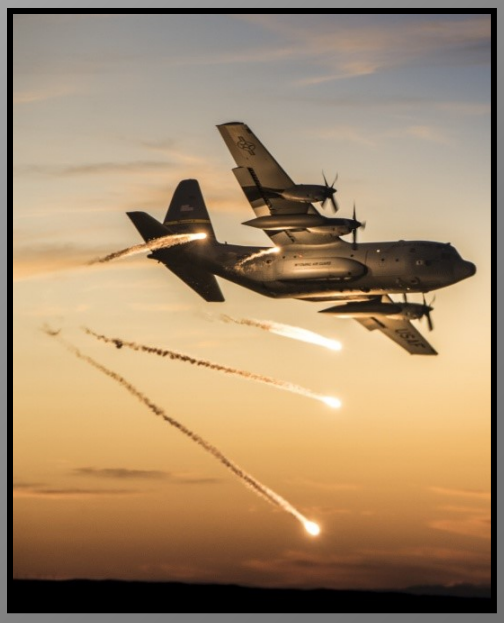
WEAPONS SYSTEMS MODERNIZATION PRIORITIES 2020



AIR NATIONAL GUARD

FOREWORD

Upholding the spirit of “Defend the Homeland-Global Warfighters”, modernizing Air National Guard (ANG) assets is more critical today than it has ever been to supporting our dual-use force. The necessity to continuously improve our aging assets is evidenced by simultaneous responses on U.S. soil during multiple rescue and recovery operations, while concurrently supporting deployments overseas to supplement Air Force Major Commands with combat-ready contingency forces in every corner of the world. The ANG is not only a National force, but a global force.

At the heart of the modernization process is the Air Reserve Component’s Weapons and Tactics Conference (WEPTAC), where deliberation amongst the experts in every major weapon system leads to industry engagement and implementation of off-the-shelf capabilities, directly influencing weapon system transformation.

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.

L. SCOTT RICE
Lieutenant General, USAF
Director, Air National Guard

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Introduction

The 2019 Air National Guard (ANG) Weapons Systems Modernization Priorities Book documents capability priorities identified during the October 2019 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 2019 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 2019.

State Matrix

Weapons System Reference Table by State (01 Dec 2019)

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																	
HI			•						•		•		AOC/BCC		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										Space			

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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 is able to 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 provides 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-cancelling, three-dimensional cockpit audio system, and an anti-jam embedded Global Positioning System.

A-10
2019 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
- 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

- All weather capability to Find / Fix / Target within a contested, degraded, and operationally limited environment
- Full AIM-9X integration
- Sensor system multi-spectral and system development
- Digital suspension equipment integration
- 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

Desired Capabilities List

- Integration of network enabled long-range / stand-off munitions
- Improved zero illumination night vision, capable of viewing in multiple spectrums
- Improved high-definition digital recording capability of all displays and sensors
- 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. ARC-210 connection refinements allow pilots to securely share data, including any ATP imagery, with Joint Terminal Attack Controllers. These actions reduce the likelihood of fratricide and collateral damage. Coupling high-resolution displays with broadband uplink will allow aircrew to broadcast high-definition real-time data enabling decision makers to expedite the kill chain. 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**
25 Targeting Pod Color Upgrades (3010) * **	**$500,000**	**$12,500,000**
Total		**$59,980,000**

* Includes 10% spares

** Quantities and Program Costs are shared with F-16s (see F-16 Information Paper)

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, improved chaff program development, and integration with digital radio frequency memory (DRFM) jamming pods. 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 EW kit and advanced IRCM system.

2. Program Details.

Quantity	Unit Cost	Program Cost
EW Architecture Non-Recurring Engineering (NRE) (3010)	**N/A**	**$7,000,000**
94 EW Kits (3010) *	**$50,000**	**$4,700,000**
ALR-69A RWR NRE (3010)	**N/A**	**$5,000,000**
Advanced IRCM System NRE (3010)	**N/A**	**$10,000,000**
94 Advanced IRCM Systems (3010) *	**$600,000**	**$56,400,000**
Total		**$83,100,000**

* 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 in order 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: 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 enables 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. Smart triple ejector rack (TER) modifications permit carriage of additional Global Positioning System-guided munitions. Maintenance personnel at each of the four units require specialized equipment to support aircraft at austere locations. This equipment includes Night Vision Goggles (NVG), NVG storage cases, infrared headlamps, integrated helmet and headsets with noise cancelling boom microphones and wireless intercom system, and secure-capable tactical radios. 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)	**$81,515**	**$10,433,920**
Smart TER NRE (3010)	**N/A**	**$2,000,000**
Total		**$13,433,920**

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 Satellite Communications (SATCOM), Three-Dimensional (3D) audio, enhanced data link. Two ARC-210 Generation (Gen) 6, Mobile User Objective System (MUOS) multi-mode digital radios with SATCOM capability meet the need for simultaneous beyond-line-of-sight and secure line-of-sight communications. The integration of noise-cancelling 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 increases the pilot's ability to process information simultaneously arriving from multiple radios and warning systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
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**
ARC-210 Gen 6 MUOS Capable Radios NRE (3010)	**N/A**	**$3,000,000**
94 ARC-210 Gen 6 MUOS Radios (3010) *	**$850,000**	**$79,900,000**
Total		**$97,360,000**

* Includes 10% spares

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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, 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
2019 Weapons and Tactics Conference

Critical Capabilities List

AOC

- Weapon System Modernization
- Data Link Training Tool (See Tab Q)
- Secure Voice Capability
- Single Pane of Glass Display Capability
- Mission Defense Team Equipment and Training

BCC

- Integrated Fire Control
- National Capital Region Camera Modernization
- Beyond Line of Sight High Frequency Capability
- Command and Control Training Next (See Tab Q)
- Advanced Ecosystem Integration

CRC

- Next Generation Long Range Radar
- TPS-75 Radar Modernization
- Electronic Attack Training Suite (See Tab Q)
- Remote Radar and Voice Communications Integration
- Integrated Recording, Playback, and Debriefing Suite

Essential Capabilities List

AOC

- Redundant Independent Circuit Path
- Multi-National Forces Systems
- Joint Worldwide Intelligence Communications System with VTC
- Cross-Domain Common Operating Picture/Common Intelligence Picture
- STO and SAP Capability Modernization

BCC

- Unmanned Aircraft System Detection
- Advanced Data Link Upgrade
- Wide Area Surveillance
- Advanced Data Visualization Capability
- 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
- Link 16 and Future Links Capable Training Suite

Desired Capabilities List

In an effort 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 Kessel Run / Pathfinder initiative is revolutionizing the way the Air Force develops, tests, employs, and updates AOC mission software, making it accessible by the Block 20 Weapon System through the cloud. To ensure redundant capability and connectivity, especially in a degraded mission environment, Pivotal Cloud Foundry (PCF) server racks hosting the Block 20 Weapon System will also be based at nine different geographic nodes [e.g. 603rd AOC in United States Air Forces in Europe (USAFE)]; however, the current plan does not include fielding PCF server racks for ANG units. Instead, ANG units are expected to access the weapon system through the cloud without local hardware. This poses a potential mission degradation challenge for ANG AOC units accessing the cloud in a conflict where the cyber-enabled environment is contested and/or degraded. This upgrade will be for six ANG AOCs, which support active component AOCs located outside of the Continental United States.

2. Program Details.

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

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, 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. An 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 EQUIPMENT AND TRAINING

1. Background. ANG Air Operations Centers require mission defense team (MDT) equipment and training to maintain readiness for their assigned AOCs and to protect their local weapon systems (WS) from compromise by peer adversaries in continually contested environments. Program Action Directive (PAD) 10-2 directs ANG units to train to the same standard as their aligned active-component AOC, requiring ANG-aligned systems to match as closely as possible. As the active-component AOCs only have the manpower to sustain normal phase one daily operations, they rely heavily on the ANG to augment them during increased tempo operations. Without these MDT toolkits, the AOC will not be able to meet the four Air Force information dominance strategic goals. The Air Force AOCs are utilizing the ANG WSs for training and distributed operations requiring the same level of data integrity, availability, and non-repudiation of the active duty AOCs. This capability and training is required for the six ANG AOCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 Weapon System MDT Equipment Kits (3080)	**$645,000**	**$3,870,000**
Total		**$3,870,000**

BCC: INTERGRATED FIRE CONTROL

1. Background. ANG Battle Control Centers (BCC) require a remote capability to enable the engagement of enemy aircraft and cruise missiles in a sensor saturated environment. Integrated Fire Control (IFC) technology, derived from the fusion of advanced sensors at the BCC, increases the combat capability of the joint force to execute the joint engagement sequence. Each BCC facility requires the ability to take advantage of advanced sensor fusion to generate a weapons quality track and forward it to airborne or ground assets executing the homeland defense mission. The solution is to outfit two of the ANG BCCs with an IFC capability that aligns it with parallel IFC development of the other command and control weapons systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 IFC Systems (3080)	**$275,000**	**$550,000**
Total		**$550,000**

BCC: NATIONAL CAPITAL REGION CAMERA MODERNIZATION

1. Background. ANG Battle Control Centers (BCC) require a modernized Enhanced Regional Situational Awareness (ERSA) System at the Joint Air Defense Operation Center (JADOC) to provide continuous support of the BCC mission. This system includes: all-weather, high definition (HD) electro-optical (EO)/infrared (IR) sensors; a network architecture that transmits HD sensor imagery in its native format; and an improved ERSA user interface. Additionally, the network architecture from the EO/IR sensors to the ERSA user interface must be updated. Without an updated architecture, new sensors cannot provide true HD imagery to the warfighter. A modernized user interface enables the operator to effectively acquire and track aircraft. The ANG National Capital Region camera system, consisting of eight HD visual warning system (VWS) cameras, 11 HD cameras, HD supported bandwidth architecture, hardware installation packages, and a modernized ERSA user interface software are required at the JADOC.

2. Program Details.

Quantity	Unit Cost	Program Cost
8 HD VWS Cameras (3080)	**$800,000**	**$6,400,000**
11 HD Cameras (3080)	**$200,000**	**$2,200,000**
1 HD Supported Bandwidth Architecture (3080)	**$1,900,000**	**$1,900,000**
1 Hardware Installation Package (3080)	**$1,000,000**	**$1,000,000**
1 ERSA User Interface Software (3080)	**$1,500,000**	**$1,500,000**
Total		**$13,000,000**

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: ADVANCED ECOSYSTEM INTEGRATION

1. Background. ANG Battle Control Centers (BCC) require enhanced situation awareness for aerospace warning and control, as well as the ability to ingest and fuse raw sensor data and apply machine learning/artificial intelligence (ML/AI) algorithms to support real-time domain awareness and warfighter decision-making. North American Aerospace Defense Command (NORAD) J6 is pathfinding its future data ecosystem to transform its existing "detect and defeat" mechanisms against enemy aggression. The NORAD & US Northern Command homeland defense mission is dependent on large amounts of data attained, derived, and processed from many disparate sources. The solution will be leveraging command and control architecture to support warfighter applications and improve decision making through ML/AI initiatives within the command's multi-domain missions. The solution will lay the foundation for future multi-domain operations and for improved data-driven decision making through enhanced data quality across the DoD enterprise. Ecosystem workstations are needed for each of the four BCCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
34 Ecosystem Workstations (3080)	**$1,200,000**	**$4,800,000**
Total		**$4,800,000**

CRC: NEXT GENERATION LONG RANGE RADAR

1. Background. ANG Control and Reporting Centers (CRC) need to augment their primary radar with a highly mobile next generation long-range radar that provides 360-degree coverage and the capability to detect low observable threats, unmanned aerial systems, and cruise missiles. 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. A mobile system with this technology provides high target sensitivity, large elevation angle coverage, high target update rate, and multiple beam and waveform flexibility. The system will provide the CRC the ability to generate target quality data that can be distributed real-time through links to key decision-makers and weapons platforms throughout the area of operations expediting the prosecution of threats. One Long Range Radar is required for each of the 10 ANG CRCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 Next Generation Long Range Radars (3080)	**$1,200,000**	**$12,000,000**
Total		**$12,000,000**

CRC: TPS-75 RADAR MODERNIZATION

1. Background. ANG Control and Reporting Centers (CRCs) require the capability to keep the TPS-75 running until the implementation of the next generation long-range radar. The TPS-75 was unveiled in 1988 and has since exceeded its service life. Replacement parts are no longer available for this aged system, and delays with a new replacement radar have pushed the anticipated fielding beyond 2030. Key components of the TPS-75 radar need to be replaced or updated. The Control and Reporting Center depends on the TPS-75 to provide long-range surveillance and execute core command and control functions. Updating the radar's components and reinstating the ability to order modernized or replacement parts for the TPS-75 will allow the system to remain operational until fielding of the replacement radar. One TPS-75 modernization kit is needed for each of the ten CRCs.

