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AIR MOBILITY MASTER PLAN

2006

Preface

The Mobility Air Forces continue to perform in an outstanding manner as we enter the fifth year of the Global War on Terrorism. It is truly a global war and the demands on air mobility are great. You should be proud of your outstanding efforts…the longest sustained air mobility surge in our Nation's history.

Air Mobility Master Plan 2006 is our effects-driven, capabilities-based flight plan for the future of the MAF—it is guided by the vision contained in the Commander's Intent and charts a steady course to ensure we meet the Nation's air mobility needs.

The world in which we operate today is demanding and will become even more challenging in the years ahead—rogue states and terrorist organizations hostile to the United States will take advantage of available, inexpensive technologies and use them as weapons against us. Weapons of mass destruction will be more wide spread and man-portable, surface-to-air missiles, the greatest threat to our aircraft today, will become more common. We need to be prepared for asymmetrical attacks against our mobility infrastructure, airfields, and aerial ports. Mobility operations are dependent upon communications and information systems which are likely to be attacked with weapons ranging from computer viruses to electromagnetic pulse weapons.

US forces are becoming lighter and more lethal…yet they remain dependent on air mobility. The anti-access strategies of our adversaries underscore the importance of the critical capabilities that the Mobility Air Forces bring to the fight.

We must continue to modernize the mobility fleet—our aircraft and support equipment must be survivable, reliable, and effective. Our Nation requires more airlift capability…and we also need to recapitalize our tanker fleet. Real-time, secure command and control is necessary for global mobility operations.

While we have good modernization programs in place, we must also continue to transform mobility operations to be effective over the next 25 years. We have blurred the distinction between strategic and tactical operations…C-17s still fly between continents…but also to assault landing zones using night vision goggles. Mobility aircraft of the future will provide the army with true battlefield maneuver, moving the Future Combat System into threat areas and landing on unimproved surfaces, without need of ground-based approach aids.

The future of air mobility is very bright and great opportunities are before us. The Mobility Air Forces look forward to the challenges the future brings…Air Mobility Master Plan 2006 lays out our course to meet the air mobility capability needs of the warfighters.

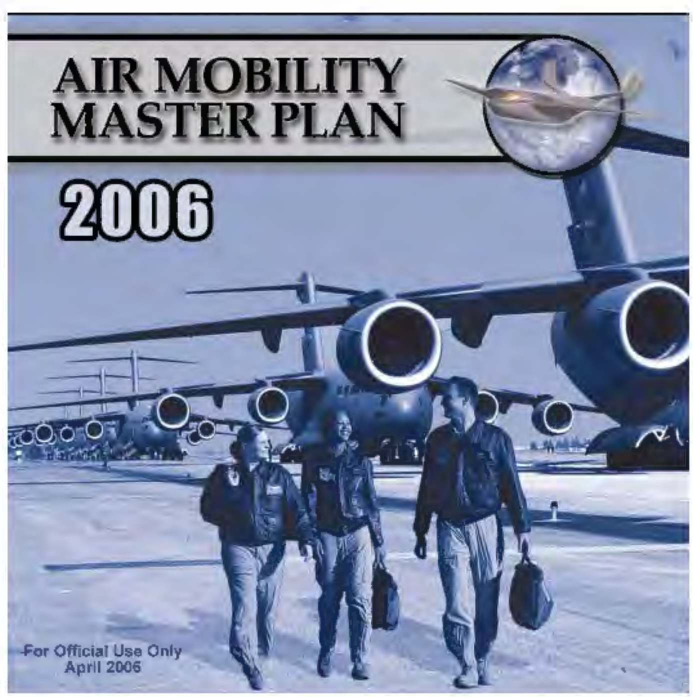

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Table Of Contents

Commander's Intent

Air mobility is our Nation's crown jewel. With our air mobility capability, we can influence and shape world events, rather than just react to them. We give America, and our leaders, options to project power and influence quickly over great distances—this capability is unmatched by any other country in the world. Air mobility is truly the "lifeline of freedom." My intent remains focused on ensuring our Mobility Air Forces continue to provide America and our leaders with "day one" options. Our plan for the future is focused on taking care of our people, modernizing our force structure, and transforming the way we conduct air mobility operations.

As we enter the fifth year of the Global War on Terrorism, our Mobility Air Force warriors continue to carry the message of freedom and hope throughout the world. Today, we are supporting combat operations in Afghanistan and Iraq, homeland defense, presidential movements, aeromedical evacuation missions, routine channels, Coronet fighter movements, specialized alerts—the demands on air mobility remain at all-time highs. In addition, we supported earthquake relief missions in Pakistan, tsunami relief operations in the Pacific, and hurricane relief operations in our own country. Since September 11, 2001, we have been engaged in the longest sustained air mobility campaign in our history; we've deployed and redeployed over 3.4 million US personnel, along with more than one and a half million tons of equipment. We've flown over 16,000 air refueling missions and transferred 2.9 billion pounds of fuel, which equates to 426 million gallons. We continue to save our own, safely moving over 18,000 patients on 3,000 aeromedical evacuation sorties. This operations tempo equates to a departure every 2 minutes, every day, 365-days-a-year. All of this has been possible only through the superb partnership of our Total Force—active duty, Air National Guard, Air Force Reserve Command, federal employees, contractors, our families, our local communities, and the Civil Reserve Air Fleet (CRAF).

People

First and foremost, let me say the people of the Mobility Air Forces are my number one priority. Since taking command, I've been most impressed with your infectious warrior attitude, enthusiasm, selfless dedication, sacrifice, and teamwork—you've won the respect of the American people and others around the world where we carry the message of hope and freedom.

We know our people and their families are vital to the mobility mission, and we remain dedicated to providing the right environment in which to live, work, and grow. We've established solid programs to develop and sustain our personnel. We are all Wingmen—we must take care of and look out for each other. Our work force is talented and diverse, and we optimize our talents and diversity with our deeply engrained teamwork. We must and will continue to provide an environment in which respect for all Airmen and their families is our culture. Commanders and leaders at all levels must recognize individual strengths and weaknesses; we must leverage those strengths and develop individual talents and character to support our Air Force team consistent with our core values.

Consistent with our commitment to our people, AMC is focused on recapitalizing and repairing our infrastructure and facilities. We've planned investments worth 1.5 billion dollars through 2011 to construct, replace, or renovate key operations and maintenance facilities, fitness centers, dining facilities, education centers, and other facilities. We're spending 194 million dollars to replace 3 of 12 AMC medical facilities and will execute 3 dormitory projects by 2008, a 44 million dollar investment to improve quality of life. Our Family Support Centers have developed and implemented programs to better care for spouses and children when their military member must work late, change shifts, work weekends, or support deployments. We're absolutely committed to taking care of our people—our top priority.

Modernization

We must continue to provide our people the very best equipment available as we send them to war and around the world. Our aircraft modernization programs and transformation processes are intertwined and increasing our effectiveness. Mobility aircraft and equipment must be adaptable, survivable, user-friendly, efficient, and, most importantly, effective. Mobility Air Forces aircraft will have the capability to display real-time information in the cockpit, possess advanced situational awareness countermeasures systems, a secure data link, and an advanced flight management system with secure, automatic aircraft position reporting.

The nation requires the right mix of C-17s and C-5s to best meet the warfighters' needs. (b)(5) (b)(5) We must stay on course toward procuring the right number of C-17s—no more and no less. We're flying the C-17, along with all our weapon systems, at a much higher rate than was planned. As a result, we need to carefully analyze the impact the "long war" has had on our mobility fleet and the effects on aircraft service life. The C-5 continues to be a very important component of the intertheater airlift fleet; we must retain our ability to move large or outsized payloads over long distances. We must continue efforts to improve the C-5 fleet's historically low reliability with two modernization initiatives: the Avionics Modernization Program (AMP) and the Reliability Enhancement and Re-engining Program (RERP). We'll continue on the present C-130 modernization course: retire the C-130E models and continue with the multiyear program to acquire C-130Js. The C-130J has performed admirably, with its improved payload and performance characteristics tested in Iraq and Afghanistan. We will continue to modernize our C-130Hs by completing the AMP, which standardizes cockpit configurations and avionics equipment and brings the aircraft into compliance with 21st century communication, navigation, and surveillance requirements.

Mobility aircraft must have defensive systems to operate in today's threat environments. We cannot afford to lose even one aircraft or aircrew because we did not address this critical need. Our goal is to equip every mobility aircraft with defensive systems. To assist mobility modernization, we're working with the Air Force, OSD, and the Congress to establish a mobility transfer fund which will help us meet emerging mobility requirements through new acquisitions or modernization efforts.

The CRAF remains a vital and cost effective part of the mobility capabilities formula. Now is the time to revitalize the CRAF program and explore improved incentives to encourage participation and look for opportunities to reinforce the partnership. We need to consider programs to increase fuel efficiency, protect aircraft from attack, and maintain the ideal commercial fleet mix to meet the needs of our nation. In that regard, there may be an emerging niche for commercial C-17s in the civilian market—these BC-17s could be incorporated into the CRAF as we reshape it for the future. Because commercial carriers move the vast majority of our people and a large portion of our cargo during contingency operations, we must ensure our CRAF partners can perform their mission safely, efficiently, and securely.

Our air refueling fleet is critical to our National Defense Strategy. The KC-135 is our oldest airframe, yet the demand for its capability is making the need to begin recapitalization critical. We must begin this process now to avoid reliance on hundreds of 80-plus-year old airplanes in the future. We look forward to seeing the results of the ongoing tanker Analysis of Alternatives that considers new, used, commercial, and military-derivative aircraft, as well as contracted refueling options. Our tanker fleet is aging. We've already removed some KC-135Es from flying status because of corrosion in engine struts; we should not invest critical resources to repair the 45-year-old E-model. We must complete the KC-135R Global Air Traffic Management program that modifies communications, navigation, and surveillance systems to meet future global airspace requirements. In addition, the KC-10 AMP provides needed 21st century capabilities—it will automate tasks, integrate cockpit displays, reduce crew workload, and link this large tanker to the modern command and control network.

Our global base infrastructure is critical to the success of the mobility mission—we will continue efforts to sustain our airbase infrastructure and keep renovation funding intact. Likewise, we will continue improving the en route system (fuel hydrants, storage tanks, ramps, and runways) to provide the necessary support for the warfighters. The Rhein-Main Transition Program is almost complete and Ramstein AB is the new "Gateway" to Europe. The massive construction programs at Ramstein and Spangdahlem Air Bases, in conjunction with improved refueling capacities at Moron AB and overall mobility infrastructure enhancements at Naval Station Rota, will improve air mobility support to Europe, the Middle East, and Central Asia. In addition, we've made great strides to improve the en route infrastructure in the Pacific. Fuel storage capacities have been increased and distribution equipment upgraded at locations to include Andersen, Elmendorf, and Hickam Air Force Bases.

Finally, global mobility operations require a solid, robust command and control (C2) capability. We continue to develop secure communications and information systems that are interoperable with all Services and coalition partners. Our communications capability must link across the Mobility Air Forces and Combat Air Forces, from top to bottom, at the strategic, operational, and tactical levels. Our C4I investments continue to pay huge dividends and will remain a vital part of our modernization strategy.

Transformation

Transformation is about changing the way we do our mobility business—improving and streamlining our organizations, creating well-designed concepts of operation, and leveraging emerging technologies. We must continue to make information technology work for us—we must understand our enemy and protect our critical C4I systems. New and improved concepts of operation, such as enhanced direct delivery, precision re-supply, and expeditionary operations are but a few areas where we must invest and improve our capabilities.

We have already made progress in transforming mobility operations, and the results of our early efforts have been promising. In Afghanistan and Iraq, we blended strategic and tactical airlift into one mission and called it "Mobility Operations." Our crews routinely fly blacked-out and use night vision goggles to operate into hostile area landing zones or runways—tactics once used only by special operations forces. Theater direct delivery is a scheduled event today delivering timely and critical capability to the warfighters. C-17s moved cargo and passengers over long and short distances, airdropped rations, and landed in short assault zones in hostile territory. Airlift missions are flown directly into the battle area, from onloads outside the theater or from operating bases nearby. The air mobility culture is now focused on warfighting and tactical operations. Efficient operations are important but effectiveness during war time is paramount.

The routine use of patient support pallets allows us to use nearly any opportune mobility aircraft to move patients and has transformed the way we conduct the aeromedical evacuation mission. No longer must the wounded soldier or ill patient wait for the arrival of a dedicated air evacuation aircraft—we are expediting the patient's movement to a care facility. As a result, we now routinely move a patient from Iraq or Afghanistan to the CONUS in 3 days—it took 10 days during Operation DESERT STORM.

Tankers are being equipped to serve as relay platforms to provide warfighters beyond-line-of-sight communications to increase our situational awareness and shorten the kill chain time for fleeting targets. Further, we need to equip future tanker aircraft with cargo doors and floors, along with defensive systems, and use them in an airlift role when it makes sense.

US military forces continue to become more expeditionary, lighter, leaner, and more lethal, while still reliant upon air mobility to get to the fight. With the capabilities provided by autonomous approach and landing systems, our crews will be able to conduct operations, regardless of weather and independent of ground-based navigation aids. This capability will dramatically increase the number of available landing sites we can use and shorten deployment and sustainment time lines. The future land forces will rely upon rapid battlefield maneuver, use a new family of combat vehicles, and employ net centric operations to fight the next war. Air mobility forces must be ready to support the warfighters' battlefield mobility requirements, be networked with the supported commanders, and be able to survive in a demanding threat environment.

AMC, along with the Air Force Research Lab and Air Force Special Operations Command, has been looking at a family of transport category aircraft that could satisfy multiservice capability demands. Variants of a common airframe could be built to complete a wide range of missions from airlift and air refueling, to special operations and ISR. Our approach looks at standardized cockpits, engines, and systems to minimize overall developmental and life-cycle costs. We are working to determine future MAF capabilities, such as payload, range, survivability, short take off and landing, high-speed cruise, and off-runway operations, required for a new mobility aircraft to be effective on future battlefields. Now is the time to start a research and development effort on the AMC-X.

As US Transportation Command implements the distribution process to expedite the flow of cargo from the rear supply points to the most forward areas, the Mobility Air Forces will continue to play a crucial role with the speed and range of mobility aircraft. To increase the velocity of air mobility operations, our CONOPS must integrate our global infrastructure with expeditionary operations, employ precision targeted delivery, focused logistics, and effective command and control. Supported commanders will require enhanced visibility over cargo in the distribution system and will base combat operations on the assured delivery of cargo and personnel. To improve our support of the distribution system, we will see improved capability with the addition of a joint cargo aircraft to the mobility fleet. This type aircraft, able to operate from very short runways and deliver small cargo loads farther forward in the battle area than is possible today, offers the potential to improve responsiveness to the warfighter engaged with the enemy.

The Way Ahead

We know some tough challenges await us in the time ahead, yet the future of air mobility is very bright. This Air Mobility Master Plan shows the course we'll follow to provide effective air mobility capabilities for today and the future. Our course is clear: First, we must take care of our magnificent Airmen and their families; Next, we must ensure they have the best training and equipment necessary to meet our Nation's air mobility needs for the next quarter century; Third, we must continue to transform mobility operations to provide the mobility capabilities needed by tomorrow's warfighters.

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DUNCAN J. McNABB
General, USAF
Commander

Executive Summary

Background

Air Mobility Master Plan (AMMP) 2006 is a strategic plan that is the result of 2 years of coordinated effort by all members of the Mobility Air Forces (MAF). This plan provides a 25-year look into the future in order to guide the research and development efforts necessary to develop the capabilities that the MAF will need to provide in the future operating environment. The plan shows how we will continue to modernize our air mobility capability while we transform our operations. It recognizes the importance that emerging technologies will have for mobility operations and the criticality of the fixed and mobile en route system to ensure Global Reach for America. Lastly, it is important to know that this is a MAF plan written by MAF members. The plan reflects AMC's responsibility as the air component of US Transportation Command (USTRANSCOM), as the lead command for air mobility operations, and as an advocate for the mobility operations performed by Air Force Space Command and AF Special Operations Command.

The MAF Planning Process

AMMP 2006 is a capability-based strategic plan that supports effects-based operations. This plan is based on supporting our national military and security strategy and objectives and is shaped by Joint and AF doctrine, and USTRANSCOM planning guidance. This plan ensures that the MAF provides the capabilities called for by Joint Operations Concepts, Joint Functional Concepts, and the Air Force Concepts of Operation (CONOPS).

Warfighting commanders put effects-based operations into practice. First, they determine campaign objectives at the strategic and tactical level. Next, they select the desired effects that will allow them to attain the campaign objectives and, thirdly, employ the right mix of capabilities to create the effects desired. Mobility capabilities are generally viewed as "enabling" the warfighter to create the desired effects—the C-17 airdrop of paratroopers in northern Iraq enabled USCENTCOM to open a second front and tie down Iraqi forces in the region. Strategically, it hastened the fall of the Hussein regime and allowed for the emergence of a democratic Arab country. In some cases, mobility can be credited with causing the desired effect—airlift saved Berlin in the 1940s and, at the strategic level, directly contributed to victory in the Cold War. This plan is aimed towards providing those global mobility capabilities that future commanders will employ to meet their campaign objectives.

The Global Mobility CONOPS is a critical driver of the AMMP, as it specifies the mobility capabilities that the MAF must provide today and into the future. To accomplish that end, the production of the AMMP is based on an iterative, three-phased strategy-to-task planning process. During the first phase, or Functional Area Assessment (FAA), MAF mission area teams—transitioning to Functional Capability Teams (FCTs)—vetted the required mobility capabilities through a thorough review of the future operating environment, the guiding documents, and technological opportunities. Significantly, the planning process carefully considers the mobility capability needs of the other Services and the combatant commanders. Next, during the Functional Needs Analysis (FNA) phase, the teams compared current mobility capabilities with those required to conduct future mobility operations; the shortcomings found in meeting future capability needs were identified during this process and are tracked as MAF capability deficiencies. The planning process includes the results of the Capabilities Review and Risk Assessments (CRRAs), yet also looks beyond the CRRA time frame to encompass long-term research and development (R&D) requirements. Lastly, during the Functional Solutions Analysis (FSA) phase, the MAF teams identified solution sets for over 350 capability deficiencies.

The status of the capability solution sets can be reviewed in applicable roadmaps contained in the AMMP CD-ROM that accompanies this document; some solutions are identified and are actively being pursued with procurement actions, while other solutions require additional research and vetting. The roadmaps contain capability assessments and milestones leading to full mission capability over the short-, mid-, and long-term.

Future Operating Environment and Impact on Mobility Air Forces

There have been profound changes in the international security environment over the last 2 years, and it is likely that the trend will continue. The State Department traditionally has defined four states as “rogue states” (Cuba, Iran, North Korea, and Syria) plus the state of Sudan as state sponsors of terrorism. The rogue states have chosen to develop weapons of mass destruction specifically as asymmetric means to offset US conventional and nuclear superiority. North Korea, Iran, and Syria are considered high threat because of biological warfare threats. Mobility forces have been fully engaged in the War on Terrorism and have played critical roles in the successful outcomes in Afghanistan and Iraq. In the future, we can anticipate that failed states, terrorist organizations, or coalitions hostile to the US will attempt to exploit widely available technologies to develop dangerous capabilities for use against us. Weapons of mass destruction will continue to proliferate beyond the 25 nations that possess them today, and man-portable surface-to-air missiles will become commonplace. Mobility aircraft and crews need to be protected from these missiles, as well as from the directed energy weapons that are now under development. The entire mobility system needs to be able to operate following the employment of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) weapons. We expect that our communications and information systems will be subject to attack in a number of ways—weapons could range from

computer viruses intended to disrupt databases to electromagnetic pulse weapons totally disabling computers, radios, and aircraft systems. We should expect asymmetric attacks; mobility infrastructure, to include major airfields, aerial port facilities, and launch and range facilities, will be a tempting target. Mobility forces are key to countering the access-denial strategies of our adversaries—greater use of air refueling, extended mission range, and direct delivery capabilities will enable global operations with less dependence upon en route bases and use of austere operating locations in a communications-challenged environment.

