of ANSI S3.19-1974 and provide greater than 20 dB of attenuation. Security Forces requires a model that would assist with increased hearing protection without sacrificing clear communication within the team. Having a headset that expeditiously converts from a single-ear device for discrete law enforcement communications to a dual headset for high-noise environment operations. This provides hearing protection that will greatly increase Security Forces capabilities over current systems while increasing 360-degree situational awareness and reducing noise-related injuries. The standard system is required for 95% of Security Forces members that are issued headsets, while a custom option must be available for the remaining 5%.

2. Program Details.

Quantity	Unit Cost	Program Cost
7755 Dual Ear Hearing Protection Headsets (3080)	**$940**	**$7,289,700**
7755 Communications Systems Accessories (3080)	**$1,300**	**$10,081,500**
Total		**$17,371,200**

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Explosive Ordnance Disposal

The ANG has 17 explosive ordnance disposal (EOD) flights. These units are uniquely trained and equipped to facilitate explosive operations during joint wartime missions. In the deployed environment, EOD operators routinely defeat improvised explosive devices (IED), render safe unexploded ordnance (UXO), perform route clearance operations, conduct post-blast analysis, evidence collection, and embed with special operations forces. Furthermore, EOD technicians must also be prepared to respond to incidents involving chemical/biological weapons, weapons of mass destruction (WMD), and nuclear weapons.

EOD technicians perform an extremely dangerous military mission and must continually adapt their equipment and technology to meet their their adversaries' ever-changing tactics. The breadth and variety of IEDs/UXOs/WMDs encountered by EOD technicians in the field forces units to maintain many single-purpose items while simultaneously staying at the forefront of technology. Technological advancement within the EOD program is imperative to match the advancements of our enemies.

Explosive Ordnance Disposal
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Critical Capabilities List

- Dual Arm Manipulator Robotic Attachment
- Communication Accessory Standardization
- Short-range EOD Recon Platform (UAS)
- M4A1 Close Combat Enhanced Lethality Modification
- Chemical Warfare Personal Protective Equipment Modernization

Essential Capabilities List

- Modernized night vision with thermal fusion and heads-up capability
- Multi-threat Counter-Improvised Explosive Device Electric Counter-Measure System
- Lightweight Dual Sensor Mine Detector
- EOD MANET Communications Solution
- Augmented/Virtual Reality Training Simulators

Desired Capabilities List

- 3 Dimensional scanning for Ordnance Identification
- State-of-the-Art High Mobility EOD Robot
- Tier 2 Physical Training Support Package
- Constant Potential Portable X-Ray Generator
- Modernized EOD Disruptor

EOD: DUAL ARM MANIPULATOR ROBOTIC ATTACHMENT

1. Background. ANG explosive ordnance disposal (EOD) units require an updated robotic arm attachment with more precise manipulation capability to replicate human dexterity better. While the safest method is to remain remote, current robotic limitations require the EOD Operator to get close to an improvised explosive device (IED) to perform delicate or complicated actions. Current remote platform manipulators are robust, able to make gross movements, lift relatively heavy loads. A dual arm manipulator robotic attachment will allow the robot operator to perform previously not achievable actions. Access to such a platform will greatly increase the safety and efficiency of any ANG EOD team during reconnaissance and execution of IED operations. ANG requires 19 total systems, one for each of the 17 ANG EOD flights and two to support regional training sites.

2. Program Details.

Quantity	Unit Cost	Program Cost
19 Dual Arm Manipulator attachments (3080)	**$250,000**	**$4,750,000**
Total		**$4,750,000**

EOD: COMMUNICATION ACCESSORY STANDARDIZATION

1. Background. ANG explosive ordnance disposal (EOD) personnel require a standardized kit to integrate existing communication platforms with all mission sets effectively. Currently, the PRC-152/A is the primary means of communication for overseas operations and a wide variety of platforms are used for stateside operations. EOD personnel require an auxiliary communications integration kit that provides them with multiple headset solutions that can be selected based on the mission requirements. This kit must be compatible with existing and next-generation communications platforms, to include military and civilian systems. The kit must also provide hearing protection for the EOD operators. ANG EOD requires 155 kits, distributed across the 17 EOD units, one kit for each EOD professional.

2. Program Details.

Quantity	Unit Cost	Program Cost
155 Communication Accessory Kits (3080)	**$10,000**	**$1,550,000**
Total		**$1,550,000**

EOD: SHORT-RANGE EXPLOSIVE ORDNANCE DISPOSAL RECON PLATFORM

1. Background. ANG explosive ordnance disposal (EOD) technicians require an enhanced capability to conduct short-range situational awareness assessments of critical mission targets before sending a team into a potentially hazardous area. The use of short and medium-range optics and cameras limits the team to viewing a threat from a single line-of-sight, preventing a complete picture for comprehensive risk analysis. To increase situational awareness, a lightweight, compact, airborne sensor capable of creating a day or night 360-degree picture of the incident site is required. Each of the 17 EOD flights and two regional training sites require one system.

2. Program Details.

Quantity	Unit Cost	Program Cost
19 Short Range EOD Reconnaissance Platforms (3080)	**$70,000**	**$1,330,000**
Total		**$1,330,000**

EOD: M4A1 CLOSE COMBAT ENHANCED LETHALITY MODIFICATION

1. Background. ANG Explosive Ordnance Disposal (EOD) teams require significant improvements to the existing, standard-issue M4A1 carbine. Current weapon systems fielded by EOD teams fail to meet standards derived from Office of the Secretary of Defense task force studies, thereby impairing teams' lethality and ceding overmatch capabilities to peer and near-peer adversaries in over one-third of doctrinal EOD mission sets. The weapons modification would include a free-floating barrel, monolithic upper receiver, enhanced bolt carrier group, variable front focal plane optic, signature reduction device, and an improved trigger. These modifications would not involve changing any serialized components and would not constitute a wholesale weapon conversion. ANG EOD requires one kit per assigned weapon for all 17 flights.

2. Program Details.

Quantity	Unit Cost	Program Cost
155 M4A1 Modernization Kits (3080)	**$6,300**	**$976,500**
Total		**$976,500**

EOD: CHEMICAL WARFARE PERSONAL PROTECTIVE EQUIPMENT MODERNIZATION

1. Background. ANG Explosive Ordnance Disposal (EOD) teams require updated personal protective equipment (PPE) that protects against current and emergent chemical warfare agents (CWA). Current PPE is not effective against all CWAs and impedes the ability of EOD teams to conduct successful operations. The chemical warfare modernization kit should afford protection against all current CWAs, not require third-party additions to afford gross contamination protection, feature a reduced thermal burden on the wearer, and allow for wear for extended periods of time even while contaminated. Additionally, scalability is desired to allow EOD teams to wear PPE during full gamut of combat operations and avoid current undesirable tradeoffs (e.g., having to wear thick over boots and gloves that reduce dexterity and mobility). The kit includes a full PPE system sans a field protective mask that satisfies all levels of Mission Oriented Protective Posture (MOPP). ANG EOD teams require one kit per all operational personnel UTCs for all 17 flights.

2. Program Details.

Quantity	Unit Cost	Program Cost
155 Chemical Warfare PPE Kits (3080)	**$5,350**	**$829,250**
Total		**$829,250**