2. Program Details.

Quantity	Unit Cost	Program Cost
11 TPS-75 Modernization Kits (3080)*	**$5,000,000**	**$55,000,000**
Total		**$55,000,000**

* Includes 10% spares

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: INTEGRATED RECORDING, PLAYBACK, AND DEBRIEFING SUITE

1. Background. ANG Control and Reporting Centers (CRC) require a integrated video and audio recording and playback suite to facilitate post mission reconstruction and debrief analysis. CRCs currently do not possess an effective ability to conduct timely reconstruction and mission analysis. This capability gap hinders the capture of flight safety, lessons learned, mission objectives, and training requirements. CRCs must be able to capture data from screens and cameras at full resolution with integrated controller communications and stream while recording to direct clients via a local network. The solution will need to support all applicable video formats. Additionally, the capability must include a standalone secure playback computer for mission analysis, capable of being displayed on a multiple personal workstations or TV/Projector for larger crew analysis and teaching. An integrated recording, playback, and debriefing suite is needed for each of the ten CRC units.

2. Program Details.

Quantity	Unit Cost	Program Cost
10 Integrated Recording, Playback, and Debriefing Suites (3080)	**$167,000**	**$1,670,000**
Total		**$1,670,000**

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
2019 Weapons and Tactics Conference

Critical Capabilities List

- Mobility Air Forces Common Carry Radio Frequency / Infrared Self-Protection Pod
- Integrated Defensive Systems for Common Mobility Air Forces Mission Computer
- Secure High-Speed Global Data
- Enhanced Data-Sharing Capability for Electronic Flight Bag Application
- Audible G-State Awareness

Essential Capabilities List

- Automated-Hardened Position, Navigation and Timing Solution
- Synthetic Head-Up Display
- Three-Dimensional Audio Capability
- Fifth Mission Computer Display in Center Pedestal
- 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: MOBILITY AIR FORCES COMMON CARRY RADIO FREQUENCY / INFRARED SELF-PROTECTION POD

1. Background. The ANG C-17 fleet requires a common carry open-architecture mission pod capable of supporting the current networked architecture and flexible enough to be quickly modified to address the ever-changing contested environments. The C-17 fleet does not currently have an on-board capability to detect or defend against electronic threats. 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 modern 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. C-17 aircraft have inadequate missile-launch detection capabilities, nor the ability to detect, degrade, and defeat the current generation of infrared (IR) man-portable air defense systems. Modular defensive systems provide a method for low-cost, simplified improvements to IR detection and suppression capabilities, degrading the enemy's ability to engage C-17 aircraft. The open-architecture mission pod will provide capacity for electronic attack/electronic protection, standoff acquisition and objective area assessment through the use of the AN/AAQ-24 Large Aircraft IR Countermeasures (LAIRCM). 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. Additionally, the C-17 fleet requires hard-points to carry two MAF common carry pods. All 50 ANG C-17s require LAIRCM and RWR group A and B kits. Each ANG C-17 unit requires two 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: INTEGRATED DEFENSIVE SYSTEMS FOR 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.

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**
Total		**$101,575,000**

* Includes 10% spares

C-17: SECURE HIGH-SPEED GLOBAL DATA

1. Background. ANG C-17 aircraft require an onboard capability to access secure and unsecure 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 unsecure 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: ENHANCED DATA-SHARING CAPABILITY FOR ELECTRONIC FLIGHT BAG APPLICATION

1. Background. ANG C-17 aircrews require the ability to share flight planning and fleet management data between devices. The Electronic Flight Bag (EFB) application has the ability to program highly reliable aircraft fuel consumption, vertical profile optimization, fleet management, and flight plan creation and filing. Enhanced data-sharing capability between EFBs enables ANG units to maintain secure databases with aircraft information and unique performance characteristics and securely transfer information to other crewmembers' EFBs for in-flight use. Centralized database management reduces data entry errors leading to cancelled flight plans by air traffic control, and inconsistent/flawed fuel planning. This enhanced capability incorporates access to situational awareness tools such as Digital Automated Terminal Information Service, Integrated Military Training Routes, and enhanced aircraft performance profiles for timing and fuel planning. All ANG C-17 aircrew members require an enhanced data-sharing electronic flight bag application.

2. Program Details.

Quantity	Unit Cost	Program Cost
800 Enhanced Data Sharing Kits for EFB (3010)	**$300**	**$240,000**
Total		**$240,000**

C-17: AUDIBLE G-STATE AWARENESS

1. Background. ANG C-17s require an audible tone or warble to enhance crew awareness that the aircraft is approaching a structural G-limit . Data indicates that increased emphasis on tactical maneuvering may be leading to an increase in structural limit exceedances. The current display is not dynamic, nor readily visible in the pilot's line of sight while maneuvering, and is merely a monochromatic display of the current G-state. An audible tone would inform the pilot that a G-limit exceedance is approaching and an increase and decrease in aural pitch could indicate whether the pilot is responding correctly. If a structural G-limit is reached or exceeded, the aural tone will inform the crew immediately to avoid further potential for structural damage. The G-limit would be dynamic to aircraft weight, configuration and symmetric/asymmetric structural exceedances. All 50 ANG C-17s require an audible G-state awareness system.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non Recurring Engineering (3010)	**N/A**	**$3,000,000**
50 Audible G-State Awareness Systems (3010)	**$250,000**	**$12,500,000**
Total		**$15,500,000**

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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

- Mobility Air Forces Common Carry Radio Frequency / Infrared Self-Protection Pod
- Integrated Defensive Systems for Common Mobility Air Forces Mission Computer
- Propulsion System Upgrades
- Global Airspace Compliant Avionics/Instrumentation and Associated Training Devices
- Single-Pass Precision Airdrop

C-130J

- Mobility Air Forces Common Carry Radio Frequency / Infrared Self-Protection Pod
- Integrated Defensive Systems for Common Mobility Air Forces Mission Computer
- Self-Contained Contested Training Suite
- Updated Avionics Suite for Global Airspace Access
- APN-241 Radar Upgrade

Essential Capabilities List

C-130H

- Engine Infrared Suppression
- High-Speed Ramp/Door
- Special Mission Processor
- Space Jam 2 Go for Contested, Degraded, and Operationally Limited Environment Training
- Improved Dual-Mode External Light-Emitting Diode Lighting

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

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

C-130H: MOBILITY AIR FORCES COMMON CARRY RADIO FREQUENCY / INFRARED SELF-PROTECTION POD

1. Background. The ANG C-130H fleet requires a common carry open-architecture mission pod capable of supporting the current networked architecture and flexible enough to be quickly modified to address the contested environments. Mobility Air Forces (MAF) C-130H aircraft have inadequate missile-launch detection and ability to detect, degrade and defeat infrared (IR) man-portable air defense systems (MANPADS). The Block 30 AN/AAQ-24 Large Aircraft IR Countermeasures (LAIRCM) system improves detection against advanced MANPADS threats, while degrading the enemy's ability to engage C-130H aircraft. To survive in modern combat, C-130H aircraft require a radar warning receiver (RWR), with geolocation ability, capable of processing signals in a dense radio frequency (RF) environment that automatically directs countermeasures to defeat those threats. The open-architecture mission system will provide additional capacity for electronic attack / electronic protection, standoff acquisition and assessment of drop zones / landing zones, and beyond line-of-sight communication with ground force commanders. 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. Only 24 C-130H1 aircraft have ALR-69A installed, leaving the remainder of the fleet without this capability. The MAF common carry active RF/IR self-protection 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 ALR-69A 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**
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		**$758,475,000**

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

1. Background. The ANG C-130H fleet requires comprehensive and networked battle space awareness. The real-time information in the cockpit (RTIC) system allows C-130 aircraft to participate on multiple data link networks using technologies fielded on other Department of Defense assets. The system must provide growth capability for future tactical data link networks. 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. Lastly, the integration of noise-cancelling and three-dimensional (3D) audio in the cockpit increases situational awareness by spatially separating aural warning and radio signals, such as angular threat information or terrain awareness cues. All 134 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**
134 AIECS Kits (3010)	**$150,000**	**$20,100,000**
Directional Audio NRE (3010)	**N/A**	**$5,000,000**
134 3D Audio Kits (3010)	**$50,000**	**$6,700,000**
Total		**$41,800,000**

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: GLOBAL AIRSPACE COMPLIANT 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, and will be out of compliance with the Communications, Navigation and Surveillance/Air Traffic Management 2020 mandate if not modernized. Additionally, tactical night operations continue to suffer with non-night vision imaging system (NVIS) compliant lighting. In order to eliminate critical sustainment issues due to diminishing manufacturing sources (DMS) this modernized cockpit will include: a multifunction engine instrument display system (EIDS), automatic dependent surveillance-broadcast (ADS-B), NVIS compatibility, and a modern flight management system with global positioning system approach and polar navigation capabilities. An NVIS-compatible and modernized glass cockpit, to include digital overhead panel, reduces crew workload, lowers maintenance costs and increases capability and sustainability to operate safely at night. Additionally, C-130H1 aircraft are unable to monitor or transmit on two separate very high frequency (VHF) channels simultaneously. This forces aircrews to go "off frequency" with air traffic control to receive weather updates in congested airspace. Adding a second VHF antenna to the ANG C-130H1 aircraft will eliminate the need to go "off frequency" and enable aircrews to monitor/transmit on two VHF channels simultaneously. All 134 C-130H models require updated avionics kits, digital overhead panels and NVIS compatibility kits. To facilitate conversions to a modernized cockpit suite, all 12 units require access to Distributed Mission Operations capable, level 6 or higher, aircrew training devices. 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**
134 Avionics Kits (3010)	**$2,800,000**	**$375,200,000**
134 NVIS Compatibility Kits (3010)	**$465,000**	**$62,310,000**
12 Aircrew Training Devices (3010)	**$14,000,000**	**$168,000,000**
134 Digital Overhead Panels (3010)	**$60,000**	**$8,040,000**
24 VHF Radio Antennas (3010)	**$50,000**	**$1,200,000**
Total		**$664,750,000**

C-130H/J: SINGLE-PASS PRECISION AIRDROP

1. Background. The ANG C-130H/J fleet requires the ability to accurately deliver airdrop loads in combat in both instrument and visual meteorological conditions (IMC/VMC). The United States Army's objective for airdrop accuracy is 50 meters circular error average, but traditional methods only provide 300-meter accuracy. Current precision airdrop (PAD) methods require multiple passes over the drop zone, increasing exposure to threats. Effective PAD operations require early identification of the drop zone by the flight crew, real-time airdrop damage estimates, real-time wind sensing (altitude to surface), displayed continuously computed impact point and launch acceptability region, and post-drop assessment. ANG C-130H/J aircraft require aircraft upgrades coupled with 77 rotatable targeting pods and off-board cueing to provide a highly-accurate all-weather single-pass airdrop capability to support domestic and contingency operations.

2. Program Details.

Quantity	Unit Cost	Program
77 Targeting Pods (3010)	**$2,000,000**	**$154,000,000**
Total		**$154,000,000**

C-130J: MOBILITY AIR FORCES COMMON CARRY RADIO FREQUENCY / INFRARED SELF-PROTECTION POD

1. Background. The ANG C-130J fleet requires a common carry open-architecture mission pod capable of producing mission enhancement effects in contested environments. Mobility Air Forces (MAF) C-130J aircraft have inadequate missile-launch detection and ability to detect, degrade and defeat infrared (IR) man-portable air defense systems (MANPADS). The Block 30 AN/AAQ-24 Large Aircraft IR Countermeasures (LAIRCM) system improves detection against advanced MANPADS threats, while degrading the enemy's ability to engage C-130J aircraft. To survive in modern combat, C-130J aircraft require a radar warning receiver (RWR), with geolocation ability, capable of processing signals in a dense radio frequency (RF) environment that automatically directs countermeasures to defeat those threats. The open-architecture mission pod will provide additional capacity for electronic attack / electronic protection, standoff acquisition and assessment of drop zones / landing zones, and beyond line-of-sight communication with ground force commanders. Increased situational awareness is needed to correlate on-board and off-board threat detection, terrain masking, and optimized dynamic rerouting capabilities to minimize exposure to threats. All 16 ANG C-130Js need to be wired with LAIRCM and next generation RF Group A kits. Group B kits will be procured for half of the ANG C-130J fleet. Two common carry pods are required at each of the two ANG C-130J units.

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) will provide global data link communications, secure beyond line-of-sight and line-of sight capabilities. RTIC offers a permanent modification to the aircraft and has the ability to change data link radios as mission needs arise. RTIC also includes an airborne executive processor, which offers a federated mission computer capability. In order to ensure units are able to effectively train, operate and deploy with secure global data link capability, all 16 ANG C-130J aircraft require this modification.

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 prior to encountering operational situations. The system also needs to account for aircraft position with respect to terrain in order 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 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: APN-241 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 APN-241 radar requires a technical refresh with 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 an upgraded APN-241 radar.