Mobility Air Force Capabilities

Air mobility supports the National Security and Military Strategies across the range of military operations, from peacetime operations for American global interests to engagement in major combat operations. The synergy of airlift and air refueling capabilities provides the speed and flexibility in deploying, employing, and sustaining our combat forces. With America's post-Cold War force primarily continental US (CONUS)-based, rapid power projection is essential to establishing or reinforcing a secure US or multinational presence. Air mobility delivers the bulk of time-critical forces and supplies and will remain a cornerstone of America's security strategy for the foreseeable future. As the lead command for air mobility, AMC coordinates with the other mobility air forces to provide the required air mobility force capability for the combatant commanders.

Air Mobility Capability Roadmaps

The Mobility Air Forces are responsible for two mission areas that support national security needs: Airlift and Air Refueling. Chapter 2 contains a series of roadmaps that provide a strategic view of the steps necessary to improve our mobility mission capability in these areas. Chapter 3 contains specific roadmaps for all weapon systems and Chapter 4 contains the support process roadmaps.

Roadmaps are published for the "conventional" air mobility missions such as air refueling, cargo and passenger airlift, combat delivery, special operations, and aeromedical evacuation. A new roadmap that reflects the growing importance of new capabilities required by the Global Mobility CONOPS is included as Open the Airbase. Each roadmap is based upon an approved mission capability statement and contains an assessment of our ability to accomplish the mission today and in 2030. Importantly, these roadmaps contain milestones that reflect the steps, organized into short-, mid-, and long-term time periods, which are needed to obtain the required mission capabilities. These roadmaps are written for use by strategic planners, programmers, industry partners, and senior leadership.

Generally, the deficiencies and solution sets for mission area or category roadmaps are broad in nature. These roadmaps provide the basis for future system enhancement and new acquisitions. The following are a few of the highlights. Our analysis suggests that we do not have sufficient airlift capacity at the present time to meet the warfighters' needs. To satisfy those needs, AMC intends to continue to acquire C-17 aircraft and complete the Avionics Modernization Program (AMP) for the C-130 and AMP and Reliability Enhancement and Re-engining Program (RERP) for the C-5. The C-130 fleet is aging, and we should retire the C-130Es and early H-models because of significant structural challenges brought on by decades of hard use. Our tanker fleet is aging and stretched to the limit. We plan on retiring the KC-135Es and look to recapitalizing the fleet. The Tanker Analysis of Alternative results will be the key to deciding on the best way to replace the KC-135 with a modern, more-capable aircraft. It is clear that we need to modernize the remaining fleet to make it more mission-capable. Avionics upgrades to the KC-10 and KC-135 will bolster worldwide operations. During adverse weather conditions, mobility operations are limited to airfields with ground-based navigation aids; autonomous approach and landing systems, using a combination of global space-based systems and on-board systems, are being pursued to permit all-weather operations. As mobility aircraft operate in this new environment, traditional roles will be expanded to maximize all the assets aboard to provide the greatest capability. In addition, mobility aircraft will operate in harm's way, thus making robust aircraft defensive systems necessary. Today, programs are established to equip some aircraft with the Large Aircraft Infrared Countermeasures (LAIRCM) system; and research is ongoing to equip our aircraft with follow-on systems that will be capable of defeating emerging, even more-lethal threat systems. Our analysis also shows a lack of a robust situational awareness, shared knowledge, command and control, information operations capability to support network-centric operations with MAF, Combat Air Forces (CAF), and Civil Reserve Air Fleet (CRAF) aircraft, as well as with Air Force, Joint, coalition, and civil organizations.

Although Open the Airbase is new for AMMP 2006, the Air Force has been opening airbases around the world for many years. Tactical airlift units led the way with Airlift Control Elements during Vietnam and, under the Global Mobility CONOPS, the MAF has the responsibility to open airbases for all Services. The Open the Airbase Roadmap illustrates this paradigm shift and shows how Contingency Response Groups (CRGs), composed of pre-identified personnel designated to respond quickly during regional contingencies, will open and establish airbases. The objective is to quickly respond to any developing situation or contingency by rapidly deploying right-sized supporting forces and capabilities. These forces and capabilities comprise the building blocks to rapidly open and stand up an airbase to support sustained air operations.

The AMMP contains weapon system roadmaps, located in Chapter 3, which provide more detailed guidance for the specific airframe type. Weapon system roadmaps support the generalized guidance contained in the various mission category roadmaps and are used by the Aeronautical Systems Center (ASC) when working aircraft modification programs. AMMP weapon system plans are useful for guiding operational programming actions, fleet modernization programs, and acquisition actions by AMC and Air Force Materiel Command (AFMC) headquarters personnel. The roadmaps published in the AMMP contain an assessment of airframe capabilities, applicable force structure charts, weapon system-specific deficiencies and solution sets, and program/modification funding charts. There are a significant number of modernization programs being worked today, and they are discussed in these roadmaps. Three significant programs are in place to address the fact that today's C-5, C-130, and KC-10 fleets do not meet communication, navigation, surveillance / air traffic management (CNS/ATM) requirements; the C-5 and C-130 Avionics Modernization Programs and the KC-10 Aircraft Modernization Program are under way to solve the shortfall in capability. Additionally, the real-time information to the cockpit (RTIC) will address global data link for both CNS/ATM and command and control requirements.

Air mobility has nine support processes, and associated roadmaps, that provide a foundation for the successful accomplishment of all mobility missions associated with each mission category. They include issues such as Command and Control and Information Operations, Logistics, and Force Protection. Air mobility relies heavily upon a robust fixed and mobile en route infrastructure to execute the global mission. The en route structure employs all the support processes and is used to provide services such as aircraft servicing, command and control, aerial port operations, and maintenance for transiting MAF aircraft. The AMMP recognizes that mobility operations are evolving, and the support needed to conduct global operations is increasing as well. Therefore, AMMP 2006 includes Modeling, Simulation, and Analysis (MS&A) and Counter-CBRNE Roadmaps.

All support process roadmaps address key issues—four illustrate our plans to increase the air mobility capability of the MAF. First, very significant infrastructure improvements are under way to improve the capability of our en route system; construction projects totaling $470 million will bring Ramstein AB and Spangdahlem AB up to standards for their increased mobility support mission. Global mobility operations require large amounts of fuel; therefore, major improvements are being made to upgrade the fuel hydrant systems and bulk fuel storage capacities at bases throughout the Pacific. Secondly, the AMMP recognizes that air mobility is dependent upon robust command and control, information operations, and communications capabilities—the Command, Control, Communications, Computers, and Intelligence and Information Operations Roadmap lays out the programs that will support network-centric operations with MAF, CAF, and CRAF aircraft, as well as, Air Force, Joint, coalition, and civil organizations. This roadmap contains solutions that will enable quicker, more accurate decision-making than that of our adversaries. Network-centric operations, global secure classified and unclassified communications, enterprise architectures, and standardized applications will support global situational awareness, shared knowledge, collaborative planning, and synchronized execution. These programs will also enable global management and tracking of air mobility assets and provide intransit visibility of cargo, passengers, fuel delivered, and mobilized aircraft. Third, air mobility must be prepared for operations following the use of CBRNE weapons. Consequently, significant effort is focused on training to conduct mobility operations in CBRNE-contaminated environments, developing reliable detection equipment, protective clothing, antidotes, laser eye protection, and hardening our systems against electromagnetic pulse weapons. The Counter-CBRNE Roadmap lays out a course of action that will permit mobility operations following the employment of weapons of mass destruction. Our limited capability to operate in a chemically contaminated environment will be expanded in the near term, and we expect to be able to operate in a biologically contaminated environment by 2020.

Finally, we see the need to provide an integrated mobility system (operations and support), both long range and theater, to support the transformed Army of the future that will demand battlefield maneuver and responsive sustainment. Advanced technology is a key enabler of that system, as it offers the potential to significantly improve our mobility capability. AMC is working closely with the Air Force Research Laboratory (AFRL) and industry on capability improvements such as the Advanced Mobility Concept Aircraft (AMC-X) that has improved ground flotation for soft-field operations, very good short-field performance, high survivability, synthetic vision techniques, and autonomous approach and landing systems. Emerging technologies are being explored for possible solution set integration in every roadmap contained in this Master Plan.

AF Roadmap

AMMP 2006 lays out a technologically feasible course for the future. AMC's input to the AF Roadmap connects programs and future capabilities to produce an overall Air Force plan that will result in an operationally effective force within a fiscally constrained environment.

Chapter 1—Future Operating Environment

"Our national security strategy is founded upon two pillars:

The first pillar is promoting freedom, justice, and human dignity—working to end tyranny, to promote effective democracies, and to extend prosperity through free and fair trade and wise development policies. Free governments are accountable to their people, govern their territory effectively, and pursue economic and political policies that benefit their citizens. Free governments do not oppress their people or attack other free nations. Peace and international stability are most reliably built on a foundation of freedom.

The second pillar of our strategy is confronting the challenges of our time by leading a growing community of democracies. Many of the problems we face—from the threat of pandemic disease, to proliferation of weapons of mass destruction, to terrorism, to human trafficking, to natural disasters—reach across borders. Effective multinational efforts are essential to solve these problems. Yet history has shown that only when we do our part will others do theirs. America must continue to lead."

President Bush, National Security Strategy, March 2006

The profound changes that have taken place in the international security environment at the beginning of this new century are unprecedented. Our Nation will continue to confront an environment that is characterized by an array of adversaries who will employ any means of attack to exploit our weaknesses. Failed states, terrorist organizations, and coalitions hostile to the US will exploit widely available technologies to develop dangerous capabilities to use against us to include weapons of mass destruction (WMD). The March 2006 National Security Strategy (NSS) states, "It is the policy of the United States to seek and support democratic movements and institutions in every nation and culture, with the ultimate goal of ending tyranny in our world. In the world today, the fundamental character of regimes matters as much as the distribution of power among them. The goal of our statecraft is to help create a world of democratic, well-governed states that can meet the needs of their citizens and conduct themselves responsibly in the international system. This is the best way to provide enduring security for the American people."

Our nation's commitment to encourage free and open societies was clearly seen in multiple, first-time elections in the Middle East: Iraq, Afghanistan, Palestine, and Lebanon. Had it not been for the actions of the US and our allies, this would not have been possible. This success has not come without sacrifice. Standing against the threats of those who would prevent this freedom, US service men and women, our allies, friends, innocent civilians, and foreign nationals have given their lives to give others the opportunities democracy offers. Their sacrifice is a testimony to the ever-threatening environment our world must face.

All of these developments have important implications for the employment of air mobility forces. The fact that new, unforeseen trends will undoubtedly emerge in the coming years requires that our plans, as well as our air mobility forces, be flexible and robust in the face of uncertainty.

The NSS focuses on several essential tasks. The United States must:

- Champion aspirations for human dignity;
- Strengthen alliances to defeat global terrorism and work to prevent attacks against us and our friends;
- Work with others to defuse regional conflicts;
- Prevent our enemies from threatening us, our allies, and our friends with weapons of mass destruction;
- Ignite a new era of global economic growth through free markets and free trade;
- Expand the circle of development by opening societies and building the infrastructure of democracy;
- Develop agendas for cooperative action with other main centers of global power;
- Transform America's national security institutions to meet the challenges and opportunities of the 21st century; and
- Engage the opportunities and confront the challenges of globalization.

While focusing on these tasks, the US must continue to maintain the ability to respond rapidly and decisively to world changes in defending the homeland, promoting security and deterring aggression, and to fight and win the Nation's wars. The US military employs the same strategy to ensure protection of the US, our allies, and their interests.

In March 2005, the Secretary of Defense released the National Defense Strategy (NDS). This strategy builds upon the goals advanced in the NSS and National Military Strategy (NMS). It goes further to include more emphasis on better preparing to deal with traditional, irregular, catastrophic, and disruptive challenges that must be overcome now and in the future.

The NDS describes each of the following four challenges:

The first is **Traditional**; states employing armies, navies, and air forces in long-established forms of military competition.

The second challenge is **Irregular**; adversaries employing irregular methods aimed to erode US influence, patience, and political will.

The third is **Catastrophic**; the ability of the adversaries to have easy access to information-related technologies and the ability to possess or seek WMD. This challenge is very problematic because the US or our allies cannot afford to allow this to happen even once. Every measure must be taken to dissuade any adversary that may pose this challenge.

Finally is **Disruptive**; revolutionary technology and associated military innovation that can fundamentally alter long-established concepts of warfare. This challenge can be almost as devastating as catastrophic because of the exploitation of US vulnerabilities and those of its partners.

The NDS provided the strategic foundation for Quadrennial Defense Review (QDR) 2006. It reinforces the reality that although the U.S. military maintains considerable advantages in traditional forms of warfare, this one is not the only or even most likely one in which adversaries will challenge the United States. The Global War on Terrorism is an example of the types of wars our nation must be prepared to fight and win. QDR 2006 seeks to operationalize the NDS strategy by identifying four priority areas the DOD must focus on to ensure mission success:

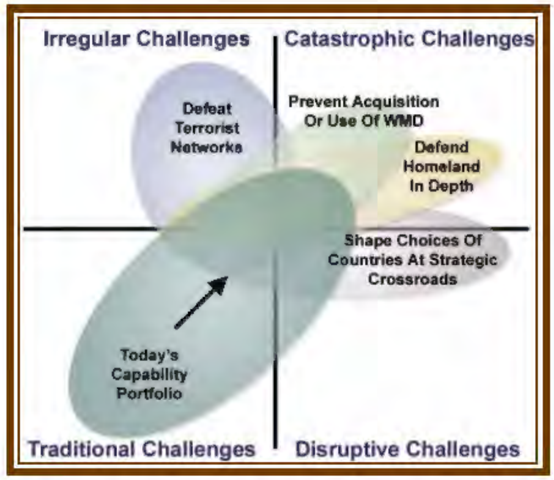
(1) Defeating terrorist networks.

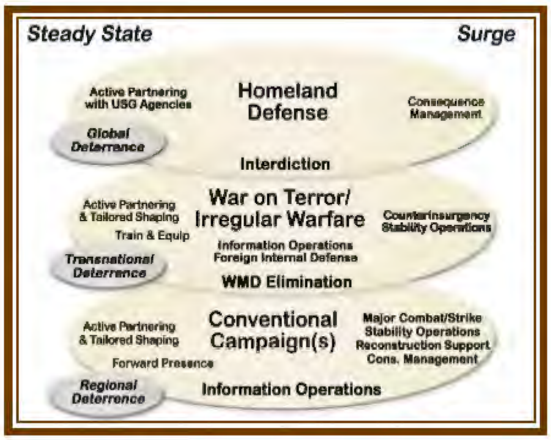
(2) Defending the homeland in depth.

(3) Shaping the choices of countries at strategic crossroads.

(4) Preventing hostile states and non-state actors from acquiring or using WMD.

As the diagram to the right shows, the DOD is shifting its portfolio of capabilities in these four critical areas to address the irregular, catastrophic, and disruptive challenges while sustaining capabilities to address traditional forces. Although these focus areas do not encompass the full range of activities the DOD may have to conduct, they are the most pressing problems that must be addressed. Air Mobility plays a critical role in all four areas. These areas have both near and long term implications for air mobility operations. Acquiring, sustaining, and strengthening MAF capabilities in these areas will improve the versatility of the MAF force to perform a wider range of mobility operations than today.



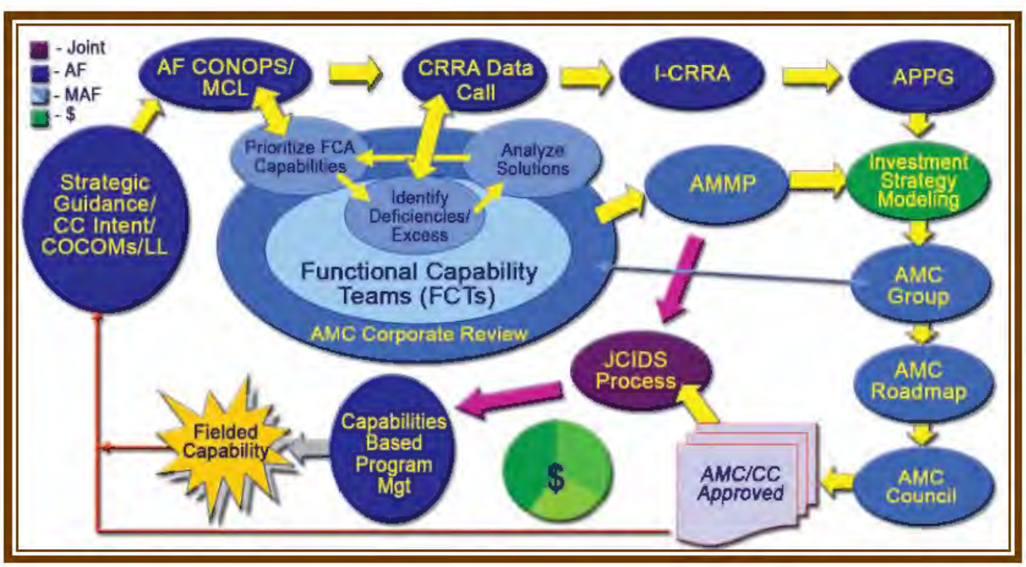


QDR 2006 refined the 1-4-2-1 Force Planning Construct. This refined planning construct for wartime (shown left) will be used instead of the force planning guidance published in the March 2005 NDS.

Speed, agility, and tailored forces characterize the Joint Force capabilities required to achieve the goals outlined in the NSS, NDS, NMS, and the QDR. Building upon the goals and objectives set by our strategic-level guidance, the following section describes the impact of political, economic, and social trends—as they shape the international security environment of tomorrow—and what effects they will have on MAF operations.