2. Program Details.

Quantity	Unit Cost	Program Cost
16 Upgraded APN-241 Radars (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 of 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). In order 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
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Critical Capabilities List

EC-130J

- Distributed Mission Operations Simulator (See Tab Q)
- Link 16
- Federated Defensive System Unit
- Multi-Mission Payload – Heavy
- Multi-Mission Payload – Heavy Long Range Broadcast System

HC-130J

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

LC-130H

- Propulsion System Upgrades
- Global Airspace Compliant Avionics/Instrumentation and Associated Training Devices
- Common Mobility Air Forces Computer
- Hardwired Iridium Flight Deck Communications
- 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

- Ground Moving Target Indicator/Synthetic Aperture Radar
- Electronic, Signals, and Communications Intelligence Collection Systems
- Fixed Wing Personnel Extraction System
- Improved Radio Frequency Countermeasures
- Enhanced Visibility in Scanner Positions

LC-130H

- Center Wing Box Replacement Program
- High Frequency Radios with Selective Calling
- Whiteout Condition Weather-Penetrating Visual Enhancement
- High-speed door
- Mobile User Objective System 6th Generation Satellite Communications

Desired Capabilities List

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

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 require a federated Defensive Systems Unit (DSU) capable of aligning with updated operation flight programs (OFPs), the ability to rapidly dispense chaff and flares, and 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 system's 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 active component 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 PAYLOAD – HEAVY

1. Background. The EC-130J requires a Multi-Mission Payload – Heavy (MMP-H) Communication Electronic Attack with Surveillance and Reconnaissance (CEASAR) pod. This device will expand the current EC-130J capabilities. Four of seven EC-130Js do not currently meet the electronic warfare (EW) needs of the Combatant Commanders. MMP-H will bridge the gap between current Commando Solo capabilities and future EW needs. The 193 Special Operations Wing requires five CEASAR pods for the four remaining Commando Solo aircraft.

2. Program Details.

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

EC-130J: LONG RANGE BROADCAST SYSTEM

1. Background. The EC-130J requires Long Range Broadcast System (LRBS) pods. Four of seven EC-130Js do not currently meet primary mission requirements for psychological operations broadcast. While not matching current Commando Solo capabilities, LRBS will enable an additional four aircraft to execute the primary mission task. The 193 SOW requires six LRBS pods for the four additional EC-130J aircraft, one for a maintenance spare, and one for a part task trainer.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 LRBS Pods (3010)	**$2,000,000**	**$12,000,000**
Total		**$12,000,000**

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 (3010)	**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 hard points 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 HC-130Js in the ANG. 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)*	**$1,300,000**	**$16,900,000**
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.

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 successfully 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 AIRPACE 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 with non-Night Vision Imaging System (NVIS) compliant lighting. In order to eliminate critical sustainment issues due to Diminishing Manufacturing Sources (DMS), 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, NVIS compatibility, and a modern flight management system with 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 NVIS-compatible and modernized glass cockpit reduces crew workload, lowers maintenance costs and increases capability and sustainability to operate safely at night. In order to produce a fully NVIS compliant aircraft, all L1 (H2) and L1A (H2.5) aircraft must receive the NVIS baseline TCTOs that modify the side panels and center console. There are 6 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**
6 NVIS TCTO Kits (3010)	**$50,000**	**$300,000**
10 NVIS Kits (3010)	**$465,000**	**$4,650,000**
Total		**$111,950,000**

LC-130: COMMON MOBILITY AIR FORCES MISSION COMPUTER

1. Background. ANG LC-130Hs require a robust, secure tactical data link (TDL). TDL provides a command and control (C2) 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, and hostile threat locations as well as allow integration through podded solutions. This increases the LC-130H's ability to effectively participate in network-centric battlespace. Recent operations have highlighted the need for comprehensive, networked C2 awareness, and integration of aircraft systems. Due to routine operations in the polar regions the LC-130H will need to upgrade to ARC-210 with voice capability and Generation 6 Mobile User Objective System satellite communications radios. A common Mobility Air Forces (MAF) mission computer will reduce communication transmission time and provide aircrew with the information necessary to adjust mission profiles in accordance with changing conditions and commander's guidance. All 10 ANG LC-130Hs require the common MAF mission computer.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**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		**$82,000,000**

LC-130: HARDWIRED IRIDIUM FLIGHT DECK COMMUNICATIONS

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 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 polar construction skiway team (PCST) equipment for the ski landing area control officer (SLACO) team. The 109AW established a UTC for a PCST and a SLACO team. These teams are required to forward deploy to remote areas, establish a forward operating base, and construct a skiway to support LC-130 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 be issued the same highly specialized extreme cold weather clothing. To be able to successfully build a skiway, equipment such as snow mobiles, 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 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, and 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
- Fifth-to-Fourth Generation Communications Gateway
- Increased Commercial / Military Beyond Line-of-Sight Internet Bandwidth Capacity
- Aircraft Engine Replacement
- Special Operations Forces-Integrated Situational Awareness Data Link

C-32B

- Gate Keeper Communication Management System
- Satellite-Based Augmentation System
- Enhanced Flight Vision System

C-40C

- High-Speed Data Upgrade
- Cabin Refurbishment

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 an 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 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 (NRE) (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. In addition, 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 on-board communications capacity. This forces the aircrew to reduce or shutdown communication channels in order 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. In addition, 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. In order 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: SPECIAL OPERATIONS FORCES – INTEGRATED SITUATIONAL AWARENESS DATA LINK

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 a number of ground forces, and is key to execution of multiple counter-air and counter-land missions. In order 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 battle space visualization between Link 16 and SADL participants for air-to-surface and air-to-air missions. In addition, 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. In addition, 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: GATE KEEPER COMMUNICATION MANAGEMENT SYSTEM

1. Background. The ANG C-32B mission requires a new communication management system (CMS). The CMS will replace the current system which fails to meet the dynamic needs of the Gate Keeper mission. The CMS will provide the needed flexibility, agility and ability to integrate with using units' communications platforms. The system will integrate existing C-32B communications capabilities into a single user interface. The system will be tailorable to the unique requirements of a given flying mission. One system is required for each of the two C-32Bs.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 CMS Integration (3010)	**$4,800,000**	**$9,600,000**
Total		**$9,600,000**

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. In addition, 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-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-40C: HIGH-SPEED DATA UPGRADE

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. 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: CABIN REFURBISHMENT

1. Background. ANG C-40Cs require a cabin interior refurbishment. ANG C-40s were delivered in the early 2000s and are in need of refurbishment. The custom seats are no longer produced and are not supported by the original manufacturer. 201st Maintenance is no longer able to repair every seat and aircraft have been dispatching on missions with inoperative seats. Additionally, the carpets, bulkheads, sidewalls, and bathrooms are in need of an updated Supplemental Type Certificate (STC). A cabin refresh with a new or amended STC is required across the C-40C fleet. This will enable the C-40C fleet to meet time-critical and persistent passenger mission requirements. All three ANG C-40s require a cabin interior refresh.

2. Program Details.

Quantity	Unit Cost	Program Cost
3 Interior Cabin Refurbishments (3010)	**$4,500,000**	**$13,500,000**
Total		**$13,500,000**

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. Active electronically scanned array (AESA) radars on ANG F-15C/Ds provide combatant commanders essential updated air superiority and homeland defense capability.

In FY19, ANG F-15s deployed overseas on multiple European and Pacific Theater Security Package taskings in support of Combatant Commander Taskings ensuring continued American air dominance presence in contested airspace throughout the areas of responsibility. ANG F-15s 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 improve 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 AESA radar, multi-spectral search and track technologies, electronic warfare and self-protection, a modern integrated cockpit, and next generation air-to-air weapons technology.

F-15
2019 Weapons and Tactics Conference

Critical Capabilities List

- Active Electronically Scanned Array Radar
- Full-Spectrum Electronic Warfare
- Multi-Spectral Search / Track / Identification / Target
- Modernized Cockpit via Upgraded Displays / Integrated Communications Suite
- Next Generation Air-to-Air Weapon

Essential Capabilities List

- Realistic Training Opportunities
- Agile Operational Flight Program Development
- High-Fidelity Networked Simulators at Air National Guard Bases
- Program Support for Joint Mission Planning System and Common Mission Debrief Program

Desired Capabilities List

- Air-Launched Hit-to-Kill Munition
- Crypto Loading Port Relocation
- Simulation Training Device Upgrade
- Beyond-Line-of-Sight Data Transfer Station

F-15: ACTIVE ELECTRONICALLY SCANNED ARRAY RADAR

1. Background. ANG F-15s require an Active Electronically Scanned Array (AESA) radar to increase detection and track ranges of airborne targets, and to improve identification capability. AESA radars give the F-15C/D multi-target track and attack capability, and vastly increase protection against advanced electronic attack from enemy systems. AESA radars are critical for Homeland Defense missions, enabling pilots to locate a target of interest in a saturated air traffic environment, as well as detect and track small, asymmetric threats. The currently-fielded APG-63(v)3 AESA meets or exceeds performance capabilities in these environments and, with no moving parts, has demonstrated a mean time between failure over 30 times greater than the APG-63(v)0. AESA is required prior to the fielding of Advanced Display Core Processor (ADCP-II). ADCP-II replaces the existing central computer in the F-15C/D aircraft, placing all F-15s on a single, common operating system with enough processing power and software agility to enable the next generation of advanced offensive and defensive systems such as the Eagle Passive Attack Warning Survivability System, and advanced joint data link systems. Thirty ANG F-15C/D aircraft still require the AESA upgrade.

2. Program Details.

Quantity	Unit Cost	Program Cost
16 F-15C(v)0 to (v)3 Conversion Kits (3010)	**$9,000,000**	**$144,000,000**
5 F-15D (v)0 to (v)3 Conversion Kits (3010)	**$9,000,000**	**$45,000,000**
9 F-15D (v)1 to (v)3 Conversion Kits (3010)	**$5,000,000**	**$45,000,000**
Total		**$234,000,000**

F-15: FULL-SPECTRUM ELECTRONIC WARFARE

1. Background. ANG F-15s require the Eagle Passive Active Warning Survivability System (EPAWSS) which will replace the functionally obsolete and unsupported Tactical Electronic Warfare System (TEWS) to enhance weapon system situational awareness and survivability against enemy threats. 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. This upgrade will significantly improve the F-15's capability to autonomously and automatically detect, identify, and locate radio frequency (RF) threats, as well as provide the ability to deny, degrade, deceive, disrupt, and defeat RF, electro-optical, and infrared threat systems in highly-contested environments through 2040. Due to an EPAWSS procurement funding reduction and prolonged installation schedule, multiple individual interim EW systems are immediately required in order 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); advanced Fiber-Optic Towed Decoy (FOTD) systems; and advanced expendables such as ALE-58 Back-of-Launcher (BOL) countermeasure dispensers. 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. Each ANG combat-coded squadron requires four BOL countermeasure missile rails for each of its 18 deployable aircraft. The ANG has procured 242 BOL rails.

2. Program Details.

Quantity	Unit Cost	Program Cost
F-15 EPAWSS Non-Recurring Engineering (3010)	**N/A**	**$416,000,000**
105 F-15 EPAWSS (3010)	**$8,000,000**	**$840,000,000**
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**
120 F-15 BOL Rails (3010)	**$50,000**	**$6,000,000**
Total		**$1,624,000,000**

* Includes 10% spares

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 in order 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: MODERNIZED COCKPIT VIA UPGRADED DISPLAYS / INTEGRATED COMMUNICATIONS SUITE

1. Background. ANG F-15Cs require replacement of legacy displays and controls. The current displays and communication/navigation functionality in the F-15C cockpit are based on outdated 1970s technology. The F-15C/D has experienced steady growth in capability and lethality in its 30+ years of combat-proven service due to the modernization of radars, weapons, and sensors, as well as the addition of data link and helmet-mounted cuing systems. Fully utilizing these enhancements requires a complex pilot vehicle interface (PVI), imposing a demanding workload on the pilot. With current and required future mission system upgrades, F-15C/D legacy displays and communication architecture are inadequate due to display size and resolution, outdated technology, and minimal audio integration. A 2007 Northern Command joint urgent operational need (JUON) for satellite communication (SATCOM) capability on Aerospace Control Alert (ACA) aircraft led to the hasty installation of the ARC-210 Generation 5 radio. The original intent was for this radio to be installed with a complementary single up-front control adjacent to the head-up display line-of-sight to avoid the degrading PVI related to three radio controls disbursed in three distinct cockpit locations. With the forthcoming Department of Defense-driven Multiple User Objective System (MUOS)-compatible SATCOM radio upgrade program for all ACA legacy fighters, the F-15 requires an up-front integrated radio controller to allow for more efficient control of its three or more radios. This integrated radio controller could be further integrated into the aircraft operational flight program (OFP) in order to also control navigation, identification friend or foe, datalink, and selected mission data information such as fuel management and time, distance, and endurance calculations. The addition of three-dimensional (3D) audio separation would allow the pilot to spatially separate and process multiple radio frequencies in addition to directional self-protection warning tones. These upgrades enhance flight safety in training and real-world environments by 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 one large area display for each F-15, and two displays for each of the 14 F-15Ds. ANG requires one integrated radio controller for each F-15 and one 3D audio system for F-15C/D each seat.

2. Program Details.

Quantity	Unit Cost	Program Cost
60 F-15 Attack Display Upgrades (3010)*	**$90,000**	**$5,400,000**
164 F-15 Large Area Display (3010)*	**$400,000**	**$65,600,000**
150 F-15 Integrated Radio Controller (3010)*	**$90,000**	**$13,500,000**
164 F-15 3D Audio (3010)*	**$100,000**	**$16,400,000**
Total		**$100,900,000**

* Includes 10% spares

F-15: NEXT GENERATION AIR-TO-AIR WEAPON

1. Background. ANG F-15s require the replacement of legacy air-to-air weapons to maintain the tactical advantage of our air superiority fleet. Operational analysis suggests the adversarial investments in electronic attack (EA), advanced radars, long range weapons technology, and early generation stealth platforms has decreased combat survivability. The next generation air-to-air weapon, when combined with advanced radar systems and multi-spectral targeting, will allow the F-15 to engage advanced threats and airborne systems which are otherwise unable to be targeted. The current kill-chain against these advanced targets will end with the tracking capability since, without an advanced long range weapon the F-15 will be unable to provide air superiority. Current missile development is underway but integration on the F-15 is not programmed. This effort will ensure integration efforts are executed in future software upgrades of the F-15 in the form of operational flight programs and will include the implementation of this critical weapon needed to provide monopolization of the aerial battlespace.

2. Program Details.

Quantity	Unit Cost	Program Cost
Next Generation Air-to-Air Weapon Non-Recurring Engineering (3010)	**N/A**	**$50,000,000**
Next Generation Air-to-Air Weapons (3010)	**$500,000**	**$345,000,000**
Total		**$395,000,000**

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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 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 advancing adversaries. Enhancements in fuel and communication systems will allow F-22s to maintain air dominance versus air and surface threats at longer ranges from support assets. Improved GPS capabilities and a helmet-mounted display will enable the F-22 to efficiently and effectively accomplish alert and combatant command tasks.

F-22
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Critical Capabilities List

- Low-Drag Pylons and External Fuel Tanks
- Controlled Reception Pattern Global Positioning System Antenna
- Cockpit Global Positioning System Signal Repeater
- External Multi-Communication Node
- Helmet-Mounted Display

Essential Capabilities List

- Improved Simulator Capabilities
- Accurate Training for Peer Threats
- Combat Identification Improvements
- Data-Link Improvements
- Beyond Line-of-Sight Communications

Desired Capabilities List

- Leverage F-35 Capabilities and Technologies
- New Integrated Forebody and RADAR Improvements
- Engine Upgrades
- Common Configuration
- Low-Observable Reduction and Sustainment Improvements

F-22: LOW-DRAG PYLONS AND EXTERNAL FUEL TANKS

1. Background. ANG F-22s require pylons and fuel tanks for extended range operations. Current threat countries are attempting to deny access to geographic areas by expanding threat capabilities against high-value airborne assets including mobility air force (MAF) refueling aircraft. This strategy, combined with existing MAF limitations, require F-22s to extend their combat radius using externally mounted fuel tanks that are low drag. Current F-22 fuel tanks and pylons are only useful in a ferry configuration and greatly decrease the capability of the F-22 in a combat scenario. Purpose-built pylons and fuel tanks will allow the F-22s to achieve higher airspeeds and fuel efficiency. All 20 ANG F-22s require this upgrade.

2. Program Details.

Quantity	Unit Cost	Program Cost
44 Low-Drag Pylons with Fuel Tank (3010)*	**$463,000**	**$20,372,000**
Total		**$20,372,000**

* Includes 10% spare

F-22: CONTROLLED RECEPTION PATTERN GLOBAL POSITIONING SYSTEM ANTENNA

1. Background. The F-22 requires an upgraded Global positioning system (GPS) antenna. GPS jamming can degrade aircraft navigation systems and GPS weapons employment with relatively low power. The F-22 has a fixed reception pattern antenna for receiving GPS signals. Installing a controlled reception pattern antenna (CRPA) would give the F-22 GPS system better capability to operate in a GPS denied environment. All 20 ANG F-22s require upgraded GPS antennas.

2. Program Details.

Quantity	Unit Cost	Program Cost
GPS CRPA Non-Recurring Engineering (3010)	**N/A**	**$50,000,000**
22 GPS CRPAs (3010)*	**$150,000**	**$3,300,000**
Total		**$53,300,000**

* Includes 10% spares

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 U.S. 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 to usage as a digital repository of flight information publications. In order to utilize the EFB as a backup means of GPS based navigation and in cases of various electrical failures, the F-22 requires a simple 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 CAF 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**
35 Helmet Mounted Displays (3010)*	**$300,000**	**$10,500,000**
Total		**$51,500,000**

* 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 Lead Command's precision-guided munitions and close air support (CAS) tasking's, including convoy escort, dedicated infrastructure defense, border patrol, and raid support. The ANG operates 333 Block 25/30/32/40/42/50/52 F-16C/Ds. The ANG F-16 aircraft makeup 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, 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
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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, Protection from, and Attack of Modern Radio Frequency and Infrared Threats
- Targeting Pod with Digital High-Definition Interface, and Displays
- Lightweight, Color, Night-Compatible Helmet-Mounted Display
- Multi-Band, Secure Beyond Line-of-Sight Radios with Three-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 Data Link With Link 16 Capability Supporting Growth for Fifth and Fourth 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
- Organic Ability to Complete a Passive Kill Chain Outside of the Radio Frequency Spectrum Against Modern Air Threats Outside of Baseline Threat Weapon Engagement Zones
- Advanced Data Link Capability with Tri-Service Interoperability to Include Broadband Uplink
- Reliable, Digital Standby Attitude and Heading Reference System with an Independent Battery Back-up
- Tactical Autopilot with Auto-throttle, and an Advanced Flight Control Computer Capable of Integrating with Weapons Delivery

Desired Capabilities List

- Ability to Find/Fix Isolated Personnel via Secure Communication and Data Transfers that Enables Coordination of Personnel Recovery Assets in Combat Search and Rescue Operations
- Increased Weapon Carriage Capacity
- Advanced Wide-Band Decoy
- Certified Area Navigation Approach Capability
- Increased On-Station Time and Combat Radius
- Radar Cross Section / Infrared Signature Enhancements Across the

Entire F-16 Fleet

- Additional Apertures Capable of Supporting Communications and Data Passage to and from National Assets
- Certified Area Navigation Approach Capability
- Mid-course and Terminal Guidance Capability for Weapons Post Launch in all Weather, at all Aspects
- Improve Brake Performance for Pre-Block Aircraft
- High Fidelity Range Assets Capable of Supporting Advanced Electronic Warfare and AESA Training Against Modern Threats and Adversary Tactics, Techniques and Procedures
- Live Virtual Constructive Training Facilitator
- Organic Capability to Accomplish Positive Enemy Identification Through Onboard Electro-Optical / Infrared Sensors
- Reliable, High Fidelity Recording and Debrief System
- Data Transfer Cartridge / Digital Video Recorder Storage and Capability Enhancement
- Rapid Integration of Emerging Technology and Weapons Outside of the Operational Flight Program Cycle
- Boresight Program Enhancement

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 effectively execute tasked missions. AESA radars provide the capability to detect and track multiple airborne targets of interest in dense civilian air traffic environments. AESA radars will improve the capability of ANG F-16s 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. There are 260 remaining ANG F-16s that require an AESA radar.

2. Program Details.

Quantity	Unit Cost	Program Cost
Radar Phase II and III Non-Recurring Engineering (3010)	**N/A**	**$35,000,000**
260 Radar Upgrades (3010)	**$2,114,943**	**$549,885,180**
Total		**$584,885,180**

F-16: RAPIDLY ADAPTABLE, AUTOMATED, 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 as well as 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 117 F-16 Block 40/42/50/52. 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**
117 ALQ-213 Kits (3010)	**$160,000**	**$18,720,000**
MWS Non-Recurring Engineering (3010)	**N/A**	**$10,000,000**
70 MWS Sets (3010)	**$1,100,000**	**$77,000,000**
Total		**$447,320,000**

F-16CM: TARGING 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 the ability to 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 the manipulation of 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 for the integration of 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 40 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**
40 CDU Kits (3010)	**$400,000**	**$16,000,000**
MFD NRE (3600)	**N/A**	**$5,000,000**
280 MFD Kits (3010)	**$50,000**	**$14,000,000**
Total		**$40,000,000**

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 concurrently maintain contact with both C2 nodes and friendly forces. 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-cancelling and directional (3D) audio simplifies 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 FIFTH AND FOURTH 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 effectively employ in the current operational environment. Legacy Situational Awareness Data Link equipment has proven inadequate due to 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 provide increased 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 electro-magnetic 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**

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 an 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 2019, all three ANG Rescue Squadrons (RQS) deployed in support of Operation Inherent Resolve. The 129 RQS worked with several agencies to fight fires in Northern California. In addition to this, HH-60Gs conducted numerous counter-drug missions throughout the state and supported search and rescue operations following hurricanes Florence and Maria.

The 101 RQS performed multiple missions in support of both overseas and domestic operations. The 210 RQS held 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 acquisition of multiple datalinks. Additional upgrades completed in FY18 focused on modernization of aircraft communication systems and integration of a helmet mounted head-up display.

HH-60G
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Critical Capabilities List

- Integrated Flight Deck with Handheld Device Interoperability
- Helmet-Mounted Display
- Aircraft Weapons Modernization to Enable Self-Escort
- Modernized Integrated Defensive Suite
- Distributed Mission Operations Capable Virtual Reality Simulator (See Tab Q)

Essential Capabilities List

- Helicopter Underwater Egress Lighting
- Performance Based Navigation Certified Area Navigation
- Improved Tactical Situation Display Artificial Intelligence / Machine Learning
- Agile Combat Search and Rescue Basing Capability
- HH-60G Direction Finding 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 require 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 which determines aircraft position, surrounding weather, and flight information. Link 16 is a tactical data link which enables digital situational awareness sharing. 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 Wifi 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: 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 cuing 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. In addition to the helmets, a modern electro-optical/infrared (EO/IR) sensor are 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: AIRCRAFT WEAPONS MODERNIZATION TO ENABLE SELF-ESCORT

1. Background. ANG HH-60Gs require weapons modernization to provide reliable defensive firepower to support various combat mission operations. The fielded systems have no capability for target marking, concealment, or battlefield illumination. To reduce the cost of combat search and rescue, the HH-60G needs a lightweight, precision and non-precision standoff weapons capability. The LAU-68 F/A Extended-Length Launcher (ELL) is a lightweight 7-shot rocket pod allowing employment of precision guided munitions such as the Advanced Precision Kill Weapons System. This system is capable of delivering precision and non-precision guided rockets armed with anti-armor, high explosive, or anti-personnel warheads as well as non-lethal smoke or battlefield illumination payloads. Two LAU-68 F/A ELL pods can be installed on an HH-60G aircraft using the current weapons mount configuration without removal or significant degradation of the crew-served GAU-2B or GAU-18. One mount kit and two pods are required for each of the 18 ANG HH-60G aircraft. In addition, a modern electro-optical/infrared (EO/IR) sensor is needed on the HH-60G to provide laser designation/spot track, coordinate generation and IR pointer capability. An upgraded sensor is needed for each of the 18 HH-60Gs in the ANG.

2. Program Details.

Quantity	Unit Cost	Program Cost
Precision Weapon Non-Recurring Engineering (NRE) (3010)	**N/A**	**$1,000,000**
18 External Stores Mount Kits (3010)	**$100,000**	**$1,800,000**
36 LAU-68 A/F ELL Pods (3010)	**$15,000**	**$540,000**
Modern EO/IR Sensor NRE (3010)	**N/A**	**$35,000,000**
21 Modern EO/IR Systems (3010)*	**$1,000,000**	**$21,000,000**
Totals		**$59,340,000**

* Includes 1 spare per unit

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. Aircrew 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**

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

- Mobility Air Forces Common Carry Radio Frequency / Infrared Self-Protection Pod
- 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

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

KC-135: MOBILITY AIR FORCES COMMON CARRY RADIO FREQUENCY / INFRARED SELF-PROTECTION POD

1. Background. ANG KC-135s require a common carry open architecture mission system capable of producing mission enhancement effects in ever-changing contested environments. These mission enhancements include radio frequency (RF) and infrared (IR) self-protection systems. Current and future areas of responsibility include a wide variety of RF and IR threats. Missions such as low-altitude refueling and forward positioning 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 defeat those threats. As a refueling platform, the KC-135 also requires 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 IR and RF countermeasures should be capable of being moved between aircraft; therefore, all 166 ANG KC-135s require digital RWR Group A-kit modifications and Large Aircraft Infrared Countermeasures (LAIRCM) Group A kits. ANG requires 38 modular, rotatable, digital RWR Group B-kits and 38 LAIRCM Group B kits to equip the 17 ANG KC-135 units, including four spares.