The MAF Planning Process

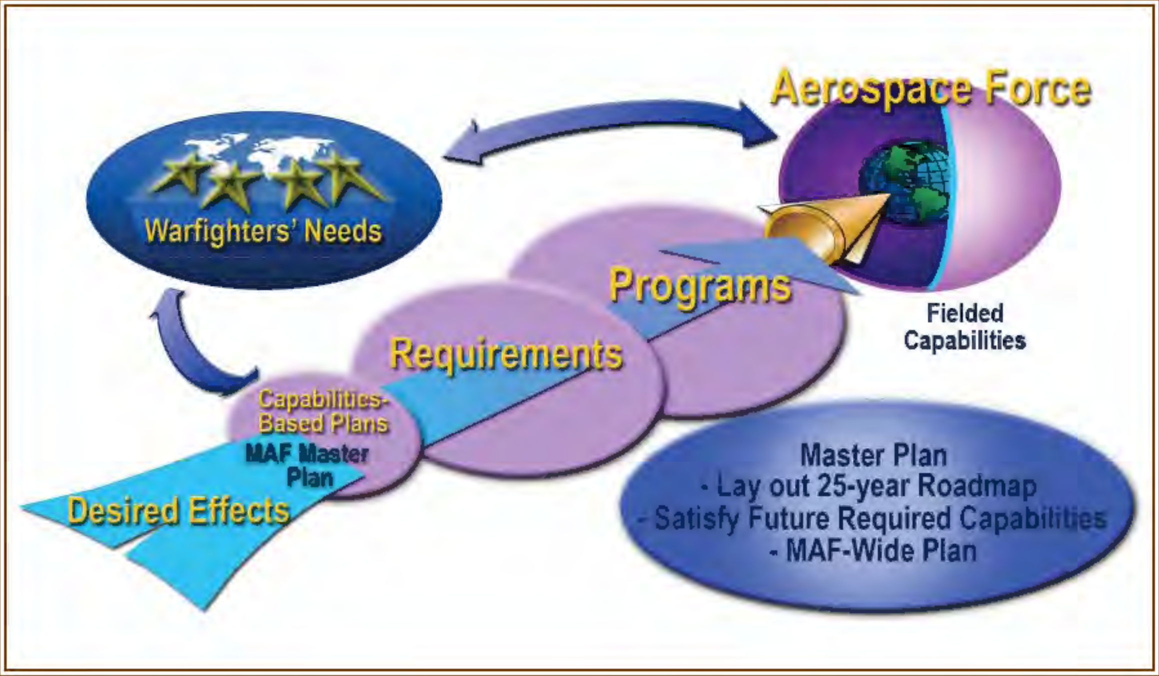
As shown on the chart below, AMMP 2006 supports effects-driven, capabilities-based operations. This plan is based on supporting our NSS, NDS, and NMS and is shaped by Joint and Air Force doctrine and US Transportation Command planning guidance. This plan ensures that the MAF provides the capabilities called for by Joint Operations Concepts, Joint Functional Concepts, and the Air Force Concepts of Operation (CONOPS).



Warfighting commanders put effects-based operations into practice. First, they determine campaign objectives at the strategic and tactical level. Next, they select the desired effects that will allow them to attain the campaign objectives and, thirdly, employ the right mix of capabilities to create the effects desired. Mobility capabilities are generally viewed as "enabling" the warfighter to create the desired effects—the C-17 airdrop of paratroopers in Northern Iraq enabled US Central Command to open a second front and tie down Iraqi forces in the region. Strategically, it hastened the fall of the Hussein regime and allowed for the emergence of a democratic Arab country. In some cases, mobility can be credited with causing the desired effect—airlift saved Berlin in the 1940s and, at the strategic level, directly contributed to victory in the Cold War. This plan is aimed towards providing those global mobility capabilities for future commanders to employ in order to attain their campaign objectives.

Air Force CONOPS

The purpose of the CONOPS is to make warfighting effects, and the capabilities needed to achieve them, drive everything we do. The CONOPS lay the foundation for our transformation to a capabilities-based Air and Space Expeditionary Force (AEF). The CONOPS transform the force presentation to theater commanders by providing tailored forces to employ as needed for mission success. They also transform the allocation process by linking all planning, requirements, and programming to an effects-generated, capabilities-based construct. Bottom line—the CONOPS are about warfighting and making sure the AF "toolbox" is equipped to do the job right.



In making sure the AF "toolbox" is properly equipped, the MAF continues to examine the impact that "external" threats could have on mobility operations between now and 2030. Even though it is a real challenge to predict the future, we know that uncertainty, complexity, and danger will continue to characterize the security environment. On the next page is a brief description of each AF CONOP.

Future Operating Environment

Homeland Security CONOPS	Leverages Air Force capabilities with joint and interagency efforts to prevent, protect, and respond to threats against our homeland—within or beyond US territories.
Space & Command, Control, Comm, Computers, Intel, Surveillance, & Recon CONOPS	Harnesses the integration of manned, unmanned, and space systems to provide persistent situation awareness and executable decision-quality information to the JFC.
Global Mobility CONOPS	Provides combatant commanders with the planning, command and control, and operations capabilities to enable timely and effective projection, employment, and sustainment of US power in support of US global interests—precision delivery for operational effect.
Global Strike CONOPS	Employs joint power-projection capabilities to engage anti-access and high-value targets, gain access to denied battlespace, and maintain battlespace access for required joint/coalition follow-on operations.
Global Persistent Attack CONOPS	Provides a spectrum of capabilities from major combat to peacekeeping and sustainment operations. Global Persistent Attack assumes that once access conditions are established (i.e., through Global Strike), there will be a need for persistent and sustained operations to maintain air, space, and information dominance.
Nuclear Response CONOPS	Provides the deterrent "umbrella" under which conventional forces operate, and, if deterrence fails, avails a scalable response.
Agile Combat Support CONOPS	The foundational and cross-cutting distinctive capability that enables AF operational concepts and is highly mobile, technologically superior, robust, responsive, flexible, and fully integrated with combat operations.

Operations Increase in Variety and Scale

The MAF will continue to support US forces, called upon to employ weapons against adversary forces, while simultaneously providing humanitarian assistance to the civilian population at home and abroad. The struggle against global terrorism is different from any other war in our history. The Long War is being fought on many fronts against a particularly elusive enemy and will last for an extended period of time. Trained terrorists remain at large with cells in North America, South America, Europe, Africa, the Middle East, and across Asia. It is imperative that the military be managed in a way that will allow us to deploy a greater percentage of our force where and when it is needed, anywhere in the world. The DOD is transitioning to a global force management process, which provides the ability to source force needs from a global, rather than a regional, perspective and to surge capabilities when needed into crisis theaters from disparate locations worldwide. [NDS]

> ***"…we must maintain and expand our national strength so we can deal with threats and challenges before they can damage our people or our interests. We must maintain a military without peer—yet our strength is not founded on force of arms alone. It also rests on economic prosperity and a vibrant democracy."***
>
> ***President Bush, NSS March 2006***

Sourcing, from a global perspective, and operating from global commons (space, international waters and airspace, and cyberspace), enables us to project power from secure bases of operation.

Speed is just as critical as reach, and the need for rapid global mobility continues to be a high priority. Agility is the key to achieving rapid global mobility. Being agile allows the ability to rapidly configure and deploy capabilities in geographically separated and environmentally diverse regions. [NMS] The Air Force Chief of Staff reinforced this perspective in a speech to the Air Force Association 2005 Air Warfare Symposium. "Agility doesn't mean the handling of our aircraft," he said. "It means the ability to respond to contingencies in unknown and unforeseen ways. To get anywhere we need to go, to get there quickly and to be able to persist is a growing reality of our United States Air Force."

> ***"Agility doesn't mean the handling of our aircraft...It means the ability to respond to contingencies in unknown and unforeseen ways."***
>
> ***CSAF, AWS, 2005***

Clearly, the MAF will be called upon to support contingency and humanitarian operations on a "global" scale with speed and agility and do so in a threat environment. In light of this, we can expect the support of force employment operations and other mission tasks will result in an increase of MAF smaller-scale contingency operations. In other cases, the MAF will be called upon to support the large-scale displacement of indigenous peoples, requiring significant air refueling and airlift operations to provide humanitarian assistance in the form of food, shelter, and medical supplies. The MAF will also continue to support humanitarian operations at home (i.e., the support provided as a result of Hurricanes Katrina and Rita).

Whether the MAF is supporting a small contingency or a large-scale humanitarian mission, it will be faced with the challenges of austere locations, undeveloped infrastructure, and hostile territories. Because of the threat of internal unrest, some allies may grant US forces permission to operate from their territory only if those operations have the lowest possible profile. This means US forces, including mobility forces, may have to operate without extensive support infrastructure and little or no host-nation support. Such operations will require the use of new innovative support concepts that could result in the merging of air mobility and agile combat support into a seamless network of warfighter support capabilities (i.e., common leading edge communication systems, to assure reach-back and/or reach-forward connectivity from anywhere in the world). Similarly, we may have to pick up and move to another cooperative security location and set up and operate without interruption in the operation. To have extended reach capability, we must ensure adequate refueling capabilities. Other challenges, no doubt, await the MAF in the future.

If the MAF is to meet the challenges in the 2030 warfighting environment, we must ensure our aircraft, personnel, and information systems are protected. The NMS states, "Global proliferation of a wide range of technology and weaponry will affect the character of future conflict. Dual-use civilian technologies, especially information technologies, high-resolution imagery and global positioning systems are widely available. These relatively low cost, commercially available technologies will improve the disruptive and destructive capabilities of a wide range of state and non-state actors. Advances in automation and information processing will allow some adversaries to locate and attack targets both overseas and in the US. Software tools for network-attack, intrusion and disruption are globally available over the internet, providing almost any interested adversary a basic computer network exploitation or attack capability." To meet these ongoing threats, it is critical for the MAF to have highly trained personnel, implementing the newest information technology.

Complex International Environment

In the future, the US will rely heavily on our allies to help protect information and sustain the forces as we conduct military operations across the globe. Their support in shaping the international environment will be a significant factor to our success in influencing the battle space. "The US cannot achieve its defense objectives alone. Our concept of active, layered defense includes international partners. To better meet new strategic circumstances we are transforming our network of alliances and partnerships, our military capabilities, and our global defense posture. Our security is inextricably linked to that of our partners. We must look to expand our role in providing first-class training to our allies which will cement coalition relationships and foster international cooperation. The forward posture of US forces and our demonstrated ability to bring forces to bear in a crisis are among the most tangible signals of our commitment to the security of our international partners." [NDS] One key goal of the NSS is to work with other nations to resolve regional crises and conflicts. In some cases, US forces will play a supporting role, lending assistance to others when our unique capabilities are needed. In other cases, US forces will be supported by international partners.

> ***"The US cannot achieve its defense objectives alone. Our concept of active, layered defense includes international partners."***
>
> ***National Defense Strategy 2005***

Air mobility forces must be prepared to support security operations across the globe, project a global US presence, and demonstrate US goodwill through humanitarian relief operations, in a complex international environment characterized with the use of anti-access strategies by our adversaries. This will require the MAF be adept at interacting with an expanded array of groups and organizations. Regional organizations, such as the European Union and the Organization for African Unity, will sometimes be the source of aid requests for their members, and will desire a leadership role in the execution of the aid operations. The role of nongovernmental organizations is growing; and the MAF will increasingly work with them during humanitarian operations. Our experience in Somalia illustrated how a humanitarian relief effort can rapidly evolve into combat operations and that there may be a number of players anxious to oppose US goodwill actions. The nonstate groups are more amorphous and difficult to fight because they do not have clearly identifiable headquarters or sources of funding. Many of these groups are becoming allied with organized crime and drug syndicates. These challenges, along with the threats posed by a long-term Global War on Terror, will result in a complex and threatening operating environment in which our air mobility forces must operate.

The future international community will be armed with a myriad of advanced weaponry. Kinetic energy kill capabilities, advanced anti-radiation weapons, high-energy lasers, long-range surface-to-air missiles, and lightweight interceptors are some of the developing technologies that will influence the weapons of tomorrow. To the extent that the US takes advantage of such technologies, new defensive systems for air mobility forces, such as directed energy self-defense systems, could emerge. At the same time, however, there could be new threats to our air mobility forces as other countries acquire and exploit innovative technologies for their own military purposes. NDS recognizes this when speaking of disruptive challenges our nation could face. "Some disruptive breakthroughs, including advances in biotechnology, cyber operations, space, or directed-energy weapons, could seriously endanger our society. As such, breakthroughs can be unpredictable we should recognize their potential consequences and hedge against them."

Greater Asymmetric Threats

Recent events throughout the world have highlighted the concern that asymmetric threats will pose more danger to our air mobility forces than in the past, both at home and abroad. Terrorist strikes at various locations around the globe, without regard for human life, demonstrate the dangers military and civilians face in today's environment. Using any means at their disposal to achieve their goals, terrorists and nonstate actors will continue to attempt to disrupt peace and stability in countries around the world. Our adversaries will attempt to bypass the use of conventional forces and seek asymmetric means to attack US forces both overseas and at home. Such attacks will be intended to cause high US casualties, in an effort to sway public opinion against an operation and to force a withdrawal.

Chemical attacks on aerial ports of debarkation could temporarily stall the deployment of our forces. In addition, biological agents could be spread in a manner similar to chemical agents—through the use of tactical ballistic missiles. The biggest challenge for the MAF will be operating in these environments. We must be able to transit contaminated areas, pick up contaminated patients, and then be able to sanitize aircraft, equipment, and living areas. We recognize, however, that a biological incident will probably emerge as an isolated illness until it spreads and gains the attention of medical facilities such as the Center for Disease Control.

The spread of radioactive material through the use of conventional explosives, referred to as a radiation dispersal device, may cause widespread panic and confusion. Another type of asymmetric strategy would be information warfare attacks to sow confusion and leave our forces vulnerable to attack. Adversaries will increasingly attempt to deny MAF access to certain regions. This anti-access strategy may include forward operatives with advanced man-portable air defense systems at major CONUS bases and at major transload sites, massive attacks by cruise missiles on forward bases, and a robust air defense system over the area of responsibility precluding entry into the area of interest. Therefore, it is imperative that the MAF continues to work toward a smaller, more-agile footprint as we work around the globe.

High Operations Tempo (OPTEMPO)

Since the end of the Cold War, the trend has been toward greater use of air mobility forces in small-scale contingencies (SSCs), ranging from rapid deployments of forces to Southwest Asia, to global humanitarian relief operations like the tsunami catastrophe in the Indian Ocean/Southeast Asia. The MAF relies upon the volunteerism of the Air Reserve Component (ARC) and uses the commercial carriers of the Civil Reserve Air Fleet (CRAF) to conduct SSC operations. These forces become

fully available when activated, albeit CRAF may be activated in three stages depending on the airlift requirement. The demands on the forces that actually are available for contingency operations have been considerable and have begun to affect personnel retention and aircraft mission capable (MC) rates. To sustain ongoing military events around the globe, active duty, ARC, and Guard forces have been strained. As we confront the future operating environment, it will be challenging for leaders to discover ways to maintain the military balance required to meet operational demands.

One challenge will lie in the requirement to maintain a high degree of readiness and training while continuously called upon to deploy forces from home stations to forward areas, where we will commence operations immediately upon arrival. The frequency and duration of these deployments have been highly unpredictable and have resulted in stresses on personnel and declines in readiness. In addition, these contingencies require forces that are highly tailored to particular situations, resulting in the use of provisional units and ad hoc command arrangements. AEF is the Air Force response to this new environment. However, because of the types of missions the airlift, air refueling, and maintenance support packages work, they do not fit neatly into the AEF construct. The MAF continues to struggle to find the right solutions to decrease the OPTEMPO and provide a more stable environment for MAF crewmembers, maintainers, and support personnel.

Enhanced Force Protection and Defensive Systems

It may not be possible to predict exactly what will take place in the future operating environment of the MAF; however, one thing is certain: the importance of force protection will continue. The MAF will face a wide range of dangers, including conventional, unconventional, terrorist, criminal, insider, environmental, WMD, civil unrest, and informational data threats. More advanced weapons, such as lasers, high-powered microwaves, acoustic weapons, or other high-technology weapons still in development, will have an impact on future MAF operations. “The entire range of strategic threats can put at risk our bases of operation at home and abroad. While we can identify some—e.g., missiles and WMD—others, like those employed against the US and its partners since September 11, 2001, may be harder to identify. We need to improve defenses against such challenges and increase our capacity to defeat them at a distance.” [NDS]

The MAF must be able to adapt to changing peacetime and wartime environments and shape them to our operational advantage. To ensure mobility dominance in this rapid and forever-changing world, the MAF must invest in advanced technologies and innovative mobility concepts that provide the capabilities required to support our national security strategy and military objectives.

Support Operations Require Quick Responses

It has been long recognized in the air mobility community that the chief limiting factor on deployment operations is not the number of available aircraft or crews, but rather the capability of the en route or destination infrastructure to accommodate the ground operations of mobility aircraft. To overcome these limitations, future air mobility forces will emphasize greater unrefueled range, decreased en route infrastructure support requirements, and enhanced intermodality of cargo and mission equipment across strategic, theater, and tactical air mobility assets. Not only will this enable the improved movement of air and land forces forward, it will help to overcome anti-access strategies used to provide sanctuary for the enemy. “A key goal is developing the capability to surge military forces rapidly from strategic distances to deny adversaries sanctuary. In some cases, this will involve discrete Special Operations Forces (SOF) or precision attacks on targets deep inside enemy territory. In others, sustained joint or combined combat operations will be necessary, requiring the comprehensive defeat of significant state and nonstate opponents operating in and from enemy territory or an ungoverned area.” [NDS]

Whether hunting down terrorists overseas or defending US interests at home and abroad, responsiveness will be required in order to meet the challenges of the future environment. SOF and combat aircraft must arrive quickly to be effective against elusive, fleeting targets. Similarly, the air defense of critical facilities in the homeland will impose demanding timelines on combat aircraft and our tanker forces. Even relief efforts to aid affected civilian populations must arrive rapidly to be most helpful. The lack of predictability associated with these operations may stress mobility forces in different ways than other operations of the past.

Limited numbers of forces have the potential to be employed more efficiently and effectively with the aid of the network-centric environment. NDS states, "The foundation of our operations proceeds from a simple proposition: the whole of an integrated and networked force is far more capable than the sum of its parts. Continuing advances in information and communications technologies hold promise for networking highly distributed joint and combined forces. Network-centric operational capability is achieved by linking compatible information systems with usable data. The functions of sensing, decision-making, and acting—which often in the past were built into a single platform—now can work closely even if they are geographically distributed across the battlespace." NDS goes on to state, "Transforming to a network-centric force requires fundamental changes in processes, policy, and culture. Change in these areas will provide the necessary speed, accuracy, and quality of decision-making critical to future success."

> ***"...the whole of an integrated and networked force is far more capable than the sum of its parts."***
>
> ***NDS***

The MAF's objective is to provide rapid global projection and sustainment of combat capability to support warfighting commanders at a level that ensures "unprecedented responsiveness" to the Defense Transportation System. In order to rapidly deploy US forces and initiate operations at remote, bare bases around the world, AMC must dynamically command and control forces by delivering decision-quality information to the hands of commanders and warfighters in a network-centric environment.

MAF Today and Tomorrow

The MAF faces challenges from the threats expected in the future operating environment while supporting the NDS. During the first phase of our strategic planning process, the mission area teams thoroughly reviewed today's mobility capabilities in our two mission areas—airlift and air refueling—against the future operating environment. The result of this analysis is the identification of capabilities required for mobility forces to properly meet our national security needs in the year 2030. Next, in a gap-analysis study, we compare today's capabilities against those required in the future; shortfalls, commonly referred to as capability deficiencies, were identified and validated. Lastly, solutions to our capability shortfalls are worked by Headquarters AMC, the AF Battlelabs, industry, and various service or commercial laboratories. The next chapter contains roadmaps that show our plans to provide improved mobility capabilities over the next 25 years. These roadmaps assess the adequacy of today's capabilities to meet tomorrow's demands, as well as showing the steps, or milestones, that we will follow to provide the required capabilities. As you review these roadmaps, several themes will become apparent to you, themes that thread their way through the roadmaps and shape our long-range plans.

First, we look at "airlift" from a new perspective…as a capability where inter- and intratheater missions are merged into one mission…one that offers improved airlift effectiveness over efficiencies. Historically, we measured our ability to provide the amount of cargo that we are capable of moving in a metric of million ton-miles per day. That is a measure of fleet capacity and depends upon the airlift system (aircraft, crews, maintainers, aerial ports, and en route airfields) working at high efficiencies. Lessons learned in Afghanistan and Iraq again show that, during war, effectiveness often is more important than efficiency in operations. Merging the two missions will provide improved effectiveness for the war fighters, and this approach is guiding our future planning. One product of this approach is common, versatile aircraft and support systems that give commanders improved flexibility to conduct operations as required to best support the mission at hand. With that perspective, we need to provide the capability to move the Army's Future Combat System on the battlefield to the areas where it is required for the fight. We will also investigate the value of common modules (See Configurable Air Transport [CAT]) on strategic, theater, and tactical aircraft to both improve throughput and enable a loaded module to be delivered directly from CONUS or regional bases to a forward location, without the need for traditional transloading of cargo and passengers between aircraft.

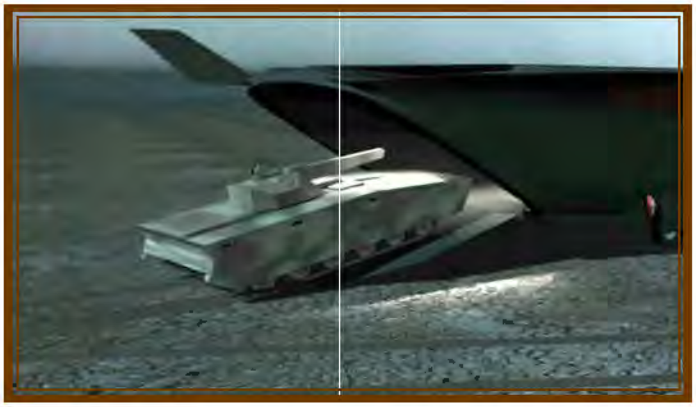
- **Flexibility for Mission Taskings**
- **Commonality of Systems**
- **Independence from Infrastructure**

Tomorrow's tanker fleet needs to be made more capable and flexible as well. Today's tanker fleet, designed to support the Strategic Air Command in the 1950s, serves us well today in the air bridge and theater air refueling roles. We know, however, that our capability needs to be transformed in order to meet future refueling capability needs. The next generation of strike aircraft will be reliant upon refueling operations to reach targets deep in denied territory—our tankers will need to be able to operate in contested airspace if strike aircraft are to be successful. Similarly, future tanker aircraft will still continue to support the nuclear strike capability of US Strategic Command (USSTRATCOM). We also will need to refuel unmanned vehicles engaged in strike, destruction of enemy air defenses, or surveillance operations—these mission all suggest that we should explore the benefits to be derived from unmanned air refueling aircraft. Future tankers will need to be self-deployable, capable of performing the secondary missions of airlift and aeromedical evacuation, and function as a node in the net-centric operations. A possible design that needs exploration is the slender blended-wing body aircraft, configured to carry multi-mission modules, that may meet improved tanker range requirements while permitting the airframe to perform a broad number of missions.

Secondly, we need to use common systems wherever possible as we modernize our current fleet of aircraft, select the replacement tanker, or design the next-generation airlift aircraft. The benefits of this approach are manyfold—common systems on today's aircraft reduce supply requirements; common systems on tomorrow's aircraft will reduce overall engineering development costs plus minimize the sustainment costs over the life-cycle of the weapon system. Common systems and equipment also suggest that aircrew and maintenance training costs should be lower because there will be fewer unique training modules or courses required. We expect to see a dramatic reduction in the time required to qualify crew members on "new" aircraft since they would already be familiar with the common cockpit and aircraft systems from their previous assignment; only new mission qualifications would be necessary. Maintenance technicians would be familiar with the systems, whether propulsion, hydraulics, electronics, or computers, on nearly every aircraft and need only aircraft differences training certification. Ultimately, crew members might be able to perform a wide variety of missions while flying essentially common airframes.

Third, we are continuing to look at a number of ways to reduce our dependency upon the mobility infrastructure used to deploy and sustain US forces around the globe. There should be no doubt that the anti-access and area-denial strategies of our adversaries will make use of today's en route bases more tenuous. Well-established overseas bases, used for refueling stops and aircrew stage locations, have long been necessary because of limited aircraft range. We have seen the advantages gained by refueling C-17s and flying them nonstop to deliver cargo and passenger directly to landing zones in forward areas. Time is saved by overflying stops en route to the objective areas; cargo handling times are minimized; en route delays are avoided; and the difficulties associated with obtaining diplomatic clearance and base landing right permissions are minimized. Recent operations have shown the value in having the MAF open airbases in forward areas—this trend will continue, but we need to ensure that our personnel are well trained and equipped to support US expeditionary operations. We need to energize industry and the laboratories to aggressively pursue new propulsion systems that dramatically reduce fuel consumption, build airframes with landing gear structures that permit short-field operations on unprepared surfaces, and operate regardless of weather conditions.

A modern look at the mobility infrastructure shows that it extends well beyond physical air bases—in fact, it includes all of the mobility support systems and processes. All are in need of transformation to meet tomorrow's mobility demands. Today, cargo handling equipment is needed for palletized cargo loading and offloading operations—tomorrow's aircraft should have a self-contained capability to do that. New automated tools are needed to identify, prioritize, and integrate user deployment and resupply requirements during contingencies. Accurate intransit visibility is absolutely critical if future combatant commanders are to quickly plan and mount operations against mobile, shadowy enemies. As we grow more dependent upon these information systems, we also recognize that they are becoming lucrative targets for an asymmetrical enemy. Attacks against the systems, or the data they hold, will be detrimental to national security. Capabilities must be developed which will defend against attacks, allow continuous command and control system operations during an attack, and/or influence the enemy's perception of the battlespace. Future force protection measures must be applied to all aspects of the mobility infrastructure.



With this perspective of our future mobility capability needs, turn to Chapter 2 for a look at how we are going to travel there.

Chapter 2—Air Mobility Capabilities Plan

Chapter 1 showed the highlights of our analysis of the future operating environment in which the Mobility Air Forces will operate. With America's post-Cold War military services primarily based in the continental United States, rapid power projection will be essential to our national interests. Threat systems will continue to become more lethal and commonplace, weapons of mass destruction will continue to proliferate throughout the world, and our adversaries will continue to employ anti-access and area denial strategies. Air mobility supports the National Security and Military Strategies across the range of military operations, from supporting peacetime humanitarian missions to participating in major combat operations. The synergy of airlift, air refueling, and combat support capabilities provides speed and flexibility in deploying, employing, protecting, and sustaining our combat forces. This chapter lays out the course that the Mobility Air Forces will follow in order to provide the mobility capabilities necessary to meet our Nation's needs from now through the year 2030.

The Mobility Air Forces are responsible for accomplishing the airlift and air refueling missions. The AMMP lays out the mission, weapon system, and mission support roadmaps—these roadmaps are the very core of our capability-based strategic mobility planning effort.

The assessment portion of each mission category and support process roadmap shows our strengths as well as those critical areas that need improvement if we are to have an effective mobility capability in the years to come. Milestones are established for each airlift and air refueling mission category and support process. The milestones, technologically and fiscally doable, show the steps we will take to overcome our shortfalls to finally achieve the desired capabilities for each area.

Air Mobility Mission

> ***"The mission of the United States Air Force is to deliver sovereign options for the defense of the United States of America and its global interests—to fly and fight in Air, Space, and Cyberspace."***
>
> ***Michael W. Wynne***
> ***Secretary of the Air Force***
>
> ***T. Michael Moseley***
> ***General, USAF***
> ***Chief of Staff***

Air Mobility supports the Air Force mission by providing global reach for the United States through airlift and air refueling of the Nation's military forces and other authorized agencies. It provides the wherewithal to project US forces rapidly overseas in support of actions ranging from humanitarian operations to warfighting. Today's strategic environment reinforces the importance of air mobility. US forces, responding to overseas contingencies, must be projected over long distances from CONUS—and this trend is expected to continue in the national defense strategy discussed in Chapter 1 of this plan. This force structure defense strategy is defined as first defending the US homeland and territory against external attacks while deterring aggression and coercion in critical regions of Northeast Asia, East Asian Littoral, Middle East/Southwest Asia, and Europe; swiftly defeating the efforts of an adversary in two overlapping wars while preserving the President's option to call for a decisive victory in one of those conflicts—including the possibility of regime change or occupation.

Mission Description

Rapid global mobility is achieved through the optimized use of active duty and Air Reserve Component military airlift and air refueling forces, and is supplemented by the Civil Reserve Air Fleet during major operations. The essence of global mobility is quickly moving large quantities of personnel, equipment, combat forces, and supplies from the continental US to overseas theaters, between theaters, and from ports of embarkation in the theaters to points of effects as close as practicable to the final destination. Any movement must be exercised as a single seamless process, providing a commander visibility over air mobility operations and providing customers a "single face" for their air mobility requirements.

Airlift

Airlift provides the ability to rapidly transport personnel, equipment, combat forces, fuel, and supplies anywhere on the globe. Airlift offers commanders a degree of speed, range, and flexibility not available with any other mode of transportation, making it an important instrument of foreign policy and an essential wartime capability. The distinction between intertheater and intratheater airlift has in the past been largely a function of the capabilities of the aircraft employed. However, with the continuing acquisition of the C-17, this distinction is blurring; and concepts of operation, such as direct delivery and theater augmentation, are expanding the range of options available for planners. Future airlift assets must be capable of providing airlift support from point of embarkation to point of effects, delivering personnel and assets to any location on the globe including prepared, unprepared, and austere airfields without the use of ground-based navigational aids and regardless of weather conditions.

Air Refueling

Combined with airlift, the capability provided by in-flight refueling makes rapid global mobility possible. Air refueling provides the flexible "air bridge" concept substantially enhancing our Nation's force projection capability. It functions as a "force multiplier" by accelerating the deployment cycle and reducing dependency on forward staging bases and host-nation support.

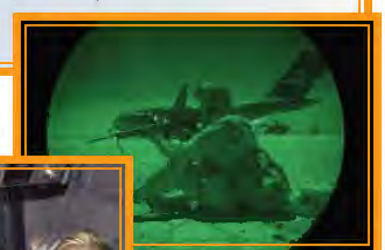
Air refueling also acts as a "force enhancer" by extending the range, payload, and loiter time of combat and combat support forces. The increased range afforded by air refueling allows fighters and bombers to attack strategic and tactical targets well within the interior of the enemy's defenses. The additional range afforded by air refueling increases the complexity of an enemy's defensive problem and allows us to maximize the element of surprise.

Air Mobility Support Processes

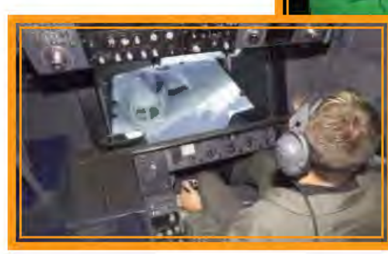
Support is the backbone of global mobility. Large-scale mobility operations require an integrated system of support forces in place to ensure aircraft are serviced and maintained, crews are rested, and passengers and cargo are properly handled. Our support processes are melded into a global network of manpower, materiel, and facilities that provide command and control, logistics, and aerial port services to air mobility forces. Contingency Response Groups perform critical roles in opening air bases around the globe. Support Processes serve as the foundation for our Nation's ability to rapidly project power anywhere in the world.

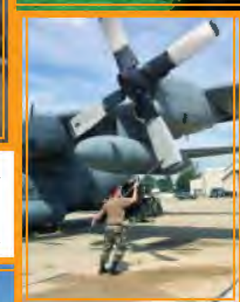
Open the Air Base. The Air Force has been opening air bases around the world for many years—the Army Air Corps established airlift bases in the Burma jungles during World War II, and tactical airlift units, using Airlift Control Elements, opened bases for airlift operations during Vietnam. Today, the Global Mobility CONOPS drives our base opening capability; first assessing and verifying the suitability of the airfield, followed by setting up command and control, operations, and maintenance capabilities, while providing force protection capabilities and air traffic control. Our objective is to quickly respond to any developing situation or contingency by rapidly deploying right-sized supporting forces and capabilities to open up an air base that can support sustained operations.

Airlift, Air Refueling, and Support Roadmaps

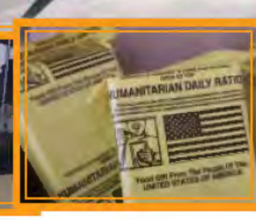


The Mobility Air Forces conduct mobility operations around the globe in support of national objectives. This section includes the major roadmaps for the various airlift mission categories and air refueling. These roadmaps are designed to serve as approved flight plans to follow over the next 25 years and give us the overarching guidance to field the required mobility capabilities. Detailed, individual weapon system roadmaps are contained in Chapter 3. The Open the Air Base Roadmap, new to the AMMP, is included in the Support Process Roadmaps section.





AMC is dedicated to providing quality aircrew training to provide aircrews capable of supporting the requirements set forth in the AMMP. An integral part of all aircrew/maintenance training is the maintenance of aircrew/maintenance training devices that are tailored to match any modification of airframes. Detailed system training plans, similar to the roadmaps contained in this AMMP, are developed in accordance with AFI 36-2251 and are stand-alone documents for each weapon system. They are used to support acquisition and modification processes, requirement documents, and milestone decisions. These documents, maintained by AMC/A37T, cover aircrew and maintenance training requirements. Military Flight Operations Quality Assurance is a program for obtaining and analyzing data recorded in flight to improve flight crew performance, training programs, operating procedures, and aircraft operations and design. The main objective is to improve safety and efficiency by identifying trends during routine flight operations, not from accidents.



AF Roadmap

AMMP 2006 lays out a course for the future that is technologically feasible. The Air Force Capabilities and Investment Strategy (AFCIS) database is the primary tool in developing a long-range, capabilities-based projection of force structure and associated support infrastructure over a three Future-Years Defense Program (FYDP) planning period. This allows the development of a fiscally constrained projection (the "AF Roadmap") which connects current programs to the future and identifies future capabilities, transformational technologies, and critical decision points in a plan to achieve an operationally effective force within a fiscally constrained environment.

The AF Roadmap presents a comprehensive, capabilities-based force structure plan that is synchronized with the AF CONOPS, CRRA, Base Realignment and Closure (BRAC), and USAF Total Force initiatives. It tells a coherent story that enumerates the overarching strategy, current force structure, planned recapitalization and modernization, investment programs, basing, and the timing of other specific force structure actions. The overall AF Roadmap includes major decision points, challenges, shortfalls, and risk areas. It is the synchronized, coordinated, and approved message used across the Air Force to explain, with a single voice, our AF program to internal and external audiences. It is sensitive to change in the budget and, therefore, is an iterative process between the major commands and Headquarters AF that is vetted through the Air Force corporate structure.

(b)(5)

Cargo and Passenger Airlift Roadmap

OPR: Airlift Mission Area Team

MAF Capability Statement

Provide the capability to effectively move personnel, supplies, and equipment from onload to offload across the range of military operations and in all operating environments.

Assessment

The MAF possesses the world's premier airlift capability, and we are employing the forces in a more flexible manner today than in the past. We once saw two airlift systems—intertheater, flown by long-range transports, and intratheater, flown by shorter-range, combat-delivery aircraft. Today, the movement of passengers or distribution of cargo from origin to final destination is expedited through the coordinated employment of aircraft that can best accomplish the mission, rather than employing aircraft only in the role for which they were categorized. C-5s were optimized for long-range flight, but we have used them to move very substantial amounts of cargo around a theater. C-17s can often deliver equipment to forward landing areas more quickly than requiring a transload of cargo to C-130s at a theater hub before the final leg to the destination. We conventionally think of passenger movement by airland operations, but we also must consider the airdrop of paratroopers and their equipment from airlift aircraft. Combat operations in Afghanistan and Iraq have shown us the importance of forward arming and refueling point operations—the loading of munitions and fuel onto combat aircraft directly from mobility aircraft that have landed at remote airfields. Organic DOD aircraft are optimized for cargo delivery, and we rely on commercial carriers to move the majority of military personnel between theaters of operations during peacetime. The Civil Reserve Air Fleet (CRAF) was activated and moved most of the personnel to and from Southwest Asia during the Iraq War. The CRAF performed well; however, it does have some limitations that we must consider: They cannot fly in a chemically, biologically, or radiologically contaminated area, perform the special operations mission, or deliver Patriot launchers and missiles. C-130s and C-17s, with their defensive systems, performed the passenger airlift mission within the theater. High-priority cargo and passenger movements are supported by a fleet of Operational Support Airlift (OSA) and Very Important Person Special Air Mission (VIPSAM) aircraft that have unique peacetime and wartime capabilities.

Previous analyses suggested that the MAF needed to provide an air mobility system with an airlift capacity of approximately (b)(5) in order to meet airlift requirements with a (b)(5) degree of risk. (b)(5)

(b)(5)

(b)(5).

(b)(5)

(b)(5)

The Road Ahead

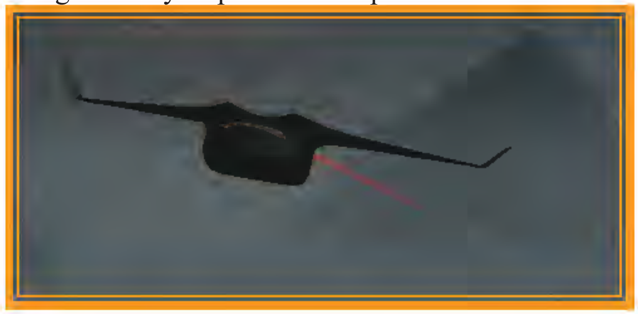
It is clear that we need to improve our airlift capability in a number of areas—this roadmap shows our plan for improvement over the next 25 years. During the near-term and mid-term, we intend to satisfy this shortcoming in a number of ways. First, we will increase our cargo airlift capacity with the procurement of additional C-17 aircraft; we also intend to increase the mission capability rates of our C-5 fleet through the C-5 Reliability Enhancement and Re-Engining Program modification and Avionics Modernization programs. Operations in Afghanistan and Iraq have shown a capability gap—the need for a responsive, light intratheater airlift capability to meet combatant commander battlefield movement requirements of high priority cargo or personnel. Further analysis is ongoing to quantify the capability needs, but it appears that the JCA will satisfy the niche of small cargo movements through airfields that are too short for C-130s or C-17s to use.

There is no doubt that emerging infrared (IR), radio frequency (RF), and directed energy weapons will put future mobility operations at risk; improved aircraft designs or more-effective countermeasures will be necessary to operate our aircraft in low- or selected medium-threat conditions. We need to aggressively continue to acquire defensive systems for our aircraft, plus develop the equipment and procedures to permit the system to operate following the employment of chemical, biological, radiological, nuclear, or high-yield explosive (CBRNE) weapons (see C-CBRNE Roadmap). Until commercial aircraft have defensive systems and an ability to operate following CBRNE weapons employment, we will continue to rely upon organic aircraft in threat areas. Army operational maneuver requirements for employing the Future Combat System are demanding, and it appears that improved battlefield mobility is necessary. Improved capability, as contained in the Air Mobility Concept-X (AMC-X), may provide the theater commanders the necessary air mobility capability (see AMC-X Roadmap).

Beyond aircraft programs, we will need to place continued emphasis on peacetime readiness training for our aircrews and support personnel. It is also clear that replacing our legacy material handling equipment (MHE) fleet of 40K and 25K loaders with Tunners and Halvorsens was a good step forward; but offloading techniques, without the use of MHE, will improve our combat capability. Further, the MAF lacks the capability to efficiently move cargo within the Defense Transportation System without rehandling cargo when it moves between different modes of transportation. Improved command, control, communications, computers, and intelligence (C4I) systems, to include real-time information in the cockpit, true global communications, and a responsive in transit visibility capability, are necessary for the cargo mobility system to be truly effective. We need to put information protective measures in place as we become even more dependent upon information technology to effectively deliver cargo to the warfighter.