2. Program Details.

Quantity	Unit Cost	Program Cost
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		**$348,800,000**

KC-135: INTEGRATED DEFENSIVE SYSTEMS FOR 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 theaters of operation. 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 effectively participate in the present-day network-centric battlespace. TDL provides near-real-time monitoring of mission events, mission status, task completion, and resource status. It also enhances the situational awareness of all participant aircraft, including tanker aircraft, receiver aircraft, and coalition network participants. All 166 ANG KC-135s require TDL radios and processors.

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**
Total		**$148,020,000**

* 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 or forward deployed environment where ground support is unavailable. This capability provides combatant commanders with greater flexibility 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 prior to 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 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 activity supports 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 is 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.

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Critical Capabilities List

Support Equipment (SE)

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

Test Equipment (TE)

- Armament Tester (Multi-MDS)
- Video Data Link Tester (Multi-MDS)
- Improved Bus Diagnostics (Multi-MDS)
- Targeting Pod External Power (Multi-MDS)

Essential Capabilities List

- Improved Avionics Intermediate Shop Modernization for Line-Replacement Units (A-10)
- Large Flightline generator (E8C)
- Deployable Polyalphaolefin Solution (F-22)
- Thermal Imaging (Multiple Aircraft)
- Wire Tester
- S1000D/Connected Flightline

Desired Capabilities List

- Improved Blade Fold Equipment
- Laser Corrosion Removal (Multiple Aircraft)
- Wireless Rekey (F-22)
- Diesel Tester/Analyzer for Aerospace Ground Equipment (Multiple Aircraft)
- Portable Lightweight Stands (Multiple Aircraft)

SE: HIGH CAPACITY 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 capacity level for the original legacy suitcase style toilet 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 aero medical 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: CORROSION CONTROL MODERNIZATION

1. Background. ANG aircraft maintenance units require updated corrosion control equipment. Current media blast booths do not meet environmental requirements for proper containment of hazardous waste. Numerous bases having risk assessment codes have shut down operations or limited operations for corrosion control throughout the ANG. The requirement is self-contained corrosion control equipment that meets regulatory ventilation requirements. Most bases either do not currently have corrosion control equipment at adequate size or do not meet required capture velocities to reduce hazards below Occupational Safety and Health Administration (OSHA) action levels. Modernizing the ANG with current off the shelf capabilities will reduce exposures to chemicals, cost and time to repair. The solutions to mitigate chemical overexposure is a self-contained blast booth which meets OSHA and Environmental Protection Agency requirements. The ANG requires one corrosion control unit and one paint booth at each of the 78 ANG flying wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
78 Corrosion Control Units (3080)	**$472,000**	**$36,816,000**
78 Paint Booths (3080)	**$975,000**	**$76,050,000**
Total		**$112,866,000**

SE: HEAVY LIFT DEVICE

1. Background. ANG C-130, KC-135, E-8C, and MQ-9 maintenance personnel require modernized equipment for removal and installation of engines and components, auxiliary power units, and flight control surfaces. The current processes to perform this maintenance requires increased man hours to safely perform removal via other means. This heavy lifting device would be technical order compliant. Some C-130 units have recently acquired a device meeting this need. ANG C-130 maintenance personnel require modernized equipment for engine removal and installation. Aging engine components and increased flight hours are causing higher frequency of flight control surfaces, engine removal and installation. One lifting device is required at each of the 18 ANG C-130 units, 17 KC-135 units, 5 MQ-9 units, and 1 E8C unit.

2. Program Details.

Quantity	Unit Cost	Program Cost
18 C-130 Heavy Lifting Devices (3080)	**$200,000**	**$3,600,000**
17 KC-135 Heavy Lifting Devices (3080**)**	**$200,000**	**$3,400,000**
5 MQ-9 Heavy Lifting Devices (3080**)**	**$200,000**	**$1,000,000**
1 E8C Heavy Lifting Device (3080**)**	**$200,000**	**$200,000**
Total		**$8,200,000**

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. Currently, aircraft positioning is accomplished by utilizing a full-size MB-4 tow tractor, or similar model, and a long tow bar which 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: VERTICAL FUEL TANK STORAGE

1. Background: ANG fighter units require modernized fuel tank storage for their external fuel tanks. Currently, the fuel tanks are 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 foot print. 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: ISOCHRONAL/PHASE STANDS

1. Background. The ANG requires A-10, F-15, F-22, C-17, KC-135, 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 more effectively complete inspections and maintenance 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, nine KC-135, one C-40C, and 3 C-130J stands.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 A-10 Phase Stands (3080)	**$900,000**	**$1,800,000**
2 F-15 Phase Stands (3080)	**$900,000**	**$1,800,000**
1 F-22 Phase Stands (3080)	**$1,200,000**	**$1,200,000**
4 C-17 ISO Stands (3080)	**$1,200,000**	**$4,800,000**
9 KC-135 ISO Stands (3080)	**$975,000**	**$8,775,000**
1 C-40C ISO Stands (3080)	**$1,100,000**	**$1,100,000**
1 E-8C ISO Stands (3080)	**$1,400,000**	**$1,400,000**
4 C-130J ISO Stands (3080)	**$1,200,000**	**$4,800,000**
Total		**$25,675,000**

TE: 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 breeches 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 capability to verify the condition of critical aircraft circuitry in a non-energized state. The tester shall have the capability to perform tests 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 575 armament testers are required to support all ANG fighter aircraft.

2. Program Details.

Quantity	Unit Cost	Program Cost
575 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 operation of 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: IMPROVED BUS DIAGNOSTICS

1. Background. ANG requires the bus characterization and integrity toolset (BCIT) tester to provide the capability to rapidly and accurately troubleshoot aircraft 1553 bus issues while the aircraft systems are powered. It is a portable, ruggedized analyzer designed to test/analyze cables and monitor operations of a MIL-STD-1553 data bus network. The software toolset maps any MIL-STD-1553 data bus network and can act as a bus controller. The BCIT can also be used as a time domain reflectometry (TDR) to find the distance to wiring faults. The BCIT's software is customizable within the Windows operating system, permitting future integration of additional MIL-STD 1553 Buses. The tester's embedded software enables 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 1553 bus. The TDR function provides guidance to maintenance personnel to within six inches of a wiring fault. The System Program Office for the Joint Surveillance Target Attack Radar System approved this device on the E-8C, and the ANG plans to adapt the capability to other airframes such as the KC-135, C-130, C-17, and HH-60 aircraft. ANG requires two BCITs per KC-135, C-130, C-17, and HH-60 aircraft maintenance group in the ANG.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non Recurring Engineering (3080)	**N/A**	**$600,000**
42 BCIT Bus Testers (3080)	**$70,000**	**$2,940,000**
Total		**$3,540,000**

TE: TARGETING POD EXTERNAL POWER

1. Background. ANG units flying variants of the LITENING Targeting Pod (TGP) need the capability to trouble-shoot, load software, perform initiated built in test, and operationally evaluate LITENING TGPs using an external power source. An external power test set would eliminate the need to repeatedly mount the LITENING TGP to the aircraft saving 3-4 man hours per mounting cycle. LITENING TGP trouble-shooting, repair, and testing can be delayed due to aircraft availability. The ANG requires two external power test sets for each of the 22 fighter wings.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non Recurring Engineering (3600)	**N/A**	**$100,000**
22 External Power Test Set (3080)	**$25,000**	**$1,100,000**
Total		**$1,200,000**

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 2019 Weapons and Tactics Conference

Critical Capabilities List

MC-12W

- Synthetic Aperture Radar / Moving Target Indicator
- Second Full-Motion Video Sensor
- Airborne Mission Network Link 16
- Improved High-Resolution Full Motion Video Displays
- Distributed Mission Operations Capable Flight Simulator / Mission Training Device (See Tab Q)

RC-26B

- Avionics Modernization
- Common Mission System Configuration
- Full Spectrum Video / Data Communication Distribution
- All-Weather Wide-Area Imagery and Moving Target Indicator
- Enhanced Short-Field Takeoff and Landing Performance

Essential Capabilities List

MC-12W

- Selective Availability Anti-Spoofing Module Global Positioning System
- Alternative Position, Navigation, and Timing
- Combat Systems Officer / Tactical Systems Operator Oxygen System Mask Integration
- Traffic Collision Avoidance System / Ground Collision Avoidance System Alerts to be Broadcast Over Combat Systems Officer / Tactical Systems Operator Intercom
- MX-15 Sensor Install

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 Management System Access
- Improved Right Pilot Keyboard and Mouse
- Infrared Suppression System

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: 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 as well as offer 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**

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: 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: IMPROVED HIGH-RESOLUTION FULL MOTION VIDEO DISPLAYS

1. Background. ANG MC-12W requires an electro-optical/infrared sensor to provide aircrews with actionable intelligence. The system needs to be capable of sending high-resolution images to each of the four crew positions while simultaneously forwarding images to combatant and task force commanders. Providing upgraded displays will maximize the capability of current and future sensors allowing the MC-12W to fly higher, mitigate more surface-to-air threats, identify more details of high value targets, and identify hostile intent by detecting armed personnel. The MC-12W requires four displays for each of the 13 aircraft assigned to the 137th Special Operations Wing.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$5,000,000**
52 High Resolution Displays (3010)	**$50,000**	**$2,600,000**
Total		**$7,600,000**

RC-26B: AVIONICS MODERNIZATION

1. Background. ANG RC-26s require cockpit modernization in order to deploy worldwide and operate in the National Airspace System. It is estimated the ANG's RC-26 aircraft may start grounding in FY19 due to non-availability of parts and diminished manufacturing supply. 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**	**$1,000,000**
11 Avionics Shipsets (3010)	**$1,550,000**	**$17,050,000**
Total		**$18,050,000**

RC-26B: SYNTHETIC APERTURE RADAR / DISMOUNT MOVING TARGET INDICATOR

1. Background. ANG RC-26s 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 RC-26B's ability to find and fix personnel and vehicles. This capability would be especially beneficial 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 SAR 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: BLOCK 20 TECHNICAL REFRESH

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 expanded Integrated Communications System (ICS), high frequency radio with upgraded antennas, and a self-protection system will bring the RC-26B Block 20 to a common configuration with Block 25R capable of all potential mission sets.

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**	**$10,500,000**
5 MMS (3010)	**$200,000**	**$1,400,000**
5 Self Protection Systems (3010)	**$300,000**	**$2,100,000**
Total		**$28,050,000**

RC-26B: HIGH-DEFINITION, LONG RANGE VIDEO DOWNLINK

1. Background. The RC-26B fleet requires the ability to off-board high definition, full motion encrypted video (FMV) line of sight for all operations to ground components and agencies seamlessly by way of ground receivers. The current system is outdated, non-encrypted and only partially mission capable due to lack of line replacement units in the supply system. Diminishing military supply issues don't allow replacement of mission parts putting mission reliability in question on every mission that is tasked. No encryption capability may put ground personnel and critical intelligence at risk. Modernizing the RC-26B fleet of 11 aircraft with this capability will allow the aircraft to provide encrypted FMV to the most remote command elements and users in both domestic response and contingency operations.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$1,000,000**
11 High Definition Downlink Kits (3010)	**$1,000,000**	**$11,000,000**
Total		**$12,000,000**

RC-26B: BEYOND LINE OF SIGHT 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). The utilization of current relay antenna systems coupled with a BLOS data connection would allow the RC-26B to be the conduit to connect the disconnected user to the command element. 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**	**$1,000,000**
11 BLOS Antenna and Installation Kits (3010)	**$1,000,000**	**$11,000,000**
Total		**$12,000,000**

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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 (See Tab Q)
- Open Architecture Artificial Intelligence Driven Common Operating Picture
- Augmented Reality for Unmanned Aircraft System Feed

Essential Capabilities List

- Publically 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 effectively fuse multiple-intelligence data. 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 fully utilize applications and capacity for future growth for targeting, 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
800 Thick Client Workstations with GPU (3080)	**$7,000**	**$5,600,000**
Total		**$5,600,000**

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. In order 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 along with 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, 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: 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 being able to share 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 process, and increase platform survivability. This COP should also be automated into a cross domain solution for both unclassified and classified networks, as well as 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 so the system can be modified 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 to the pilot or sensor operator's heads up displays (HUD). This results in lengthy, and at time confusing, threat and target identification for the pilot and sensor operator. Augmented reality allows for increased situational awareness to RPA aircrew and customers which will increase the 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 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**

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 in permissive and denied environments. Pararescue personnel provide recovery and emergency medical treatment necessary to stabilize and evacuate injured personnel.