Solution sets, to increase MAF's airlift capability, are planned over the next 25 years. First, our required increase in airlift capacity will be met with the continued purchase of C-17s and the modernization of the C-5 fleet. Next, for the near- and mid-term, we will retire C-130Es, modernize the H-models, and procure the Joint Cargo Aircraft and C-130Js. Lastly, development of the AMC-X is seen as the best way to meet the battlefield mobility requirements of US land forces in the long-term.

Aside from aircraft acquisition programs, several key supporting capabilities will be extremely important in making our airlift fleet more effective. Obviously, equipping our aircraft with defensive systems to counter the proliferation of IR- and RF-based surface-to-air missiles is planned. While solid programs are in place for the organic fleets, similar efforts do not exist for the commercial carriers. Modification of our aircraft with an autonomous approach and landing capability (AALC) will exponentially expand the number of airfields that we will be able to use regardless of weather or status of ground-based approach aids. Unit deployment times will drop rapidly with the increase in usable airfields, and the combat resupply of units will become much more responsive than today. Improved C4I system upgrades are also planned and will significantly improve the responsiveness of the air mobility system. Solid, reliable intransit visibility data will give supported commanders the real-time information they need to plan combat operations and lead to the fielding of an effective cargo End-to-End Distribution System. Some technological development will occur over the out-years; research and developmental efforts are planned to mature the technologies necessary to begin fielding the AMC-X by 2021.



The phased solutions to our airlift capability needs are planned to the next 25 years and are shown as the milestones below. The short-term milestones reflect the presence of funded, mature programs that are ready for transition. Milestones that are planned for the out-years are based upon technologically feasible capabilities that are not funded in the current Program Objective Memorandum (POM), or are based on other capabilities that may require additional research or study before final adaptation by the MAF.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Combat Delivery Roadmap

OPR: Airlift Mission Area Team

MAF Capability Statement

Provide the capability to deliver combat personnel, their equipment and supplies in direct support of combat operations by airdrop to a precisely designated location or by airland operations at austere landing zones. Airdrop a brigade-size force over strategic distances and sustain combat forces by aerial delivery or airland operations. Combat delivery mission capability must exist at night or during periods of adverse weather, across the range of military operations, and in all operating environments.

Assessment

The MAF provides the world's best combat delivery capability, but has been significantly stressed by the Global War on Terrorism. Today, combatant commanders rely heavily on our combat delivery capability to insert forces directly into battle and sustain the forces engaged in combat operations. While the number of combat delivery missions flown, or the tonnage of cargo delivered, is relatively small when compared to intertheater deployments, the importance is great because the mission cannot be accomplished by other means. With the significance of the combat delivery mission comes increased risk—local air superiority, accurate and timely intelligence, detailed mission planning, and defensive systems are required to be successful in a threat environment. Combat delivery provides the United States with the unique military force projection capability—forcible entry into denied areas—that other nations cannot match. This mission often involves the airdrop of airborne forces or Ranger units, but also may be accomplished by carefully planned airland assaults on airfields and other landing areas. Our operations in Afghanistan and Iraq have indicated the potential need for an aircraft, smaller than a C-130, to provide a responsive, light airlift capability to better support the combatant commander. It appears that there is a capability gap in the low end of the intratheater airlift mission—the delivery of small amounts of cargo and personnel into remote, austere airfields or landing areas that will not require C-130 or C-17 aircraft or permit their employment due to short or low strength runways. Ongoing operations show the need for a Joint Cargo Aircraft (JCA) to provide the capability to carry up to 3 pallets of cargo or 25-30 personnel into airfields with runway lengths of less than 2500 feet; the Army has done a significant amount of work to define the needed capability and the MAF will build upon that effort with additional analysis. Our preliminary look at the JCA suggests that the STOL aircraft be capable of conducting airdrop or airland operations, aeromedical evacuation missions, and forward arming and refueling point (FARP) operations. The aircraft should be network centric compliant and operable in a threat environment. The JCA will complement the C-130 and C-17 fleets and will fill the low end niche of our combat delivery capability. Further study is necessary to refine the required capability.

The MAF operates the C-130, the primary combat delivery aircraft, and we plan to continue it in service through 2030. We also recognize the combat delivery contributions that the C-17 can make with its capability to airdrop and operate from short fields. The C-17 is the backbone of our long-range brigade airdrop capability during the near- and mid-term time periods. The effectiveness of the C-17 will increase with the full implementation of the dual-row airdrop system and with the Large Aircraft Infrared Countermeasures (LAIRCM) modification.

Improvements to the C-130 fleet are very critical. We have grounded or placed flight restrictions on some of the older E- and H-model aircraft because of structural weaknesses and are continuing the C-130 Avionics Modernization Program (AMP) to standardize the mixed fleet of H-models. Together, C-130J and C-130H modernization initiatives will reduce the number of aircraft variants to maintain and operate. This will significantly reduce the support footprint and increase the capability of the C-130 fleet. This modification program will also enable the fleet to meet known communication, navigation, surveillance/air traffic management requirements for the future. Improvements in line-of-sight and beyond-line-of-sight communication systems will provide the needed global connectivity for dynamic command and control (C2) and the interoperability to effectively interface with all theater C2 and aircraft for enhanced predictive battlespace awareness. The LAIRCM modification will significantly improve the survivability of C-130 aircraft.

Today, onboard C-130 radar systems and the C-17 computer approach systems provide some capability to conduct approaches into airfields without dependency on ground-based navigation aids. However, neither system permits operations in near zero-zero weather conditions; more-capable, autonomous aircraft approach and landing systems will allow us to operate unrestricted at any airfield, regardless of the availability of ground-based navigation aids, airfield markings, and approach/runway lighting. Operations in Afghanistan highlighted the importance of precision airdrops for combat operations and humanitarian relief.

Beyond aircraft modernization programs, we continue to place emphasis on peacetime readiness training for our aircrews and support personnel. Operations in Iraq and the transformation of the Army have shown the need to increase the number of Air Mobility Liaison Officers in order to better support field operations. We plan to upgrade our C-130 simulators to Federal Aviation Administration Level C+ capability for legacy C-130s and level D for C-130J aircraft. These improved, more-capable simulators will enhance the aircrew-training program significantly. Lastly, we recognize the fact that combat delivery missions are flown in direct support of combat operations and are commonly exposed to hostile weapons systems. We will continue programs that modify aircraft with the defensive systems necessary for them to complete their missions. Some aircraft do have defensive systems installed today, and aircraft armor is being added.

Similarly, we can expect combat delivery operations to be necessary following weapon of mass destruction attacks. More work is needed to ensure more of the combat delivery aircraft are equipped to operate in contaminated areas and also have updated defensive systems required to operate in the expected theater threat environment. The modernization of our C-130 forces strengthens our ability to ensure the success of our warfighting combatant commanders and lays the foundation for tomorrow's readiness. We know that the operations environment will continue to evolve and that over time, today's combat delivery fleet will need to be improved—we are well established on the road to do that.

The Road Ahead

The War on Terrorism has required us to look at combat delivery from a different perspective and has given the MAF a new vector for the future. The world has changed, and this capability is evolving as well. Combat delivery was once viewed as synonymous with C-130 theater operations; our recent experience has shown us that we can improve our capability by using a wider range of aircraft to perform the mission. Continued acquisition of the C-130J and implementation of the C-130 AMP will bring our aircraft up to date and allow us to keep some of the older aircraft in service longer than planned. The C-17 has excelled at operating on assault landing zones in a combat environment and will remain our choice for long-range airdrops. We are also continuing our efforts to design the AMC-X, a family of multi-mission variants, operated by multiple services to meet combat delivery capability needs. When fielded, that aircraft will work in concert with the other combat delivery platforms and give the combatant commanders the flexibility they need to meet their battlefield maneuver requirements. It will be capable of carrying up to 80,000 pounds of outsized cargo, land on unimproved areas in zero-zero conditions, conduct airdrops, and survive in the 2020 threat environment. While the Mobility Capability Study suggests some future combat delivery requirements, we need the more thorough look that the proposed joint JCS J4-led intratheater airlift analysis will provide.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Aeromedical Evacuation Roadmap

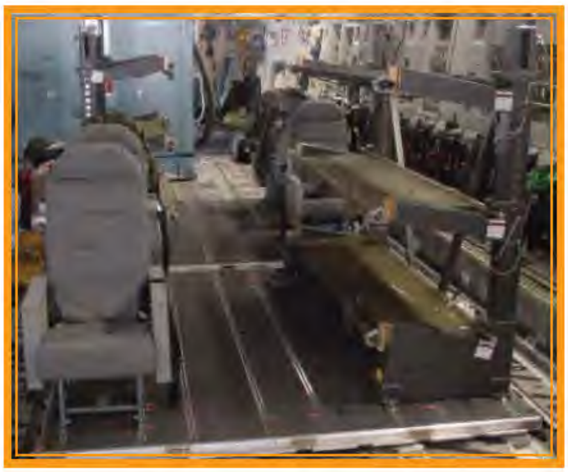
OPR: Airlift Mission Area Team

MAF Capability Statement

Provide an Air Force aeromedical evacuation (AE) system capable of staging and moving patients across the full range of military operations and in all operating environments.

Assessment

The retirement of the C-9 and pending retirement of the C-141 fleet drove an aeromedical airlift mission utilization analysis. The analysis concluded that use of dedicated AE airframes was cost-prohibitive. The analysis suggested that the AE mission could be better performed with prepositioned medical air crews, universally qualified to operate on practically any organic mobility aircraft configurable for the AE mission. Equipment such as the Litter Support Augmentation System and the Patient Support Pallets optimize AE capability.



AE performance, during the War on Terror, validated this finding; battle-tested and exceeding all expectations, the system provides state-of-the-art, in-flight medical care for transport of US and coalition forces. In the year following initiation of hostilities with Iraq, the Air Force flew over 3,200 missions, with more than 40,000 patient movements, without a single in-flight combat-related death. Today, contingency-related intratheater patient movements are conducted primarily by C-130s; intertheater patient movements are accomplished with C-17s, KC-135s, and the retiring C-141s. Return of patients to the United States in wartime will be conducted primarily by designated AE missions utilizing mobility airlift assets, and by B-767s of the Civil Reserve Air Fleet, when activated. The B-767 aircraft requires an aeromedical evacuation shipset kit to convert it from the commercial passenger to the AE configuration.

The USAF AE Mission Initial Capabilities Document reflects gaps in capabilities. This AMMP provides concept solutions that address these short-, mid-, and long-term challenges.

The Road Ahead

Our aeromedical airlift capability is the world's best, but several efforts are needed to ensure we can continue to meet the requirements in 2030. First, we recognize that the commercial B-767 fleet is aging; we will need to determine the best alternative to meet our wartime needs prior to its leaving service. Second, aircraft are important, but universally qualified medical aircrews are absolutely critical to the success of the AE system; establishment of an aeromedical evacuation formal training unit will ensure standardized training, plus reduce the overall mission qualification time. Third, improvements are needed to ensure we can transport patients following the employment of chemical, biological, radiological, or nuclear weapons. Currently, there is no patient isolation equipment in the aeromedical evacuation inventory designed to move contagious patients. AMC is in the process of acquiring Patient Isolation Units and intends to have full operational capability by 2009. When transporting contagious patients, we recognize the challenges of protecting our medical teams from exposure as well as the difficulties of providing in-flight care while outfitted in Mission-Oriented Protective Posture gear.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Special Operations Roadmap

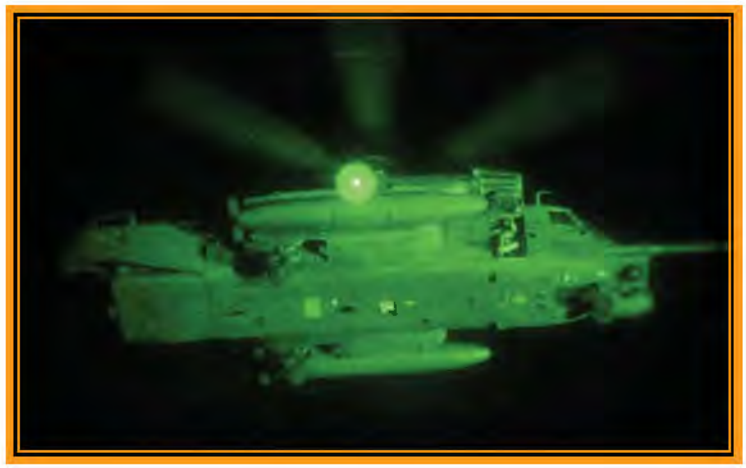
OPR: AMC/A39

MAF Capability Statement

Provide airlift capability to execute clandestine special operations missions while extending the range of special operations with air refueling. Conduct worldwide operations in adverse weather and hostile threat conditions with special operations aircraft.

Assessment

AMC and Air Force Special Operations Command (AFSOC) provide mobility for special operations activities with the long-range airlift capability of C-17, C-5, and MC-130E/H aircraft, and the short-range MH-53s. Army special operations forces (SOF) provide support with MH-47s and MH-60s. Refueling support for fixed-wing special operation aircraft is provided by KC-135s or KC-10s; the refueling of rotary-winged aircraft is accomplished by MC-130 aircraft. Given that the C-5 and C-17 aircraft have the inherent capability to transport outsized/oversized cargo over strategic distances, we have equipped them specifically for the missions tasked. Aircrew members must receive intensive, highly specialized and frequent training to be a part of the special operations team. The C-17 has proven its ability to perform the special operations mission. These aircraft were built with night vision goggle-compatible cockpit lighting systems, and special operations aircrew procedures have been well tested and approved for use. Aircraft modifications are ongoing to retrofit the C-17 fleet with a night vision-compatible cargo compartment and exterior lighting. Fielding of the CV-22 will significantly improve AFSOC's mobility capability.



The Road Ahead

We have identified enabling capabilities in other roadmaps that will significantly assist us in performing the special operations mission. These enabling capabilities include improved aircraft defensive systems, adaptable electronic warfare jamming systems, detection awareness, detection avoidance systems, threat avoidance, real-time information in the cockpit, and an autonomous approach and landing capability. We recognize the challenges of operating in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment, including the ability to transload/onload cargo and passengers between "dirty" and "clean" locations. Significant work has been accomplished in this area over the last 5 years, but more is necessary if mobility forces are to operate following employment of these weapons. Since none of the capabilities listed above are SOF-unique, they are addressed as deficiencies for all combat delivery MAF forces and located in the Combat Delivery Roadmap of this Master Plan. However, the capabilities described above should be given priority on special operations MAF assets since the SOF mission is generally exposed to the highest threat levels.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Air Refueling Roadmap

OPR: Air Refueling Mission Area Team

MAF Capability

Provide the capability to simultaneously refuel multiple United States, allied, or coalition (including rotary wing and unmanned) aircraft during day/night, in adverse weather, with probe/drogue and boom on the same sortie, across the range of military operations.

Assessment

Air refueling is a vital part of air mobility and serves to enable and multiply the effects of airpower at all levels of warfare. The Mobility Air Forces' air refueling (AR) capability makes possible the intertheater air bridge operations needed to support large deployments, humanitarian assistance, global strike, or the long-range airdrops of paratroopers and their equipment without reliance upon intermediate or in-theater staging bases. (b)(5) (b)(5) (b)(5) Air refueling provides the nuclear-equipped bomber force with the ability to deliver its payload to any location in the world and recover to a suitable reconstitution base. Combat operations normally require air refueling to extend the persistence/endurance as well as range of all aircraft. AMC is working with Air Combat Command to develop the capability to refuel future unmanned aircraft, and Air Force Special Operations Command has the lead for refueling rotary-wing aircraft. The air refueling force is comprised of active duty, Air Force Reserve Command, and Air National Guard units that support combatant commanders across the globe. They operate KC-135, KC-10, and HC/MC-130 aircraft and are a self-deployable force capable of performing a number of secondary missions to include cargo and passenger airlift, aeromedical evacuation, OPLAN 8044 support, and the airborne relay for command and control (C2) information.

The MAF operates the world's best air refueling fleet, but continuous operations since 1990 have stressed the aircraft and the people who fly and maintain them. Existing capability shortfalls create additional challenges to meet the increasing requirements of National Defense Strategy. It is clear that our air refueling aircraft are aging and that it is necessary to recapitalize the fleet.

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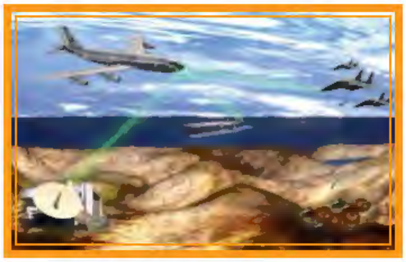
The MAF has several initiatives underway to improve refueling capabilities. The 327 Tanker Sustainment Group implemented an improvement plan to reduce the number of depot-possessed aircraft. While this initiative has been helpful in providing more aircraft available for daily



missions, it does not fully overcome the current tanker shortfall. The KC-135 Global Air Traffic Management program improves the aircraft's operational readiness and gives it the communication, navigation, and surveillance upgrades necessary to fly in worldwide airspace. Similar benefits will be realized from the KC-10 Aircraft Modernization Program, with modified aircraft deliveries scheduled between FY10-FY20.

The current tanker fleet has 20 KC-10 aircraft with 15 wing-pod sets and 40 KC-135s with 20 multi-point refueling pods capable of refueling two or more probe-equipped aircraft simultaneously. Eight KC-135s, and the entire KC-10 aircraft fleet, are air refuelable.

The Road Ahead

This roadmap illustrates the plan to improve our air refueling fleet over the next 25 years.

AMC has retired a small number of the KC-135E models and will retire the remainder by FY08. Meanwhile, AMC is initiating the process to acquire the replacement tanker based on the Tanker Analysis of Alternatives platform recommendation. The Capabilities Development Document (CDD) will identify the capabilities required in the replacement tanker. A separate CDD is under development to specify the modernization of the KC-10A fleet to insure it meets communication, navigation, surveillance/air traffic management requirements, other Federal Aviation Administration-related improvements, military capabilities (command, control, communications, computers, and intelligence, real-time information in the cockpit , multi-mission payload, aeromedical evacuation, and aircraft survivability), aircraft reliability/maintainability/supportability capabilities (to counter failure rates, nonmaintainable and obsolescence issues), and downward-directed programs (i.e., Aircraft Information Program, Joint Tactical Radio System, and Network Centric Operations).

Automated air refueling capability is in development and, when fielded, will permit refueling of unmanned aircraft. This same capability may transfer to manned aircraft and improve air refueling mission effectiveness.

Additional fleetwide capability improvements are planned to provide the capability of automatic identification of all aircraft, the capability to counter radio frequency, infrared, directed-energy, and man-portable air defensive systems. Modification of cockpit, boom operator station, and aircraft external lighting with night vision imaging system compatible lighting will improve crew situational awareness and enhance operations in tactical environments.

Tanker aircraft, forward-deployed to the theater, are reliant upon the availability of ground-based navigation aids for approaches and landings to their operating bases during low-weather conditions. An autonomous approach and landing capability, as is envisioned for airlift aircraft, would permit tanker operations, regardless of approach aid status.

Improved connectivity will provide the capability to seamlessly and automatically transmit voice, video, and data to permit near-real-time information flow and improved decision-making. This includes timely information transfer of aircraft systems performance data, mission data (i.e., AR offloads and cargo/passenger), aircrew flight times, and currency data. Enhanced automated systems will also provide the capability for transfer of dynamic retasking information, common operating picture, and predictive battlespace awareness.

In the future, the increased effectiveness of anti-access and area denial strategies will necessitate that air refueling aircraft stand off outside the range of the threat—thus limiting the ability of shorter-range weapon systems to penetrate deep into enemy battlespace. Over the long-term, we should look at the capabilities that a more survivable tanker aircraft, like the AMC-T, would have on our strike operations.