The ANG has two Special Tactics squadrons comprised of special tactics teams which are quick-reaction, deployable special operations units, uniquely organized, trained, and equipped to conduct joint special operations and sensitive recovery missions. Special tactics personnel, including combat controllers, pararescue jumpers, and special operations weathermen, 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 onto enemy ground targets. TACPs also provide the planning and employment of assets, in full spectrum combat, in support of the U.S. 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

- Maritime Operations Modernization
- Battlespace Mobility
- Combat Survivability Suite
- Modular Airdrop System
- Human Performance Optimization

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
- Focused Mission Planning Suite
- Light Tactical Battlefield Vehicular Equipment

Essential Capabilities List

Guardian Angel

- Maritime Support Package
- Mountain Warfare Equipment
- High-Altitude High-Opening Equipment Modernization
- Portable Satellite Communications Suite
- Fixed-Wing Recovery System

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: 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 (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 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.

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**
Total		**$9,086,000**

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 the need for a separate pallet and without modification to the aircraft. The vehicle must be able to be reset for airdrop in the field and be able to transport one or more litter patients. It must be able to transition repeatedly between powered flight and driving. The system must support employment of 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 airdrop kits, six non-airdrop canopies, and three EO/IR sensors. Both ST units require two LTATVs, four reusable airdrop 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 Airdrop 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**

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, modern water communication devices, and a next generation modular helmet; are necessary for each of the 200 ANG GAs.

2. Program Details.

Quantity	Unit Cost	Program Cost
200 Modern Water 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**
Total		**$2,100,000**

GA: MODULAR AIRDROP PLATFORM

1. Background. ANG Guardian Angel (GA) and Special Tactics (ST) teams requires reusable, scalable, modular airdrop systems to deliver vehicles, watercraft, and other mission equipment. GA and ST teams currently have the ability to airdrop vehicles, watercraft, and equipment, but are limited by current labor and resource intensive airdrop platforms that have poor sustainability and suitability for alert missions. Current airdrop technical orders (TO) require tailored airdrop pallets to be hand-built for each specific type of equipment. The construction and rigging of these pallets is very labor intensive and difficult to reset for alert in a deployed environment. Additionally, the TOs need to be recertified every time there is a part number change for a vehicle or watercraft. Having a scalable, modular systems that can be used for both land and water drops will increase suitability and decrease the resources required for training and operations. These systems should be built for long-term, repeated use. The systems should be easily recoverable for training and not require overhead cranes or heavy material handling equipment for recovery, rigging, reset, and aircraft loading. The systems should be designed to be rigged quickly in austere locations, and attainable for operational use. Each of the three GA squadrons require six airdrop systems configured for vehicle airdrop and 10 airdrop systems configured for maritime airdrop. Both ST squadrons require 10 airdrop systems configured for vehicle airdrop, and 6 airdrop systems configured for maritime airdrop.

2. Program Details.

Quantity	Unit Cost	Program Cost
38 Modular Vehicle Platform (3080)	**$11,000**	**$418,000**
42 Modular Maritime Platform (3080)	**$11,000**	**$462,000**
Total		**$880,000**

GA: HUMAN PERFORMANCE OPTIMIZATION

1. Background. ANG Guardian Angel (GA) and Tactical Air Control Party (TACP) requires 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**

ST: SMALL UMANNED 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 continue 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 need to 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 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 a vital need 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**
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**
Total		**$6,379,000**

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 is 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 vehicle, 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/dust proof, and meet electromagnetic and security requirements. This must also be scalable and upgradeable to keep up with morphing technology. An individual must be able to communicate from aircraft, tactical vehicle, 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.

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**
Total		**$5,160,000**

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 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, surveille, 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 low probability of intercept and low probability of detection (LPI/LPD). To do this, JTACs require a handheld system that is capable of interfacing with multiple airborne platforms through Link 16. The system must be lightweight, J-Voice capable, and able to interface with situational awareness kits. In order to interface with the Link 16 radio, JTACs require a lightweight 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 require 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 7 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) members require an effective and efficient command and control communications capability. TACPs at all echelons currently lack the ability to reach necessary networks during combat operations. In order to enable this capability, Air Support Operations Centers (ASOC) require two network systems with upgraded hardware and software and two mission application packages at each of the two locations. To connect to the ASOCs, the 14 Air Support Operations Squadrons require two rapidly deployable gateway systems.

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**
28 Data Link Network Gateways (3080)	**$219,000**	**$6,132,000**
Total		**$8,828,000**

TACP: BROAD SPECTRUM BATTLEFIELD IDENTIFICATION

1. Background. ANG Tactical Air Control Party (TACP) Joint Terminal Attack Controllers (JTAC) require target acquisition/marking devices that operate in multiple spectrums outside of near infrared (IR). JTACs require the ability to acquire targets in electro optical, forward looking IR, short-wave infrared (SWIR) spectrums day/night and generate a location out to 12 kilometers (km). JTACs must have the ability to determine target location day/night out to 5 km in a small lightweight device that can be integrated in situational awareness kits. JTACs must be able to simultaneously see multiple 1064 nanometer (nm) coded lasers out to 6 km and determine the pulse repetition frequency code for target correlation. Additionally, JTACs require the ability to mark a target with non-pulsed 1064 nm and 1550 nm lasers. Finally, JTACs need the ability to mark friendly locations with strobes in the SWIR and mid-wave infrared (MWIR) spectrums to prevent fratricide as targeting transitions to these emerging spectra. Each of the 14 operational TACP squadrons requires 21 non-pulse SWIR pointers, 21 MWIR strobes, 21 SWIR strobes, 15 SWIR acquisition devices, 21 small light weight laser range finders, and 21 long range multi-spectrum laser range finders.

2. Program Details.

Quantity	Unit Cost	Program Cost
210 SWIR Acquisition Devices (3080)	**$31,000**	**$6,510,000**
294 SWIR Pointers (3080)	**$5,100**	**$1,499,400**
294 MWIR Strobes (3080)	**$3,000**	**$882,000**
294 SWIR Strobes (3080)	**$1,500**	**$441,000**
294 Range Finder (3080)	**$5,000**	**$1,470,000**
294 Long Range Multi-Spectrum Laser Range Finder (3080)	**$15,000**	**$4,410,000**
Total		**$15,212,400**

TACP: FOCUSED MISSION PLANNING SUITE

1. Background. ANG Tactical Air Control Party (TACP) require a mission planning and debrief capability for in-garrison and combat operations in order to maximize training value and build proficiency in the TACP mission set. The system will be used for mission planning; must be compatible with the TACP's radio and peripheral device suite; and be able to build, distribute, and store tactical mission plans and other key hardware support files and software. The focused mission planning suite must be fully compatible with Special Warfare Assault Kit (SWAK) and the Android Tactical Assault Kit (ATAK) software and aid in the development of mission products and production of physical copies of mission products. The system must be able to fully integrate TACP point of view video, screen capture of the TACP multi-function display, and multi-channel audio recording without interfering with the TACP during both day and night operations. The mission planning suite must be able to provide a log of all actions. Each of the 14 Air Support Operations Squadrons (ASOS) require one in-garrison and 10 deployed mission planning suites and a server for support. The 137th Combat Training Flight requires one in-garrison and four deployed mission planning suites and a server for support. Additionally, each of the 883 ANG Joint Terminal Attack Controllers (JTAC) require one JTAC mission recording system.

2. Program Details.

Quantity	Unit Cost	Program Cost
15 In-Garrison Mission Planning Suites (3080)	**$30,000**	**$450,000**
883 JTAC Mission Recording Systems (3080)	**$1,500**	**$1,324,500**
144 Deployed Mission Planning/Debrief Kits (3080)	**$15,000**	**$2,160,000**
15 Servers (3080)	**$10,000**	**$150,000**
Total		**$4,084,500**

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)	**$100,000**	**$14,000,000**
Total		**$14,000,000**

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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 flying training unit operations at two locations and supports test and evaluation at a third. Five launch and recovery element sites are capable of supporting 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
2019 Weapons and Tactics Conference

Critical Capabilities List

- Minimal Latency Tactical Data Link and Communications Pod
- Infrared, Radio Frequency, and Laser Threat Awareness, Self-Protection, and Defeat
- Edge Processing for Artificial Intelligence / Machine Learning
- Agile Remote / Split Operations Plus Multi-Domain Dissemination
- Open Mission Systems-Compliant Hardware and Software

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: 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 with regard to aircraft position and airspace deconfliction. 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, to 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, AND LASER THREAT AWARNESS, 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 these systems were detected by another platform, the MQ-9 has no ability to defend against these threats. As a result, the MQ-9 is unable to 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 load out 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	**$10,000,000**	**$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 datalink 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 3 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 5 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. In order 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 location of the hardware in a fixed facility. If that fixed facility is damaged, in any way, the ability to conduct operations is severely hindered or stops all together. 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 stop gap in case of 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 in order 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)	**$2,400,000**	**$2,400,000**
1 RSO+ Mobile Server Room (3010)	**$300,000**	**$300,000**
Total		**$2,700,000**

MQ-9: OPEN MISSION SYSTEMS-COMPLIANT HARDWARE AND SOFTWARE

1. Background. ANG MQ-9 aircraft require Open Architecture Mission Control Modules (OAMCM) to enable third-party middleware-controlled onboard network connections for all sensors and aircraft payloads. The OAMCM enables rapid fielding of emerging sensor technologies, machine learning integration, and commercial off-the-shelf / government off-the-shelf payload integration. This OAMCM must allow high-bandwidth internet protocol based communication between the ground control station, aircraft and aircraft station to other aircraft stations. The OAMCM must allow for communication, command and control outside of the operational flight program. One OAMCM and associated hardware is required for the 32 remaining ANG MQ-9s.

2. Program Details.

Quantity	Unit Cost	Program Cost
Non-Recurring Engineering (3010)	**N/A**	**$6,000,000**
32 OAMCMs (3010)	**$250,000**	**$8,000,000**
32 Installation Hardware Kits (3010)	**$150,000**	**$4,800,000**
Total		**$18,800,000**

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Simulation, Operational Training Infrastructure, and Ranges

- **Advanced Simulator Development**
- **Operational Training Environments**
- **Range Infrastructure**

This tab supports three components of the simulation portfolio: Simulation, Operational Training Infrastructure (OTI), and Ranges. The first tab component provides squadron-level simulators for ANG warfighters to meet specific warfighting mission requirements. The ANG's five year simulator plan will deliver over 85 training devices to our warfighters. These devices span the entire spectrum from immersive high-fidelity full flight simulators to medium-fidelity trainers.

The second 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.

Air Combat Command released its Enterprise Range Plan, the third 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.

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

Simulation, Operational Training Infrastructure, and Ranges
2019 Weapons and Tactics Conference

Critical Capabilities List

Simulation
- Air Operations Center Data Link Training Tool
- Battle Control Center Live Command and Control Training Next
- Control and Reporting Center Electronic Attack Training Suite
- Cyber Part Task Trainer
- Cyber Advanced Threat Training System
- Explosive Ordnance Disposal Unexploded Ordnance / Improvised Explosive Device Training Simulators
- GIISR Cyber Part Task Trainer
- HC-130J Distributed Mission Operations Simulator
- HH-60G Distributed Mission Operations-Capable Virtual Reality Simulator
- MC-12W Distributed Mission Operations-Capable Flight Simulator / Mission Training Device
- Space Electronic Warfare Training Modernization

Operational Training Infrastructure
- Event Control Workstation Virtual Desktop Environment
- Networked Radio Solutions to Enable Training in Remote and Distributed Environments
- Networked Datalink Solutions That Facilitate Training with Live Assets in Remote Locations
- Common Debrief System for Distributed Live and Synthetic Mission Operations
- Training Aid Workstations to Provide Realistic Man-in-the-Loop Virtual Training

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

Essential Capabilities List

Simulation
- C-130J Data Link Capability for Weapon System Trainer / Multi-Mission Cockpit Trainers
- CRC Mission Defense Team Training Suite
- CRC Link 16 and Future Links Capable Training Suite
- Explosive Ordnance Disposal Augmented/Virtual Reality Training Simulators
- F-15 High Fidelity Networked Simulators
- F-16C Proliferation and Sustainment of Concurrent High-Fidelity Ready Aircrew Program Quality Simulators
- F-22 Improved Simulator Capabilities
- MQ-9 Launch and Recovery Element Aircraft Simulator
- Security Forces Portable Modular Training Shelters

- GIISR Distributed Training Operations Servers to Enable Realistic Mission Training
- GIISR Joint Targeting Cycle Simulation Capability
- Space Small Communications Satellite and/or Communications Ride-Share Payload for Space Control Training

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

Simulation
- Air Operations Center Fully Integrated Distributed Mission Operations Training Capability
- F-15C Simulation Training Device Upgrade
- C-5M Virtual Reality Training Platform
- GIISR Virtual Reality Training and Mission Planning Tool
- GIISR Cognitive Performance Training Facilitator
- F-16 Live Virtual Constructive Training Facilitator
- F-16 High Fidelity Range Assets Capable of Supporting Advanced EWS and AESA Training Against Modern Threats and Adversaries

Operational Training Infrastructure
- Additional Operations and Equipment Facility Space at LVC-OT Sites
- Automated LVC-OT Support Activities that Reduce Manpower Requirements
- LVC-OT Synthetic Training Environments Compatible with All Weapons Systems
- LVC-OT Networked Threat Systems Connected to Distributed Training Networks and Real-Time Controllable by Scenario Managers at Remote Locations.
- LVC-OT Augmented Reality Technologies that Provide Visual Representation of Synthetic Entities to Special Warfare Airmen and Other Live Weapon Systems.

SIMULATION: AIR OPERATIONS CENTER DATA LINK TRAINING TOOL

1. Background. ANG Air Operations Centers (AOC) require an operational level data link training tool to allow the Joint Interface Control Cell (JICC) operators to conduct training on a number of Air Combat Command mandated training tasks. Unlike the active component, ANG units cannot consistently accomplish data link training using a "live" architecture from home station. The data link training tool needs a database that incorporates current and future Army, Navy, Marine, and Air Force assets. The proposed training tool should allow an operator to manipulate Department of Defense assets in a four-dimensional environment. These requirements will allow for the transmission and reception of J-Series message traffic anomalies, and allow the JICC to simulate and manage a real-world architecture and inject link problems that would require operator input to correct. This upgrade is for six of the ANG Air Operations Groups.

2. Program Details.

Quantity	Unit Cost	Program Cost
High Resolution Display Non-Recurring Engineering (3080)	**N/A**	**$432,000**
6 Training Systems (3080)	**$1,200,000**	**$7,200,000**
Total		**$7,632,000**

SIMULATION: BATTLE CONTROL CENTER COMMAND AND CONTROL 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 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, 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**

SIMULATION: CONTROL AND REPORTING CENTER 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**

SIMULATION: CYBER PART TASK TRAINER

1. Background. ANG Cyberspace Operations (CO) units require the ability to train 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 that is used 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 potential compromise of scenarios in a training environment. The system is maintained locally, allows for 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, and 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 as well as 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**

SIMULATION: 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 able to replicate multiple types of networks, environments, and advanced adversary threats. This capability provides the flexibility to rapidly change from one environment to another, 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**

SIMULATION: EOD INTERACTIVE UNEXPLODED ORDNANCE / IMPROVISED EXPLOSIVE DEVICE TRAINING SIMULATORS

1. Background. ANG explosive ordnance disposal (EOD) forces require varying unexploded ordnance (UXO) and improvised explosive device (IED) simulator training tools to efficiently perform all required annual training. ANG EOD requires the ability to conduct as much training as possible at home station due to lack of time, funding, and manpower. This equipment and training should include various conventional ordnance items, first seen ordnance items, chemicals weapons, explosives, explosive effects, IEDs, and post blast analysis. These aides must also be accompanied by battlefield effects to enhance the training and make it as realistic as possible. ANG requires 60 assorted training simulators and associated battlefield effects for each of the 17 EOD flights.

2. Program Details.

Quantity	Unit Cost	Program Cost
1,020 Assorted Training Simulators (3080)	**$2,500**	**$2,550,000**
Total		**$2,550,000**

SIMULATION: GLOBAL INTEGRATED INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE 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**

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**

SIMULATION: HH-60G DISTRIBUTED MISSION OPERATIONS-CAPABLE VIRTUAL REALITY SIMULATOR

1. Background. ANG HH-60G units require co-located virtual reality training devices (VRTD) with distributed mission operations (DMO) capability. The VRTD enables around the clock training for aircrews. These trainers would allow full formation training capability in a virtual-reality (VR) based aircraft, to include fully replicated aircraft hardware and software systems, operational weapons and mission systems (GAU-2/GAU-18 machine guns, hoist, air-refueling, and defensive systems). The trainer also includes full virtual cockpit interactivity augmented by aircraft-realistic physical primary controls. Additionally, the VRTD requires a full suite of scenario development, recording/playback, and debrief tools allowing immersive training to realistic threat engagements. The training will also include all-weather day/night operations, and multi-mission design series scenarios with integrated friendly and enemy ground-, air-, and maritime-based assets. With DMO capabilities, the crew can enter a virtual environment and fly missions with other platforms at other bases in real world mission scenarios. This capability will ensure proficient, mission-ready airmen for short-notice deployments. Two VRTDs, each configured for a crew of four plus one instructor/operator station are required for each of the three ANG combat rescue wings equipped with HH-60Gs.

2. Program Details.

Quantity	Unit Cost	Program Cost
6 HH-60G VRTD (3010)	**$250,000**	**$1,500,000**
Total		**$1,500,000**

SIMULATION: MC-12W DISTRIBUTED MISSION OPERATIONS-CAPABLE FLIGHT SIMULATOR / MISSION TRAINING DEVICE

1. Background. The ANG MC-12W community requires a co-located MC-12W mission systems trainer (MST) with distributed mission operations capability. Without this device, all currency, proficiency and mission qualification training must be accomplished in the aircraft or off-station. Additionally, the MC-12W MST will provide training that can only be conducted in a simulator device, such as emergency procedures (EP) training, realistic threat defense, and deployment preparation route rehearsal. Currently, crews are required to travel to other units for EP training, thereby reducing crew availability and incurring significant travel cost. The 137th Special Operations Wing requires one MC-12W MST.

2. Program Details.

Quantity	Unit Cost	Program Cost
1 MC-12W MST (3010)	**$1,600,000**	**$1,600,000**
Total		**$1,600,000**

SIMULATION: SPACE ELECTRONIC WARFARE TRAINING EQUIPMENT MODERNIZATION

1. Background. ANG Space Control Squadrons require adequate training equipment to meet combatant commanders' taskings. Without a signal environment that is offline from real world assets, space control operators do not obtain sufficient training and knowledge of mission operations. Current systems do not accurately convey the real world operational threat environment the warfighter faces. The three space control squadrons require eight environment presentation assemblies, eight combined advanced network emulators, three joint information operations range nodes and two spectrum analyzers.

2. Program Details.

Quantity	Unit Cost	Program Cost
8 Environment Presentation Assemblies (3080)	**$300,000**	**$2,400,000**
8 Combined Advanced Network Emulators (3080)	**$2,000,000**	**$16,000,000**
3 Joint Information Operations Range Nodes (3080)	**$70,000**	**$210,000**
2 Spectrum Analyzers (3080)	**$39,679**	**$79,358**
Total		**$18,689,358**

OPERATIONAL TRAINING INFRASTRUCTURE: EVENT CONTROL WORKSTATION VIRTUAL DESKTOP ENVIRONMENT

1. Background. The ANG Distributed Training Centers (DTCs) are seeking to leverage virtualized computing capabilities and emerging technological solutions to enhance small scale training opportunities in support of urgent training needs and requirements. Current DTC event control centers are configured to specific networks, have significant hardware footprints, and are labor intensive to secure and maintain. Virtualizing event control centers at ARC DTCs will shrink hardware life-cycle costs, increase scheduling efficiency, cut information technician man hour requirements, and reduce security risks. Virtualization efforts will be focused at the Distributed Training Operations Center (DTOC) and Air Force NORTH DTC.

2. Program Details.

Quantity	Unit Cost	Program Cost
2 Virtualization Desktop Workstations (3080)	**$1,000,000**	**$2,000,000**
Total		**$2,000,000**

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. In order 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, VIRTUAL CONSTRUCTIVE-OPERATIONAL TRAINING DATALINK SOLUTIONS

1. Background. The ANG's Operational Training Infrastructure (OTI) requires a networked datalink 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 datalink capability. There is no plan to provide this capability for other primary users of these ranges. A networked datalink capability will allow users to conduct datalink 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 datalink entity generation to bolster training scenarios with live assets operating in distributed airspaces. In order to achieve this capability, right-sized datalink 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 Datalink 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 the ability 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: TRAINING AID WORKSTATIONS TO PROVIDE REALISTIC MAN-IN-THE-LOOP VIRTUAL TRAINING

1. Background. The ANG's Distributed Training Operations Center (DTOC) requires man-in-the-loop virtual surrogate fighter training aid workstations (TAW). ANG distributed mission operations training is limited to using mostly scripted constructive entities. DTOC TAWs allow pilot subject matter experts (SMEs) to take control of various constructive entities at critical points in the engagement to provide much more realistic behaviors. This allows more efficient use of DTOC white force SMEs by controlling multiple aircraft through a few TAWs. The DTOC needs four TAWs to provide scheduling flexibility to support virtual training.

2. Program Details.

Quantity	Unit Cost	Program Cost
4 TAWs (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, as well as 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 18 RRUs, 14 RTO systems, 34 AAR systems and 44 additional P5CTS pods. 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 that is a central component of 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
18 RRUs (3080)	**$400,000**	**$7,200,000**
14 RTO Systems (3080)	**$50,000**	**$700,000**
34 AAR Systems (3080)	**$10,000**	**$340,000**
44 P5CTS Pods (3080)	**$180,000**	**$7,920,000**
4 Regional Level Control Suites (3080)	**$750,000**	**$3,000,000**
23 Unit Level Control Suites (3080)	**$300,000**	**$6,900,000**
Total		**$26,060,000**

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 (4 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 SADL Radios (3080)	**$30,000**	**$1,020,000**
34 Data Link Management Systems (3080)	**$297,000**	**$10,098,000**
34 Range Radio Systems (3080)	**$150,000**	**$5,600,000**
34 DRMS (3080)	**$480,000**	**$16,320,000**
Total		**$44,778,000**

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 four electronic warfare (EW) training ranges require fifteen high fidelity targets each to be associated with specific EW threat emitters.

2. Program Details.

Quantity	Unit Cost	Program Cost
60 High-Fidelity Targets (3080)	**$500,000**	**$30,000,000**
Total		**$30,000,000**

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 additionally 4 advanced threat systems compatible with training requirements for both 4th and 5th generation aircraft, 4 EW servers and 10 weapons flyout simulations to fully equip all 4 ANG EW ranges.

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: JOINT ADVANCED WEAPON SCORING SYSTEM

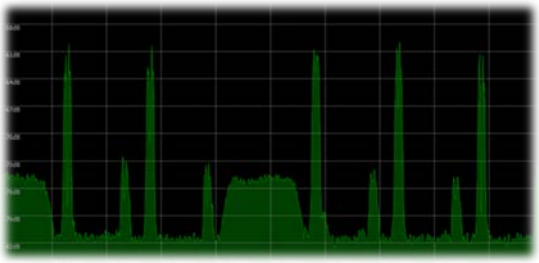
1. Background. ANG requires an upgrade to the tactical ordnance scoring system (TOSS). The TOSS system in place at ANG ranges no longer supports the expanding gamut of ANG training requirements. The Joint Advanced Weapon Scoring System (JAWSS) provides greater accuracy, night and day scoring capabilities, 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. Each of the ANG's 11 ranges will require one JAWSS capability and two Laser/Target Displays.

2. Program Details.

Quantity	Unit Cost	Program Cost
11 Replacement WISS Systems (3080)	**$500,000**	**$5,500,000**
11 Site Communications Infrastructure (3080)	**$250,000**	**$2,750,000**
11 JAWSS Spare/Upgrade (3080)	**$200,000**	**$2,200,000**
22 Laser/Target Scope and Display (3080)	**$50,000**	**$1,100,000**
Total		**$11,550,000**

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 Air Force Space Command 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, satellite communications, and 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, and space electronic warfare in support of both exercises and operations. Execution of these activities occurs from home station and deployed locations.

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Critical Capabilities List

- Space Electronic Warfare Training Modernization (See Tab Q)
- Intel Modeling and Database Capabilities
- Space Electronic Warfare Operational Equipment Modernization
- Secure Infrastructure and Collaborative Capability
- Remote Secure Communication

Essential Capabilities List

- Space Test Range Capabilities
- Space Control Open Architecture
- Big Top Satellite Link Emulator
- Space Control Technique Development

Desired Capabilities List

- Small Communications Satellite and/or Communications Ride Share Payload Used for Space Control Training

SPACE: 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, & constructive (LVC) environment from multiple distributed locations. Currently the space control community has limited ability to conduct basic continuation training (CT), 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 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, & space to house a 10.2 weapons system, Big Top trainer, 8 combined advanced network emulators, antenna pad, secure computer terminals, and all other required network connectivity equipment. Each of the four space control squadrons also require a web based radio frequency (RF) fundamentals course and 2 counter communication emulation laptops for unit level training.