The phased solutions to our air refueling capability needs are planned for the next 25 years and are shown as milestones below. The milestones, in the short-term, reflect funded, mature programs that are ready for transition. Milestones that are planned for the out-years are based upon technologically feasible capabilities, not funded with the current Program Objective Memorandum (POM) or require additional research or study before final adaptation by the MAF.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

(b)(5) [redacted]

Long-Term (FY21-30)

(b)(5) [redacted]

Air Mobility Support Roadmap

OPR: AMC/A55

MAF Capability Statement

Provide the capability to support airlift and air refueling at home station or deployed locations across the range of military operations and in all operating environments.

Assessment

People

One of our most critical support functions is to meet the needs of our most important resource—our people. We recognize that delivering airpower to the battlefield involves not only doctrine, tactics and hardware, but also dedicated people. It is our people who bring everything together to create battlefield effects.

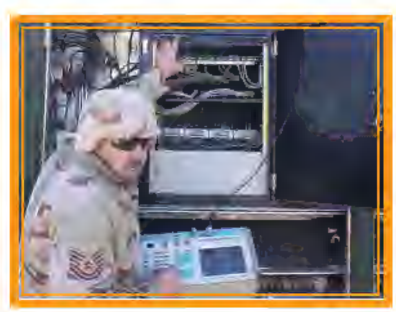
To meet the needs of expeditionary Air Force personnel, the AF is shaping the personnel career field with the right skills so that we can leverage technology required to provide self-service anytime, anywhere and improve the availability of service provided to Active, Reserve, Guard and civilian Airmen. Utilizing the Personnel Service Delivery-Transformation (PSD-T) service model, the AF will replace most of the highly labor-intensive processes we know today with technology, freeing personnel professionals to serve as strategic advisors.

We are also dedicated to providing working, living, and social environments where respect for all Airmen and their families is a routine part of the MAF culture. To achieve this, every Airman must be dedicated to the Air Force core values of "Integrity First, Service Before Self, and Excellence In All We Do." MAF commanders and leaders at all levels must leverage their people's strengths while developing their talents and character around these core values. The MAF goal of promoting excellence in the workplace is accomplished by fostering a culture that respects individual differences, encourages spiritual well-being, and is firm in prevention of and response to sexual harassment and/or sexual assault. Work force diversity and sexual harassment/sexual assault prevention and response will continue to be staples in the MAF's commitment to care for our Airmen.

Processes

Air mobility support processes are those activities that provide a foundation for the successful accomplishment of all of our missions. These enduring processes cut across every mission category, are essential for air mobility operations, and require talented and dedicated professionals trained to task at all levels of the MAF. Our support processes and personnel directly contribute to the AF agile combat support capabilities. Some of the key products and services provided are:

Global En Route Support System (GERS). Provides worldwide capability to support combatant commanders' wartime and peacetime mobility requirements through established or expeditionary en route airfields, that can support sustained mobility operations, where possible, by MAF assets from point of upload to point of download at any point on the globe across the full range of military operations and in all operating environments.



Command, Control, Communications, Computers, Intelligence and Information Operations (C4I & IO). Provides the ability to reliably and securely deliver the commander's intent to every echelon and all elements of the command (airborne, fixed, and mobile) across the entire spectrum of operations. Provides integrated and responsive command, control, communications, computers, intelligence, logistics, security, weather, finance, information assurance, and information operations functions. Performs effective and agile air mobility mission monitoring, analyzing/assessing, prioritizing, planning, allocating, scheduling, coordinating, and directing MAF operations execution supported by an assured, flexible, secure, survivable, integrated, and interoperable global information infrastructure.

Logistics. Prepares units for deployments, maintains supplies, and manages personnel and equipment movement in support of air and space and other DOD forces across the range of military operations and in all operating environments.

Force Protection. Prevents or mitigates successful hostile actions against Air Force people and resources when they are not directly engaged with the enemy. Force Protection is accomplished by a commander program designed to protect service members, civilian employees, family members, facilities, and equipment in all locations and situations. Force Protection must exist across the range of military operations and in all operating environments.

Installations & Expeditionary Combat Support. Provides critical installations and expeditionary combat support services (civil engineering, services, chaplain, contracting, personnel, staff judge advocate, etc.) at CONUS and deployed locations across the full range of military operations and in all operating environments.

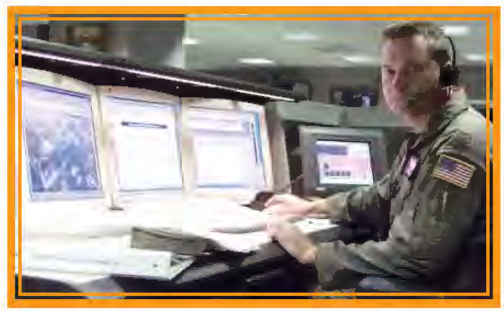
Medical. Provides managed community health care system that delivers a seamless uniform health benefit focusing on disease prevention, health promotion, force health protection, and personnel physical fitness with medically appropriate access to the right level of care, at the right time, and at a reasonable cost, commensurate with the operation of a dual peacetime/readiness-capable infrastructure.

Modeling, Simulation, and Analysis (MS&A). Provides capability for MS&A support to analyze worldwide mobility operations moving through established or expeditionary en route airfields able to support sustained mobility operations using in-place infrastructure or deployable assets and personnel. Capability must provide MS&A support to decision-makers and warfighters to predict and assess effects-based operations across the full spectrum of mobility operations and in all operating and training environments, to include those in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment live, virtual, and constructive simulations. Capability must also provide MS&A support to commanders at all levels, war games, exercises, planning, operations, distributed mission operations, experimentation, and acquisitions. MS&A outputs must enable robust and timely analyses to support decision-makers, support effects-based operations, and assure the most effective decisions for utilization of MAF forces. This MS&A capability should prepare, equip, and transform MAF forces through net-centric, on-demand components, and provide the world's best air and space capabilities to both the MAF forces and the Joint warfighter. MAF MS&A must align with AF MS&A capabilities in supporting four principal communities of interest: Air

Force Operators; Capabilities-Based Planning and Acquisition Communities; Air Force Leaders; and Combatant Commanders.

Open the Airbase. Provides the rapid-response capability to open airbases globally across the full range of military operations and in all operating environments, regardless of follow-on mission or aircraft type. This capability should seamlessly bridge the gap between seizure forces and follow-on forces, whether they are Air Force or other Service forces.

All support processes address key issues and are absolutely essential to increase air mobility capability for the MAF. Very significant infrastructure improvements are under way to improve the capability of our GERS. The GERS is also being assessed as the DOD transitions to a Global En Route Network in support of National Security Strategy, National Defense Strategy, and National Military Strategy. Global mobility operations require large amounts of fuel; therefore, major improvements are being made to upgrade the fuel hydrant systems and bulk fuel storage capacities at bases throughout the GERS. The AMMP also recognizes that air mobility is dependent upon a robust C4I & IO capability—the C4I & IO Roadmap lays out the programs that will further communications, information, intelligence, and information operations technology interoperability with Joint and Combat Air Forces and integration with Global Air Traffic Management systems. Network-centric operations, global communications, and enterprise architectures will improve command and control and ensure global tracking of assets and intransit visibility (ITV) of cargo and passengers. Force protection is another capability that is essential to mission success. AMC personnel are performing mission operations in hostile environments around the globe. Urban warfare, suicide bombings, and the potential use of chemical and/or biological weapons by terrorist organizations challenge the MAF to come up with both lethal and nonlethal means to protect our people and resources. Projected threats are now present day realities that must be dealt with and overcome. Our force protection roadmap describes some of the innovative means the MAF is employing to meet these challenges. The Air Force Civil Engineer Support Agency is establishing an airborne firefighter program. These firefighters can be inserted into a new airfield and set up fire protection in advance of the first aircraft arrival. The Air Force Flight Standards Agency is currently working with all MAJCOMs and the Air Reserve Component to reorganize air traffic, airfield management, and associated maintenance functions into organizations that better support combatant commanders. It is also critical for the MAF to maintain a flexible and responsive health care system that meets the needs of MAF members and their families. Our medical roadmap describes what is being done to ensure our MAF family continues to receive the most efficient and effective health care available. Finally, whether the MAF member is at home or deployed, it is critical that they and their families are assured that we are doing all we can to provide for their physical, spiritual, financial, and recreational needs. The Installations and Expeditionary Combat Support Roadmap addresses areas such as facilities improvement, housing, legal, spiritual, and other services that are important to all of us. It addresses challenges we face in each of these areas and what we are doing to overcome them.



The Road Ahead

Support process roadmaps describe in detail the challenges, milestones, and possible solutions that, once implemented, will ensure the MAF's ability to support both current and future air mobility operations. Examples of projected improvements include:

- Significant infrastructure upgrades to our Global En Route Support System.
- Improvements to command and control of MAF Civil Reserve Air Fleet and ground forces worldwide as well as ITV for patients, passengers, cargo, personnel, and equipment.

- Data standardization and compliance with open systems and compliance with open system standards and defense information infrastructure common operating environment to allow interoperability within AMC, the rest of DOD, our allies, and our commercial partners.
- Secure, high capacity day 0 and sustaining voice and data service for common users; and the global HF voice and data ground-air-ground connectivity for deployed forces.
- Technological improvements for nonlethal weapons for use in stability operations.
- Improved personal protective equipment for security forces (such as ballistic vests that provide both ballistic and flak protection), portable defensive fighting positions, and counter sniper capabilities.
- Advanced small arms capable of defeating current and advanced enemy protective equipment.
- Improved sensor systems for protection of Air Force Level 1, 2, and 3 resources.
- Ability to conduct operations in a CBRNE environment IAW 2006 C-CBRNE Roadmap.

- Detailed, robust analysis of material and personnel movement, airframes, fuel, crews, infrastructure support, command and control, information flow, integration of airlift and tanker operations, etc., to support war games, exercises, planning, and operations on a daily basis, and to explore the capability for analysis tools use within the developing Joint Synthetic Battlespace.
- To ensure we maintain our MAF Radar Warning Receiver capability, replacing the APM-427 TRS with the PLM-4 Radar Signal Simulator (RSS). The PLM-4 RSS combines the functionality of four APM-427 TRS units into one lightweight tester. Mobility footprint and tester cost are reduced by 92%.
- Critical tracking of aircrew life support equipment through the automated life support record and training system to solve identified SAF/IG Eagle Look findings and General Accounting Office (GAO) audit findings in managing aircrew chemical defense ensemble.
- Development and fielding of critical laser eye protection to operate in a laser threat environment.
- Ensuring our aircrews have critical protection from small arms fire with imbedded survival and rescue components.
- Fielding critical secure emergency and survival communication capability.
- Development of essential smoke and fume protection for cockpit emergencies.

MAF Deficiencies/Solutions | MAF Capabilities | Reference Documents

Future Concepts Roadmap

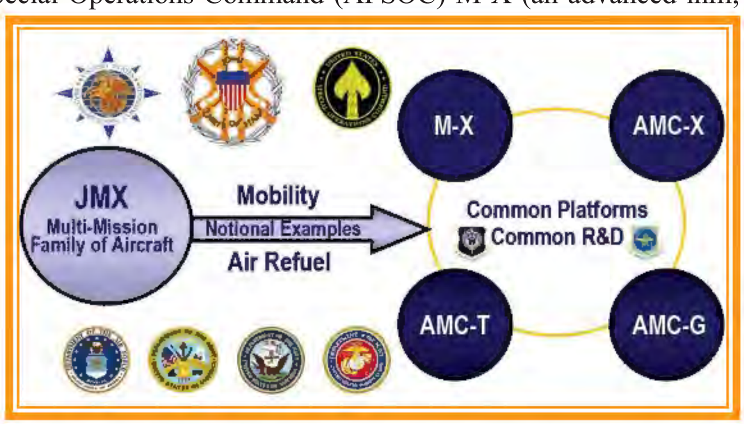
OPR: AMC/A55

Weapon System and Support System Assessment

Air Mobility Command, the lead agent for the Mobility Air Forces (MAF), is actively investigating new technologies that will transform the MAF's peacetime and combat capabilities.

Our technology research focuses on the near- (FY06-13), mid- (FY14-20), and far-term (FY21-30) time frames. The technology areas we concentrate on most are the programs that support joint theater maneuver; timely and assured delivery, reducing our forward area footprint, achieving higher survivability, deep, austere area operations, air refueling, rapid deployment, possible sea based options, new command and control decision-making tools, and a much-improved detection and neutralization of weapons of mass destruction capability. Examples are opportune landing site identification, autonomous approach and landing capability, combat collision avoidance systems, advanced sensors technology, threat avoidance measures, advanced situational awareness systems coupled with advanced defensive systems, protection from laser weapons, short takeoff and landing devices with soft-surface, high-flotation landing gear, advanced materials construction, bioengineering, and versatile affordable advanced turbine engines.

As new capabilities-based technologies mature, we want them to have broad applicability. As an example, for economies of scale, the MAF supports a family of aircraft whose core research and development are common among multiple communities. The AMC-X (a medium-sized, tactical transport aircraft), the Air Force Special Operations Command (AFSOC) M-X (an advanced infil, exfil and resupply aircraft), the AMC-T (a future tactical tanker), and the far-term AMC-G (the next-generation global large aircraft) will benefit from spin-off and maturing technologies with this "system of systems" approach. The AMC-X, AMC-T, and M-X all have the potential to come from a common design much like the Joint Strike Fighter variants. At present, we are engaged with AFSOC, the Air Force Research Lab, the US Army Training & Doctrine Command Futures Center, and industry in investigating the degree of commonality that can be obtained without diluting individual mission effectiveness. As a benefit to this approach, through fielding basic capabilities and then spiral-developing improvements as they mature, AMC will bring new hardware to support our warriors sooner rather than later.



Also, the supporting technologies that help the MAF execute day-to-day operations are extremely important to us. Presently, we are focusing our efforts on improving the current MAF processes. It is imperative that system developers and program agencies understand the importance of accurate data reporting/transmission from the source generating the information. Technological advancements gained by future capabilities (i.e., airborne data burst transmission) can only be realized by ensuring accurate self status, fault, and diagnostic information are reported from the automated built-in-test point. We want to develop automated systems that will allow us to track people and equipment from load-up to delivery on the battlefield while improving command and control, surveillance/intelligence, and security capabilities.

We conclude this brief introduction to AMC Future Concepts with the AMC Technology Time Line Chart. We will use this time line to initiate our investment strategies, as well as provide a plan for the key decision points.

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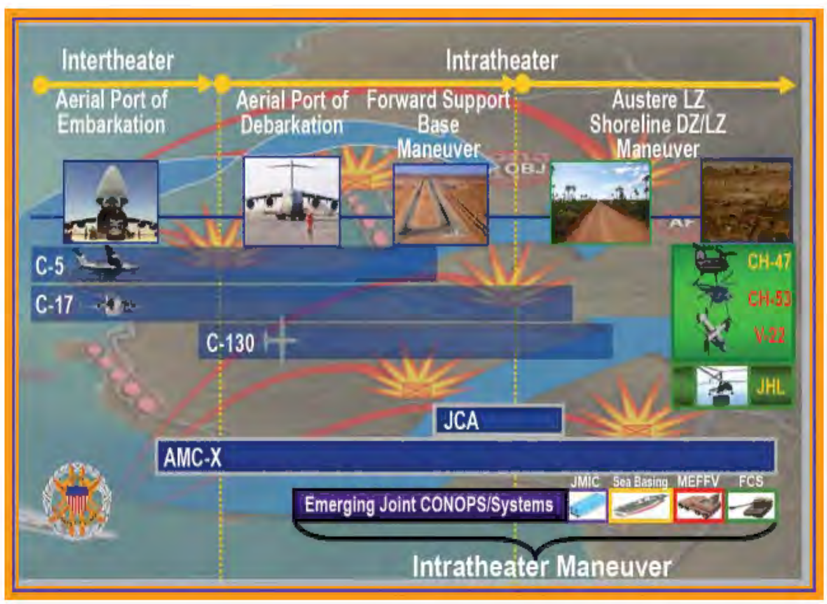
AMC-X: A Family of Capabilities

OPR: AMC/A55

Current AMC aircraft can be deployed worldwide to support operations across the range of military operations wherever US interests are threatened. We support our national military doctrine to counter forces armed with various mixes of increasingly sophisticated weaponry. Foreign governments, drug traffickers, insurgents, terrorists and problematic transnational states are all continuing to acquire advanced, conventional weaponry; command, control, communications, and intelligence systems; and weapons of mass destruction. High-speed mobility into the threat-laden battlefield is a mobility capability that provides key combat support to the ground forces. Moving deeper into the battlefield to support ground forces will reveal threat scenarios that are especially problematic due to the proliferation of effective, low-cost, integrated weaponry.

Today, we rely upon our C-130s and C-17s to provide intratheater maneuver, but our customers (primarily the US Army) are developing advanced ground combat systems that will fully exploit their new battlefield strategies. Within the US Army's dominant maneuver strategy, the MAF will not necessarily operate from aerial ports of debarkation and forward operating bases as we do today. More likely, we will operate from more austere, isolated locations as we have recently experienced in the Global War on Terrorism (GWOT). In future operations, our ability to land on soft surfaces, unprepared roads, and pastures will greatly increase our access. As mentioned before in these scenarios, the future threat to MAF aircraft will include more effective surface-to-air missiles, man-portable air defense systems, integrated air defense systems (IADS), directed-energy weapons, advanced enemy combat aircraft, biological and chemical weapons, and space-based information warfare gathering systems. IADS is especially problematic as it continues to proliferate with more complex and affordable systems. Improved situational awareness, on-board defensive systems, and some ability to control and balance aircraft signatures will help us to counter future threats.



The following chart is the result of an intense 2-year research study on what future (2015 and beyond) capabilities the MAF will need to execute air mobility missions and the realistic and achievable technologies that support these capabilities. The study team, comprised of AMC, Air Force Special

Operations Command (AFSOC), Air Force Research Laboratories (AFRL), US Transportation Command (USTRANSCOM), Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA), Training and Doctrine Command (TRADOC), National Aeronautics and Space Administration (NASA), and industry, undertook a thorough review of likely future scenarios, future customer needs and capability-based technologies that will support the MAF to meet the future challenges. As the charts point out, what we expect in the future determines the capabilities we need and, in turn, drives the technologies that support the capabilities.

What To Expect ➡	Capabilities Needed ➡	Driven Technologies
Response Time Will Decrease	Provide Joint Theater Maneuver	High Flotation Landing Gear and High Lift Devices for Short Take Off and Landing Operations and Access
Distance to Fight Will Increase	Deliver and Sustain Combat Power and Humanitarian Relief When And Where Needed	Situational Awareness, Defensive Systems, and Balanced Signatures
Anti-Access, Forward Area Denial	Timely and Assured Delivery	Autonomous Approach and Landing Capability
Ability to Survive Will Diminish	Reduce Forward Area Footprint	Opportune Landing Site ID
DOD Requirements are Evolving	Highly Survivable and Networked	Rugged, Redundant, and Self-Healing Systems
Future Networked, Nonlinear Battlespace	Austere Area Operations	
Current Legacy Theater Airlift Fleet will Continue to Diminish in Capability and Sustainability	Possible Sea Based Options	
Deliver and Sustain Combat Power and Humanitarian Relief When and Where Needed		

From this intratheater research, the Advanced Mobility Concept-X (AMC-X) emerged. AMC-X is a medium-sized, highly survivable, as-short-as-possible takeoff and landing aircraft that is designed to operate into and out of unimproved landing areas while carrying the USA and the USMC future ground combat vehicles. AMC-X will both airland and, with precision, airdrop. In short, AMC-X capabilities will allow MAF delivery from longer ranges, with heavy tactical payloads, into more challenging areas than we do today.