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**
Total		**$15,650,000**

SPACE: INTEL MODELING AND DATABASE CAPABILITIES

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 development of 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 lack of viable tools to effectively model non-kinetic effects on any given target. Current tools do not comprehensively assess complex scenarios of multiple partners and platforms working in sync against a complex target vulnerability. A modeling tool is required to frequently update from a database that pulls from a cloud to accurately simulate environments based on current intelligence. Each of the five ANG space intelligence units require a space targeting modeling system.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 Intel Space Targeting Modeling System (3080)	**$1,100,000**	**$5,500,000**
Total		**$5,500,000**

SPACE: 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 utilization of additional antennas within the CCS system. Additionally, software upgrades are required to automate signal detection, characterization and electronic positive identification for signals of interest. Each of the four ANG space control squadrons require one CCS hardware and software upgrade, two antennas, and two additional antennas for training for the space EW training range.

2. Program Details.

Quantity	Unit Cost	Program Cost
Common Platform Graphics User Interface Upgrade	**$1,655,000**	**$1,655,000**
Signal Characterization Monitor and Hardware	**$560,000**	**$560,000**
Signal Characterization NRE (3080)	**N/A**	**$6,000,000**
10 Antennas (3080)	**$750,000**	**$7,500,000**
CCS Automation Hardware		**$850,000**
Mission Automation NRE (3080)	**N/A**	**$5,544,000**
Total		**$22,109,000**

SPACE: SECURE INFRASTRUCTURE & COLLABORATIVE CAPABILITY

1. Background. ANG space squadrons require Secure Infrastructure Collaborative Capability (SIC2) to provide shared situational awareness. SIC2 is a secure collaborative interactive environment and common operational picture that supports near real-time, full-spectrum space operations and training opportunities. The majority of planning, operations activities, and space warfare information-sharing occur in classified, collaborative environments. ANG units need the capability to access in real-time the collaborative networks used by United States Space Command, Cyber Command, and the USAF. The SIC2 will reduce travel and manpower costs, while providing a system to conduct briefings, debriefings, and information-sharing in a collaborative environment that is distributed to all ANG space mission areas. Each of the 8 space units require a SIC2 system.

2. Program Details.

Quantity	Unit Cost	Program Cost
8 SIC2 Systems (3080)	**$600,000**	**$4,800,000**
Total		**$4,800,000**

SPACE: REMOTE SECURE COMMUNICATIONS

1. Background. The ANG 233rd Space Group requires remote secure communication for the space based infrared system mobile ground system (MGS). The 233rd is not equipped with a tactical communications system capable of supporting convoy operations, deployed operations, and command and control (C2) with tactical control and operational control entities. The legacy MGS tactical radio system is beyond end of life and provides no C2 or situational awareness capability. The replacement system is intended to deliver the same or equivalent communications, C2, and situational awareness capability currently fielded in Reg AF protection level (PL) 1 convoys. The 233rd Space Group requires five secure communication packages with mobile intrusion detection systems.

2. Program Details.

Quantity	Unit Cost	Program Cost
5 Communications System	**$1,080,000**	**$5,400,000**
5 Integrated Mobile Intrusion Detection System	**$560,000**	**$2,800,000**
Total		**$8,200,000**

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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 and the 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, with a focus of 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 along with 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 occurs from home station and national facilities through distributed operations.

Cyberspace Operations
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Critical Capabilities List

- Part Task Trainer – Industrial Control System (See Tab Q)
- Advanced Threat Training System (See Tab Q)
- Advanced Cyber Forensics Toolkit
- Automated Collaboration and Execution System
- Airborne Cyber Intercept Platform

Essential Capabilities List

- Cyber Heads Up Display
- Industrial Control System Attack Detection and Response
- 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 be able to 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 a variety of equipment. This toolkit must allow for collecting 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. In order 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, with the aim 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 in order to collect telemetry. This information is synthesized into a heads-up display that is 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 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: AIRBORNE CYBER INTERCEPT PLATFORM

1. Background. ANG cyberspace operations (CO) units require a multi-platform, reduced form-factor cyberspace capability in austere and off-network environments on airborne weapon systems and integrate into ground based systems. This cyber platform interacts with internet protocol devices for delivering cyber effects near real-time and beyond line-of-sight (BLOS). The size, weight, and power must be compatible across various Air Force airborne systems. The system will provide an integrated capability for command and control including BLOS, tactical data links, or standalone systems. It will provide two-way communications for transmitting and receiving data packets to target devices and receiving updates to provide battle damage indicators. This capability will support access to previously unreachable target sets while identifying previously unknown targets in either a permissive or non-permissive flying environment. One Airborne Cyber Interceptor Platform (ACIP) system is required for each of the 20 Cyber units.

2. Program Details.

Quantity	Unit Cost	Program Cost
20 ACIPs (3080)	**$500,000**	**$10,000,000**
Total		**$10,000,000**

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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 7,400 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
- Integrated Base Defense Sensor Fusion and Analytics
- Improved Modular Ballistic Protection
- Enhanced Explosives / Narcotics / Chemical Detection

Essential Capabilities List

- Portable Modular Training Shelters
- Upgraded Individual Night Vision Imaging System with Capabilities Consistent with PVS-31A To Include White Phosphorous Imaging
- First Responder All Weather Ensemble
- Bone Conducting Communications Interoperability Capable Of Teaming Multiple Devices To Include Common Cell Phones
- M-18 Block II/Light/Laser Accessory Kit

Desired Capabilities List

- Personnel-Based Weight Distribution System
- Portable Intrusion Detection
- Vehicle Payload/Undercarriage Inspection
- Directed-Radiation Less-Than-Lethal Device
- Improved Final Denial System

SECURITY FORCES: COUNTER-SMALL UNMANNED AIRCRAFT SYSTEM DEFENSE PLATFORM

1. Background. ANG Security Forces (SF) 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. Each of the 78 stand-alone ANG sites requires this platform.

2. Program Details.

Quantity	Unit Cost	Program Cost
78 C-sUAS Platforms (3080)	**$400,000**	**$31,200,000**
Total		**$31,200,000**

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 be able to ensure all of the Air Force's assigned combat personnel, an average of over 250 personnel per installation, receive weapons qualification training in a timely and cost-efficient manner. Additionally, personnel assigned to a deployable unit type code must now 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 only three are compliant with the Air Force Engineering Technical Letter (ETL) 11-18: Small Arms Range Design and Construction. The need for a modular small arms range is magnified because, 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 then they will be closed. Due to significant health and safety concerns, the ETL prohibits major or component repairs of an existing range if it will cost more than 50 percent of the estimated replacement cost. In the event that repairs will cost more than 50 percent of the replacement cost, the entire range facility must be upgraded to comply with the ETL. The ETL identifies and authorizes only one replacement option that meets a majority of ANG bases' needs. 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 other members of ANG wings, while also incurring a substantial cost for travel and/or range time. Currently, there are nine modular small arms ranges; as small arms ranges continue to be closed, 10 additional ranges are required to allow for weapons qualifications to continue while base civil engineers program for new ranges to be constructed using military construction funds**.**

2. Program Details.

Quantity	Unit Cost	Program Cost
10 Small Arms Ranges (3080)	**$4,500,000**	**$45,000,000**
Total		**$45,000,000**

SECURITY FORCES: INTEGRATED BASE DEFENSE SENSOR FUSION AND ANALYTICS

1. Background. The ANG Security Forces (SF) organizations require a system that collects, analyzes and provides a real-time and situational awareness picture of emerging and near-peer threats. This system must link all currently existing communication technologies, audio/visual equipment; situational awareness devices, weapon systems, and personnel. In addition, it must incorporate video and data analytics intelligently fusing this raw data into a functional, lethal, and precision command and control platform. To achieve superiority over near-peer threats, this system must incorporate a 4-dimensional fluid battlespace and unknown threats. Lastly, to fully capitalize on this type of system, SF will require a more effective means of threat detection and assessment, utilizing a localized intelligence, surveillance, and reconnaissance and geolocation sensor, similar to mid-wave infrared sensor pods, "Blue" unmanned aircraft systems (UAS) and handheld imaging devices. Each of the 78 stand-alone ANG sites requires a sensor fusion system, a sensor pod tower, two thermal viewers, and a UAS system.

2. Program Details.

Quantity	Unit Cost	Program Cost
78 Sensor Fusion System (3080)	**$150,000**	**$11,700,000**
78 Multi-Spectrum Infrared Sensor Pod Tower (3080)	**$850,000**	**$66,300,000**
156 High-Resolution Integrated Thermal viewers (3080)	**$85,000**	**$13,260,000**
78 Blue UAS systems	**$650,000**	**$50,700,000**
Total		**$141,960,000**

SECURITY FORCES: IMPROVED MODULAR BALLISTIC PROTECTION

1. Background. ANG Security Forces (SF) requires modernized body armor to provide SF personnel 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. 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. The light-weight armor kits must integrate with current SF duty gear programs to include front, back, and side plates. Armor weight should not exceed two pounds per plate and must be multi-hit capable and adhere to or exceed National Institute of Justice Level IV standards. In order to use this light-weight armor kit, a specialized ballistic combat garment is required. One modernized individual body armor system and two ballistic combat garments is required for every ANG Defender.

2. Program Details.

Quantity	Unit Cost	Program Cost
7,500 Individual Body Armor Kits (3080)*	**$4,000**	**$30,000,000**
15,000 Ballistic Combat Garment (summer) (3080)*	**$1,000**	**$15,000,000**
Total		**$45,000,000**

* Includes 1% spare

SECURITY FORCES: ENHANCED EXPLOSIVES / NARCOTICS / CHEMICAL DETECTION

1. Background. ANG Security Forces (SF) require an accurate multi-trace detection system. The current detection system, a replacement for the military working dog program, is limited to explosive detection and operates at a detection rate of under 50%. SF requires a model that would provide the ability to swab/test vehicles and personnel providing real time results with an accuracy rate of 90% or greater. As the threat landscape continues to evolve, the selected system needs to have updateable software with data collection and reporting features that allow emerging trends to be up-channeled. The device should be capable of detecting a broad spectrum of threatening organic and inorganic material (ie. explosives, precursors and narcotics). This detection system will significantly impact prevention, mitigation, and deterrence of explosive and dangerous materials entering all stand-alone ANG installations. Two devices are required for each of the 78 ANG sites.

2. Program Details.

Quantity	Unit Cost	Program Cost
156 Multi-Trace Detection Systems (3080)	**$65,000**	**$10,140,000**
Total		**$10,140,000**

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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 the ever-changing tactics of their adversaries. 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 in order to match the advancements of our enemies.

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Critical Capabilities List

- Enhanced Team Situation Awareness System
- Dual Arm Manipulator Robotic Attachment
- Communication Accessory Standardization
- Short-range EOD Recon Platform (UAS)
- Interactive UXO/IED Training Simulators (See Tab Q)

Essential Capabilities List

- 3 Dimensional scanning for Ordnance Identification
- Multi-threat Counter-Improvised Explosive Device Electric Counter-Measure System
- State-of-the-Art High Mobility EOD Robot (Centaur)
- Advanced EOD Chemical Operations Combat Kit
- Augmented/Virtual Reality Training Simulators

Desired Capabilities List

- Integrated Team Power Management
- Individual blast PPE/Sensors
- Lightweight Dual Sensor Mine Detector
- Accurate underground UXO locator
- EOD MANET Communications Solution

EOD: ENHANCED TEAM SITUATION AWARENESS SYSTEM

1. Background. ANG explosive ordnance disposal (EOD) teams require a lightweight situational awareness system with portable power storage and power management solutions. Current mission environments and locations limit the range and capability of existing devices to communicate with other echelons beyond line-of-sight. The fielded batteries needed for EOD and command and control operations vary in type and are not rechargeable nor easily replaceable under field conditions. The situational awareness system should be ruggedized, wearable, powered by a single power management solution, and able to transmit and receive through existing radios. A mobile ad-hoc network integrated with the system increases the range and operability of teams independently. The system includes a battery management system, high definition display with protective case, and a cable system that allows the power management system to be connected to multiple mission critical devices. ANG EOD teams require eight kits and one ad-hoc antenna set for each of the 17 flights.

2. Program Details.

Quantity	Unit Cost	Program Cost
136 Situational Awareness Devices (3080)	**$25,000**	**$3,400,000**
17 Ad-Hoc Mesh Network Antenna Sets (3080)	**$25,000**	**$425,000**
Total		**$3,825,000**

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 better replicate human dexterity. 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, and are capable of lifting relatively heavy loads. A dual arm manipulator robotic attachment will allow the robot operator to perform actions that were previously not achievable. 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)	**$120,000**	**$2,280,000**
Total		**$2,280,000**

EOD: COMMUNICATION ACCESSORY STANDARDIZATION

1. Background. ANG explosive ordnance disposal (EOD) personnel require a standardized kit that enables them to effectively integrate existing communication platforms with all mission sets. 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 Standardization 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 prior to sending a team into a potentially hazardous area. The use of short and medium-range optics and cameras limit the team to viewing a threat from a single line-of-sight, preventing a complete picture for a 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**