In addition to understanding the future intratheater capabilities the MAF will need, the research team also analyzed how to provide these capabilities in a fiscally responsible way. To address economies of scale, AMC developed a family mobility system (of systems) that will maximize limited fiscal dollars and will robust future MAF capabilities.

The AMC-X family of aircraft will transform air mobility this century. This fiscally responsible system of systems that can be spirally developed will provide our Nation with decisive future air mobility power.

The AMC-X concept will remain in development as the study team focuses their efforts on further analysis and concept development with the Office of the Secretary of Defense, the Joint Staff, USTRANSCOM, US Special Operations Command (USSOCOM), the Air Staff, AFSOC, the Labs, sister services, and industry. These efforts will further define future needed capabilities.

In summation, the AMC-X capability-based preliminary characteristics can best be described as:

- Joint Use—USTRANSCOM, USSOCOM, Joint Forces Command
  - USAF, USA, USMC, USN
- Medium-Sized Airlifter with Precision Airdrop/Airland Capability
- Battlefield Maneuver: Range ~1200 nm
- Airliner Speed and Altitudes
- 2,000-Foot Takeoff and Landing on Unimproved Surfaces (California Bearing Ratio 5)
- All-Weather Land, Taxi, Takeoff, and Combat Delivery
- Easily Maintained in Field, Highly Reliable With Rugged, Redundant, Self-Healing Systems
- Outsized Loads (~30- 40 Short-Tons)
- Air Refuelable, Forward Air Refueling Point Capable
- Highly Survivable (Balanced: radar, Infrared, Acoustics, Visual) and Deployable Into Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Environment
- Network-Centric Operations Compliant
- Family of Systems: AMC-T and M-X
- Possibly Sea Based
- Desired First Flight: 2015; First Delivery: 2018; Initial Operating Capability: 2021

Chapter 3 - Weapon System Roadmaps

C-5 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-5 Galaxy, with its tremendous payload capability, provides AMC intertheater airlift in support of US national defense. The C-5 provides passenger and outsized/oversized cargo airlift, airland, and special operations-type missions even under adverse conditions such as those found in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment (see C-CBRNE Roadmap). With the C-5's unique visor door and kneeling capability, the aircraft can both load and offload (roll on/roll off) simultaneously. The aircraft can carry fully equipped, combat-ready military units to any point in the world on short notice, then provide field support required to help sustain the fighting force. Many members of the Mobility Air Forces (MAF), including AMC, Air Education and Training Command, Air National Guard, and Air Force Reserve Command, operate the C-5.

Lockheed-Georgia Co. delivered the first operational Galaxy to the 437th Airlift Wing, Charleston AFB SC, in June 1970. The Air Force stationed C-5s at Altus AFB OK, Dover AFB DE, and Travis AFB CA. AMC transferred some C-5s to the Air Reserve Components at Lackland AFB TX, Stewart ANGB NY, Westover ARB MA, Memphis ANGB TN, Wright-Patterson AFB OH, and Martinsburg ANGB WV (FY07). In March 1989, AMC added the last of 50 C-5B aircraft to the 76 C-5As in the Air Force's airlift force structure. Current projections are to have 112 C-5 aircraft within the MAF.

- First Flight: 30 June 1968
- First Operational Aircraft Delivered: C-5A, 1969; C-5B, 1986
- Average Age of Fleet: C-5A, 32 years; C-5B, 15.5 years
- Payload/Range: 291,000 pounds (max) at 1,530 NM; 180,000 pounds at 3,200 NM; max ferry range 6,238 NM
- Crew Ratio: Active, 1.8; Associate Reserve, 1.8; Air National Guard and Air Force Reserve, 2

The weapon system currently faces avionics obsolescence and communication, navigation, surveillance/air traffic management (CNS/ATM) compliance challenges. It also has historically low mission-capable (MC) rates (59-64%—AMC standard 75%) and reliability rates (~81%—AMC standard 85%). Two modernization programs address these C-5 problems: the Avionics Modernization Program (AMP) and Reliability Enhancement and Re-engining Program (RERP). AMP provides a fully supportable, CNS/ATM-compliant avionics suite/glass cockpit and digital upgrades to allow continued sustainment. RERP replaces engines with commercially proven, more-powerful engines and addresses "bad actor" components; projected performance improvements include increases in fleet logistics departure reliability to 92% and an MC rate over 75%. Upon completion of these two major modifications, the airplane will be designated the C-5M. The aircraft is a key part of our wartime mobility capability and needs defensive equipment to be survivable.

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Fleet Sustainment Strategy

Total dependence on the "fly-to-fail" sustainment strategy has contributed to high en route system component failures and driven unacceptable unscheduled maintenance rates. To complement the AMP and RERP reliability enhancements and improve aircraft availability and flight safety, the 330th Strategic Airlift Sustainment Group Commander has prioritized select mission-essential parts to be changed during scheduled maintenance. Once implemented, this "time change" strategy will increase the C-5's availability for Transportation Working Capital Fund (TWCF) missions and decrease costs to deploy maintenance recovery teams, support equipment, and readiness spares packages (RSP).

Incremental Capability Release

The forum for addressing capability improvements is AMC's Requirements and Planning Council (R&PC) process. Reflecting the MAF and AMC/CV-approved projects and prioritized ranking, the R&PC matrix establishes the command's priority of projects within the C-5 program, including the introduction of new blocks. The current listing includes:

Order	Program	Funding
1	Large Aircraft Infrared Countermeasures (LAIRCM)	Partial
2	C-5A Defensive System Install (59 C-5A/2 C-5C)	N
3	AAR-47 (V2+) Missile Warning System (MWS) Upgrade (50 C-5B/1 C-5A)	Partial

4	AMP-RERP Modernization Programs	Partial
5	Flap/Slat Asymmetry Protection Upgrade	N
6	Flap/Slat Overhaul Program	N
7	Aircraft Armor	N
8	Digital Flight Data Recorder/Cockpit Voice Recorder (DFDR/CVR)	Full
9	Enhanced Surveillance/IFF Mode 5	N
10	Selective Availability Anti-Spoofing Module	N
11	TF-39 Thrust Reverser End Shoe / Slider Support Beam	N
12	Improved Air Exit Door Pressurization (in RERP)	N
13	Brake Temperature Indication System	N
14	Night Vision Imaging System Compatible Lighting Mod	N
15	Real-Time Information Into the Cockpit (RTIC)	N

This listing shows the importance of the aircraft to our wartime mobility capability and the need for defensive equipment. With the introduction of a digital baseline to the C-5, software updates and other smaller modifications will be consolidated into blocks. The block updates will capture these requirements and consolidate them into logical programs for consideration by the R&PC.

Key Capability Improvements

AMC has numerous ongoing capability improvement programs planned for the C-5 fleet with the most critical programs shown on the chart below. Use the chart, in concert with the modification explanations shown immediately following.

C-5 Program/Modifications

Program/Modification

LAIRCM
C-5B AAR-47 MWS (V2+) Upgrade
Emergency Power System Upgrade
AMP
RERP
DFDR & CVR
Hydraulic Surge Control Valves
Troop Floor Corrosion Prevention

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Modification Explanations

Large Aircraft Advanced Infrared Countermeasures

The LAIRCM mod proposal is for a total of 50 C-5Bs as part of a LAIRCM-equipped fleet of 444 MAF aircraft. AMC carried forward an FY06 POM initiative which started development for LAIRCM mods on C-5Bs in FY05 and modifies the first 22 aircraft in a dual-turret configuration by the end of FY11.

AAR-47 Missile Warning System

This modification is applicable to the 50 C-5Bs and 1 C-5A that currently have the AAR-47 system already installed. The AAR-47 components are: Control Processor (1), Controller Indicator (1), Aft Sensors (2), Fwd Sensors (2), Signal Repeaters (2). To continue to provide protection for AMC C-5 aircraft against infrared (IR)-guided surface-to-air missiles and correct system obsolescence issues, the missile warning system must be modified. Older, degrading sensors on the MWS are unable to detect an approaching missile, leaving the aircraft and crew vulnerable. Further, advances in technology render various system components obsolete. Optical sensors chemically decompose, blinding MWS sensors to a threat missile's signature. Failing sensors must be replaced to maintain a missile warning system capable of detecting IR surface-to-air missiles. Obsolete parts need to be replaced to ensure the MWS remains logistically supportable. Without a functioning MWS, AMC crews and aircraft are vulnerable to the IR SAM threat. The Navy-managed optical sensor replacement program replaces all four MWS optical sensors, upgrades the MWS computer processor software and hardware, and provides a new control indicator.

Emergency Power System Upgrade

C-5 emergency direct current power system upgrade provides increased electrical capacity for emergency use. The current system is the original system designed 36+ years ago. Load analysis indicates DC power buses exceed emergency generator capacity and might exceed capacity by ~ 25 amps with the C-5 AMP installation. This initiative replaces the current system (3 kilovolt-ampere [KVA] generator and two 5 amp-hour batteries) with a new 6.5 KVA militarized off-the-shelf generator and one 54 amp-hour battery. The upgrade also adds two new 100-amp regulated transformer rectifier units, a battery charging system, and modifies the flight engineer's direct current control panel.

AMP/CNS/ATM (includes: Data Link Capability, Traffic Alert and Collision Avoidance System II [TCAS II], Terrain Awareness and Warning System [TAWS], Ultra High Frequency Satellite Communications/Advanced Digital Voice Terminal/Demand Assigned Multiple Access)

AMP modifications combine two major ORDs for the C-5. Both the CNS/ATM and the All Weather Flight Control System (AWFCS) requirements are in this program. Some of the CNS/ATM items include: HF, data-link capability, upgraded Global Positioning System (GPS) receivers; international maritime satellite communications (voice and data link); and a required navigation performance certified Flight Management System. The AWFCS effort replaces low-reliability avionics components in the autopilot/flight augmentation systems with new digital systems. It also replaces unsupportable flight and engine instruments with a new digital electronic display suite. We project a fivefold increase of reliability of the avionics system measured by mean time between failure. Secretary of Defense-directed safety modifications including the TCAS II and TAWS are part of this program. The Air Force mitigates program risk and funding challenges by use of a single (competitive) source for integration development, kits, installation, and options for follow-on support. The TCAS portion of AMP was accelerated and completed in FY02. Installation of new communications and surveillance equipment to improve air traffic management under CNS/ATM will allow the C-5 to take advantage of optimum air routes. Non-CNS/ATM-compliant aircraft will be unable to fly without special approval in European airspace or the oceanic track systems as new CNS/ATM procedures began in March 2005.

C-5 Reliability Enhancement and Re-Engining Program

RERP is a comprehensive modernization of an AMPd C-5A/B/C that improves aircraft reliability, maintainability, and availability. The C-5M is the model designation series for AMPd C-5s modified under RERP. This effort includes replacing TF-39 engines with the General Electric CF6-80C2, a more-reliable commercial, off-the-shelf (COTS) turbofan engine with increased takeoff thrust, reduced fuel consumption, Stage III noise compliance, and FAR 34 emissions compliance. The military designation for the CF6-80C2L1F is the F138-GE-100. The new propulsion system (F138-GE-100 and new pylons) significantly decrease depot maintenance. The pylon is designed to stay on wing and the engine has a contract guaranteed 10,000 hours time on wing between overhauls. Additionally RERP upgrades components of numerous subsystems, including auxiliary power units; electrical, flight control, hydraulic, fuel, fire suppression, pressurization/air conditioning systems; landing gear; cargo lighting, and the airframe. RERP replaces the Malfunction Detection, Analysis and Recording System III with an Embedded Diagnostic System (EDS) which will improve maintenance repair time. EDS presents all faults in English text to the flight crews and maintenance technicians. The C-5M will have a totally new maintenance manual set. EDS provides improved fault isolation so that 99% of all faults are solved using EDS and the new maintenance technical orders. Studies validate that RERP will increase reliability, maintainability, and availability (RM&A) to levels comparable to other AMC aircraft, with substantial increases in aircraft availability and on-time departures and reduced total ownership costs. The wartime MC rate will be at least 75% and logistics departure reliability will be at least 85%. A fleet of 112 C-5Ms will reduce total ownership costs of the C-5 fleet by $11.4B (BY00). The new engines will produce 22% more thrust, thus increasing the aircraft's allowable cargo load, as well as increasing wartime mission throughput.

Digital Flight Data Recorder & Cockpit Voice Recorder

FDR and CVR are flight-critical systems required for safety compliance. They capture data used by a crash investigation to determine cause of the incident and to provide recommendations to improve equipment and procedures. FDR and CVR will soon be difficult to support due to parts obsolescence, and the current system does not meet current survivability requirements. Modification replaces both LRUs. Executing the modification will reduce combined MMH to 86% (1,184 hrs to 169) (DFDR to 90%; and CVR to 80%). HQ USAF/SE and XO mandated the FDR and CVR modification on all troop/passenger aircraft.

Hydraulic Surge Control Valves

Hydraulic surge control valves are currently in development to reduce hydraulic failures associated with system use. Upon activation, the current system instantaneously applies over 3000 psi to the system. The new "slow opening" valves will allow for the even pressure buildup within the system. Prototype testing was completed in the third quarter of FY03.

Troop Floor Corrosion Prevention

Stress panels in the troop compartment latrine have significant corrosion. To replace the panels, maintenance personnel must remove the entire latrine. This causes a 3-week programmed depot maintenance (PDM) delay. PDM will install the C-5B-designed latrine on the C-5A. The C-5B latrine has a one-piece fiberglass floor pan, fiberglass walls, and a larger holding tank. Four C-5A aircraft have prototype kits installed. PDM currently has 55 kits ready for installation. AMC programmed kit installation through the R&PC process. The requirement is approximately $2.3 million.

Advanced Situational Awareness and Countermeasures (ASACM)

ASACM addresses AMC radio frequency countermeasures mission need statement, November 2000. The system will initially provide advanced SA capability for threat avoidance by using radar warning receivers with precision location and identification capability. ASACM will also add coordinated countermeasures to a limited number of MAF aircraft to defeat or degrade threat systems, if avoidance is impossible.

Real-Time Information Into the Cockpit

RTIC capabilities provide MAF aircrews real-time, global, secure voice and data (capable of machine-to-machine and human interface) command and control (C2) and situational/threat awareness. C2 agencies can provide real-time threat updates, weather changes, and mission changes. Aircrews must be able to access required C2 agencies, securely while in-flight, to exchange maintenance status, flight plan updates, and identified threats. Interim solutions include, but are not limited to, Combat Track II, Airborne Broadcast Intelligence, Minitransmitter Blue Force Tracking, and secure commercial handsets. Future transformational solutions include ASACM.

C-5 Deficiencies/Solutions
MAF Deficiencies/Solutions
Reference Documents

C-17 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-17 is the Nation's core military airlifter, and it continues to perform very well in a wide range of operational mission scenarios. Initial squadron operations began June 1993 with the first aircraft delivery to Charleston AFB, and AMC/CC declared initial operational capability on 17 January 1995. The C-17 provides direct-delivery options: the air movement of cargo and/or personnel from an airlift point of embarkation (POE) to a location as close as practicable to the customer's final destination. It is the only aircraft capable of delivering outsize cargo to small, austere airfields. It is also capable of aerial delivery, night vision goggle (NVG) operations, nuclear weapons transportation, and aeromedical evacuation. The C-17 provides the flexibility to support both intertheater and intratheater missions and allows AMC to significantly improve throughput during contingency operations.

The aircraft is designed to carry up to 102 troops (188 troops with a new palletized seating system), 36 litter patients, or 18 standard 463L pallets. To ensure the C-17 can fulfill required mission capabilities, operations in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment must be addressed (see C-CBRNE Roadmap).

Using C-17s in an expanded intratheater airlift mode to provide relief to the C-130 fleet and also reduce ground forces' dependence on convoys in Iraq highlighted the flexibility and value of the C-17. The C-17 also drew positive attention after successful airdrop of the Stryker and assessed capability to airlift the Army's proposed Future Combat System.

- First Flight: 15 September 1991
- First Operational Aircraft Delivered: 14 June 1993
- Range: 160K pounds at 2,400 nautical miles (NM); 110K pounds (threshold) at 3,200 NM
- Max Ferry Range: 4,600 NM
- Crew Ratio: 5.0

Production aircraft under the current multi-year procurement (MYP) are scheduled for delivery through FY08. Current and future bases include: Charleston AFB SC, Altus AFB OK (C-17 schoolhouse under Air Education and Training Command), McChord AFB WA, Jackson MS (Air National Guard unit), McGuire AFB NJ, March ARB CA (AFRC unit), Hickam AFB HI, Travis AFB CA, Elmendorf AFB AK, and Dover AFB DE.

The 2006 QDR calls for plans to acquire and modernize a fleet of 292 intertheater airlifters (180 C-17s and 112 modernized and reliability-enhanced C-5s). C-17 tooling will be moved to off site storage to preserve the option of procuring additional C-17s. The FY06 President's Budget includes $227.5 million for advanced procurement of additional aircraft in FY07; however, full funding for additional aircraft is required in the FY07 budget. Congressional language in the FY06 budget supports the Program of Record of 180 C-17 aircraft under the current multi-year procurement. However, the language also states if modernization and the intertheater requirements are not met, they would support additional C-17s to meet the mobility requirement. One effort under consideration is selling used C-17s to affordably increase airlift capacity via a commercial C-17 program, the BC-17X, while strengthening US Civil Reserve Air Fleet by adding outsize capability. The BC-17X initiative focuses on the trade-in of the oldest C-17s, potentially easing budget pressures associated with follow-on MYP. The program carries some risk: cost for Federal Aviation Administration (FAA) certification, congressional and Office of the Secretary of Defense scrutiny, and timelines for the FY07 Amended Program Objective Memorandum (APOM).

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Numerous improvements to the aircraft have been made since the first aircraft were delivered to operational squadrons. These capability improvements are made to production aircraft as new block configurations with fielded aircraft systematically undergoing block upgrades through the Global Reach Improvement Program or field retrofits. Both methodologies are used to maintain a single-model aircraft fleet. In addition, the first 70 aircraft produced (P-1 through P-70) are scheduled to be modified with extended-range fuel tanks concurrent with their upgrade with a second-generation On-Board Gas Generating System (OBIGGS II).

The forum for addressing capability improvements is AMC's Requirements and Planning Council (R&PC) meetings between AMC and the C-17SG. Reflecting the MAF and AMC/CV-approved projects and prioritized ranking, the R&PC matrix establishes the command's priority of projects within the C-17 program, including the introduction of new blocks. The current production line is delivering Block 15 aircraft. The first Block 16 aircraft (P-138) was delivered to March ARB CA in August 2005. The first Block 17 aircraft (P-153) was delivered to Hickam AFB HI in February 2006. Block 16 improvements include a new digital weather radar, OBIGGS II, stabilizer struts, and M2K. Block 17 improvements include NVG-friendly combat lighting; airdrop improvements; on-board loose equipment; aerial delivery system improvements; demand-assigned multiple access satellite communication; identification friend or foe (IFF) Mode 5; communications, navigation, surveillance/air traffic management (CNS/ATM) IFF Mode S Enhanced Surveillance; and Formation Flight System (FFS). The FFS is an alternative-technology (to station keeping equipment, or SKE) solution and is intended to meet the US Army's requirement for the Strategic Brigade Airdrop (SBA). FFS will replace the current SKE follow-on system that was introduced as a Block 13 cut-in on P-86. It is designed to provide significantly higher reliability and availability, compared to the C-17's current SKE system. The SBA capability, utilizing the FFS, will be met in August 2007. Operational frequency approval submission for the FFS is planned for FY06.

Nonblock improvements to the C-17 fleet include palletized seats for expanded personnel movement capability, procurement of additional aeromedical litter stations to expand the fleet organic capability to transport litter patients, and Large Aircraft Advanced Infrared Countermeasures (LAIRCM).

Key Capability Improvements

Numerous ongoing capability improvement programs are planned for the C-17 fleet with the most critical programs shown on the chart below. Use the chart, in concert with the modification explanations shown immediately following.

C-17 Program/Modifications

Program/Modification

Block 16:

Stabilizer Strut

Weather Radar

OBIGGS II

Aircraft Communications Addressing And Reporting System (ACARS) Enhancements

Extended Range (ER)/OBIGGS II Retrofit

Block 17:

Secure En route Communications Package-Improved (SECOMP-I) Rev C Flying Local Area Network (FLAN)

Liquid Oxygen (LOX) Bottle Protection

Required Navigation Performance Improvement (RNPI) and High-Frequency Data Link (HFDL)

Combat Lighting

Formation Flight System

Block 18:

Core Integrated Processor (CIP) Replacement

Other Projects:

LAIRCM

Airborne Broadcast Intelligence (ABI)/Combat Track II (CTII)

Joint Precision Airdrop System (JPADS)

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***Army Funding**

Modification Explanations

Stabilizer Struts System

The C-17 stabilizer strut system is used to support the aircraft during heavy cargo on/offloading and as a self-jacking capability to facilitate tire/wheel changes. The legacy system has experienced ground and in-flight malfunctions resulting in aircraft damage. Several interim operational supplements, revising operational and maintenance instructions, have been issued. A contract to redesign and simplify the stabilizer strut system was awarded in January 2004. This redesign will improve system operational capability, suitability, and reliability. It will eliminate stabilizer strut uncommanded movement and simplify system operations and user interface. The project is on track for its scheduled P-138 production effectivity (July 2005) with a retrofit program to follow through to FY2011.

Weather Radar

Due to diminishing manufacturing sources, aircraft after P-137 will require a new weather radar system. A modified commercial weather radar will replace the existing weather radar. The new weather radar will field the following capabilities: 1) weather detection, 2) ground mapping, 3) skin paint, and 4) video display alerting the crew of wind shear conditions. Hardware changes will include removal of the existing radar line replaceable units (LRUs) and associated wiring and replacement with new radar LRUs and associated wiring. The new design will also include a replacement radar control panel that will provide radar control. Although this is an obsolescence-driven change, the replacement weather radar will double weather cell detection range and provide improved skin painting capability over the current radar.

OBIGGS II

OBIGGS has been an unreliable and heavy maintenance burden since the inception of the C-17. Several attempts to improve reliability have had some success. Redesign of OBIGGS using a new constant flow technology vice high-pressure storage bottles will significantly increase system effectiveness, utility, maintainability, and will reduce life cycle costs by nearly $400 million. Compressor, storage bottles, and mission planning will not be required. The new system will initialize in approximately 30 minutes versus the current 8-hour inerting time, and it will weigh approximately 500 pounds less than the current system. Most importantly, the new system will be simpler, with 900% higher mean-time-between-maintenance reliability. The OBIGGS II program contract awarded on 31 March 2003. Production effectivity is P-138 and subsequent aircraft. OBIGGS II will also be retrofitted on all prior P-1 through P-137 aircraft.

ACARS Enhancements

The C-17 incorporates an aircraft communications addressing and reporting system capability for data link communications between the aircraft and the 18 AF/Tanker Airlift Control Center. This project upgrades the C-17 mission computer and aircrew data transfer device software to provide AMC airline operational control. In addition, the Universal Aerial Refueling Receptacle Slipway Installation (UARRSI) actuation system is being redesigned to accommodate and install a wide-carriage printer in the cockpit pedestal, necessitating relocation of the UARRSI actuation handle. Production effectivity was P-121 with retrofit on P-1 through P-120.

ER/OBIGGS II Retrofit

This program combines two retrofits into one combined effort in order to minimize cost and schedule. The OBIGGS II modification is described above. The extended range modification increases aircraft fuel capacity by approximately 9,500 gallons and adds approximately 1,800 pounds of fuel system components and supporting structure to the aircraft gross weight. In order to have the Extended Range Fuel Containment System and OBIGGS II (ER/OBIGGS II) retrofit in a position for FY07 kit proofing, the up-front installation design effort will be accomplished in FY05. Multiple-kit proofing will be needed to address multiple fuel tank configurations due to differences in secondary structure, brackets, fixtures, etc., installations in legacy aircraft. ER/OBIGGS II retrofit will be accomplished on aircraft P-1 through P-70 since the ER mod was incorporated into production at P-71.

SECOMP-I Rev C FLAN

The Army XVIII Airborne Corps concept for C2 is the secure en route communications package-improved (SECOMP-I). The FLAN project allows the Army to perform real-time mission planning and rehearsal while en route. This Army-funded C-17 mod will include adding 4 FLAN antennas and associated power wiring, circuit breakers, coax cables, and low-noise amplifiers. The C-17 FLAN effort will develop the necessary production and engineering drawings needed to incorporate this additional communications capability into the C-17 through production cut-in and fleet retrofit. Army FLAN radio equipment will be rolled on board and installed into optimized mounting locations to maximize performance. This portable equipment approach will meet Army needs and minimize costs. FLAN retrofit began in FY04 to provide an accelerated capability. FLAN cuts into production aircraft at P-153.

Liquid Oxygen (LOX) Bottle Protection

C-17s are currently equipped with armor to protect against a 7.62mm armor-piercing incendiary threat in the cockpit and forward loadmaster station. The original protection package did not include the LOX bottles, as it was erroneously thought that the LOX bottles would not explode if struck and penetrated by gunfire. The LOX bottles are located directly below the cockpit. This LOX Bottle protection project adds a blast containment blanket over the LOX bottles to protect the aircraft against a 21.7mm API threat. Currently the LOX bottle protection development effort is funded and moving forward with a planned P-153. The simplicity of the design will facilitate a quick field-level retrofit of the aircraft.

RNPI/HFDL

RNPI and HFDL is a follow-on to the Global Air Traffic Management initiative. The RNPI portion of the project will provide the capability to maintain precise control of navigation accuracy to within 1 NM of the aircraft's planned position while en route and less than 1 NM in the terminal area. The RNPI portion will also include a Selective Availability Anti-Spoofing Module capability that is needed to comply with a DOD-mandated requirement for improved protection of GPS navigation systems. In addition, the HFDL capability will provide a backup data link to the AERO-I system and provide better coverage over polar areas than that provided by the satellite-dependent AERO-I system. RNPI/HFDL also includes implementation of 5 flight control computer and spoiler control electronic flap computer changes for improved flight control performance.

Combat Lighting

This project will provide the C-17 with Night Vision Imaging System (NVIS)-compatible/covert lighting for the cargo compartment and NVIS-friendly/covert lighting for aircraft exterior lights. Exterior lighting will be capable of going from visible (meeting FAA requirements) to covert with the flick of a switch. All lighting on the exterior, with the exception of the in-trail formation lights, will be dual-mode (overt/covert) providing this capability. Also, an additional set of landing and taxi lights will be installed to permit the pilots to switch from overt to covert mode with the flick of a switch. This capability is scheduled for delivery at P-138 and subsequent aircraft, with a planned retrofit for the rest of the fleet.

Formation Flight Systems

The Formation Flight System (FFS) is an alternate-technology (to legacy Station Keeping Equipment) solution that is intended to meet the US Army's requirement for a Strategic Brigade Airdrop (SBA) pass time across the drop zone of 30 minutes. The FFS will replace the current SKE follow-on system that was introduced on P-86. The FFS will provide significantly higher reliability and availability than the C-17's current formation-flying system. The FFS will meet the all performance requirements including formation-flying in day/night/instrument meteorological conditions /visual meteorological conditions. The FFS will also be able to provide the TCAS functionality that is currently on fielded C-17 aircraft, and thus allow elimination of the current TCAS LRU from the aircraft. The SBA capability, utilizing the FFS, will be met in August 2007.

Core Integrated Processor (CIP) Replacement

The current C-17 Mission Computer/Core Integrated Processor has been identified as an obsolescence item in the post P-180 time frame to support sustainment as well as future avionics capability upgrades. A form, fit, and function CIP replacement at the LRU level will upgrade the existing CIP for spares support and later aircraft. The CIP replacement shall be operationally transparent to the aircrew. The CIP replacement shall provide processing throughput improvement and added memory capacities to support future capability upgrade via block software. All development effort is scheduled to support aircraft retrofit starting in March 2009.

LAIRCM

This plan includes both Phase I and Phase II C-17 LAIRCM requirements. The LAIRCM system provides advanced defensive capability to large transport and tanker aircraft. This system employs an ultraviolet missile-warning system, a fine tracker, and a laser jammer to detect, track, and jam incoming IR missiles. LAIRCM will be retrofitted on the entire C-17 fleet, but funding and yearly retrofit quantities beyond 2010 are still in the planning stages. In addition, LAIRCM equipment upgrades (improved warning, tracking, and jamming) will be incorporated as they become available. The C-17 and LAIRCM programs will ensure that aircraft integration impacts are considered as LAIRCM improvements are developed.

Airborne Network Integration (ANI)

The MAF has a global secure and nonsecure communications requirement to meet MAF missions in support of the USAF CONOPS. ANI upgrade will provide integrated access to the global information grid (GIG) to support C2 voice and data requirements; transfer aircraft status, accurate health and fault/diagnostics information, and position information to secure Tactical Data Link; and provide aircraft IP addressability within the GIG for sharing of operational data. The MAF's plan is to use Joint Tactical Radio System (JTRS) Program radios to provide required capabilities not provided by CNS/ATM modifications or avionics modernization programs (e.g. airborne networking, wide-band applications, etc). ANI will enable real-time information to the cockpit (RTIC) AMC MNS 002-93; Global Mobility CONOPS (Sec 5.3), JTRS ORD Version 3.2; JROCM 087-03, 9 April 2003; and Advanced Situational Awareness and Countermeasures (ASACM) CDD (draft currently in AFROC coordination). ANI development is contingent upon availability of JTRS low-rate initial production projected in late FY08.

JPADS

JPADS will provide the means to meet the combatant commander requirement of sustaining combat power using high-altitude, precision airdrop, as a direct and theater delivery method, into a dynamic, dispersed, and nonsecure battlespace. Precision airdrop supports the full spectrum of military operations from humanitarian relief/low-intensity conflict to major theater war . Special operations, force protection, and resupply are all examples of supportable military operations. Accurate aerial delivery minimizes both the logistic footprint and vulnerability to enemy attack due to inaccurate delivery. The capability to conduct unilateral, joint, and other DOD combat, resupply, and humanitarian high-altitude airdrop operations—with accuracy standards that meet Army requirements (100 meter accuracy) and enhance survivability of AMC assets via standoff drop capability at high altitude—will eliminate lost or damaged resupply material.

C-130 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-130 is the primary combat delivery aircraft for the US military and is operated by AMC, US Air Forces, Europe, Pacific Air Forces, Air National Guard (ANG), Air Force Reserve Command (AFRC), and Air Education and Training Command. Special mission variants are operated by Air Force Special Operations Command (AFSOC) and Air Combat Command active duty, AFRC, and ANG organizations.

The C-130 was first fielded in the 1950s and was designed to accomplish both long-range and tactical airlift missions. Today, it is employed primarily in a theater role, providing rapid transport of personnel and cargo for aerial delivery to a designated drop zone, or by landing at austere locations within a theater of operations. A highly versatile weapon system, C-130 variants routinely provide combat delivery capability, conduct aeromedical evacuation missions, penetrate hurricanes, provide combat communications links, facilitate rescues on land or at sea, service our remote stations at the North and South Poles, refuel aircraft, broadcast radio and television messages, deliver ordnance, and fight forest fires. In addition, C-130s have the capability to augment strategic airlift forces as well as support humanitarian, peacekeeping, and disaster relief operations when needed.

The C-130 fleet has been upgraded over the last four decades with improved avionics, navigation systems, engines, and aircraft systems. Equipment was added in the 1970s to permit adverse-weather formation flight and airdrops; and, more recently, we have added aircraft defensive equipment to permit operations in a low- to selected medium-threat environment.

The MAF fleet is composed of the older C-130Es, several versions of the more modern C-130Hs, and the newest C-130Js. While it has been an outstanding performer, upgrades are necessary to meet known capability shortfalls: C-130s do not meet some communications, navigation, surveillance/air traffic management (CNS/ATM) and Air Force Navigation Safety (Nav-Safety) Master Plan requirements. The C-130E/H fleet is nearly 30 years old; has serious reliability, maintainability, and supportability (RM&S) issues; and some are reaching the end of their service life. Most recently, numerous C-130E/H models have been grounded or placed under significant flight restrictions due to exceeding center wing box life expectancy.

As we look at the future operating environment, it seems increasingly more likely that the older C-130s, without modernization, will be unable to provide the cargo and passenger airlift capabilities needed by warfighters. While the C-130J permits the transport of eight pallets versus the standard six for the remainder of the fleet, the cargo box size will likely be inadequate to transport the series of manned-vehicle future combat system components for the US Army. Similarly, aircraft performance at high gross weights will not permit operations from runways in the 1000 foot to 2000 foot range, nor will current ground flotation characteristics permit operations on unprepared or soft surfaces. While improved aircraft defensive systems are planned, the increased range and lethality of future enemy threat systems could relegate C-130 operations to missions in low-threat environments.

To ensure the C-130 can fulfill today's, as well as future missions, operations following the employment of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) must be addressed (see C-CBRNE Roadmap).

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For the near- and mid-term, the Air Force plans to retire its C-130E fleet; acquire combat delivery C-130Js; and through the C-130 Avionics Modernization Program (AMP), upgrade 279 combat-delivery and 155 special-mission aircraft. The AMP modification will address avionics-related RM&S, nav-safety and CNS/ATM problems, as well as training and interoperability issues. At this juncture, while there is no written requirement for a replacement for the C-130 weapon system, current plans call for introduction of the Advanced Mobility Concept Aircraft (AMC-X) in 2021. This aircraft will be designed to meet future mobility needs.

- First Flight: 7 April 1955
- First Operational Aircraft Delivered: 9 December 1956
- Average Age Of Fleet: Over 30 years for active duty aircraft
- Payload/Range: 25,000 pounds at 2,500 miles; max ferry range is 5,200 miles
- Crew Ratio: Continental United States (CONUS) Active, 2.0; Overseas Active, 1.75; ANG, 2.0; AFRC, 1.75

Key Capability Improvements

Numerous capability improvement programs are ongoing or planned for the C-130 fleet with the most critical programs addressed below. For additional details on capability deficiencies, or for background material on the various modification explanations, use the link immediately following the explanation. The C-130 Requirements and Planning Council highlighted additional enhancements and modifications:

- Center Wing Box (MAF and AFSOC Aircraft)
- Defensive Systems Improvements to include Large Aircraft Infrared Countermeasures (LAIRCM) integration, infrared (IR) sensor upgrade, and remote defensive systems switches on E/H pilot and copilot yokes, Advanced Situational Awareness/Countermeasures
- C-130J Propeller Windmilling
- C-130J Live-Fire Test
- C-130 Surface-to-Air Fire Look-out Capability
- Night Vision Imaging System Compatible Lighting Modification
- CNS/ATM and Nav Safety Enhancements to Traffic Alert and Collision Avoidance System (TCAS), Terrain Awareness and Warning System (TAWS), etc.
- C-130 Loadmaster Crash-Worthy Seat
- Real-Time Information in the Cockpit
- AMP Training Systems Modifications and Acquisitions
- Readiness Spares Package and Initial Spares Funding
- C-130J Positive Lock Engagement
- Joint Precision Airdrop System (JPADS)

C-130 Program/Modifications

Program/Modification	(b)(5)
C-130 Avionics Modernization Program (AMP)	
ALR-69A	
LAIRCM	
Link-16, Joint Tactical Radio System (JTRS) [C-130E/H/J]	
Center Wing Box (CWB) Replacement	
CNS/ATM (C-130J)	
Airborne Broadcast Intelligence (ABI)/Combat Track II (CTII)	
JPADS	

(*Total Fleet Replacement Through 2054)

Modifications Explanations

C-130 Avionics Modernization Program

The C-130 weapon system has evolved into different models with multiple variants within each model. This proliferation of models and configurations exacerbates support and training inefficiencies and complicates unit interoperability. The AMP modification will incorporate and integrate Nav-Safety, CNS/ATM, RM&S, and C-130 Broad Area Review requirements including an Enhanced TCAS, Elementary Mode S, and a TAWS. It also replaces the APN-59 and APQ-175 radars, replaces the N-1 and C-12 compasses, provides dual autopilots, installs a modern flight management system, and provides high frequency/ultra high frequency (UHF)/very high frequency data link. Approximately 434 aircraft will be modified.

Defensive Systems ALR-69A Precision Location and Identification (PLAID)

C-130 aircraft routinely operate in areas of heightened tension, without electronic combat support or escort aircraft, in support of US policy. All C-130 aircraft require the capability to detect and avoid radar threats to increase survivability. The ALR-69 provides airborne warning of radar-directed anti-aircraft artillery, airborne interceptors, and surface-to-air missiles. The system is being upgraded to provide PLAID technology. With this modification, the system will have improved azimuth and range accuracy which supports a planned geolocation capability for increased situational awareness. The system will also have increased capability to operate in dense-signal environments. A total of 379 aircraft will be modified.

LAIRCM

The LAIRCM program is designed to protect transport and tanker aircraft from IR man-portable air defense system missiles. LAIRCM will increase crew warning time, decrease false alarm rates, and automatically counter advanced IR missile systems. The missile warning subsystem will use multiple sensors to provide full spatial coverage. The countermeasures subsystem will use lasers mounted in pointer tracker turret assemblies. Current plans include the modification of 150 C-130 aircraft.

Communications Link-16, JTRS (C-130 E/H/J)

JTRS is a joint program that is using spiral development to produce a software-compliant-architecture radio supporting multiple waveforms. OSD issued a mandate prohibiting the acquisition of any aircraft radio that is not JTRS-compliant. They have also tasked the AF to develop a migration schedule to JTRS for all platforms. The AMC plan is to initially migrate to JTRS for tactical data link (Link-16) and UHF satellite communications. Installation should start in FY09-10 when the JTRS airborne cluster is projected to become available.

Center Wing Box Replacement

Due to unique mission requirements and the severity of their flight environment, special purpose C-130s have been replacing center wing boxes since the early to mid-1990s. The Warner Robins Air Logistics Center establishes center wing replacement requirements for special and general purpose C-130s, using a structural analysis model that predicts wing life based on usage severity factors and equivalent baseline hours. Engineering models run to date suggest the MC-130H fleet will begin to reach its center-wing service life in FY07. Generalized cracking in the center wings of the combat delivery fleet has been discovered earlier than originally forecast, resulting in the grounding of some aircraft and the imposition of varying levels of flight restrictions on a number of aircraft.

CNS/ATM

The future air traffic control system will require significant upgrades to today's aircraft to increase system capacity and flight efficiency while continuing to meet flight safety standards. New architecture takes advantage of emerging technologies in communication, navigation, and surveillance to improve air traffic management. The ability to reduce aircraft separation and implement other new ATM procedures, while maintaining or improving safety standards, is based on the use of new technology.

Joint Precision Airdrop System

JPADS will provide the means to meet the combatant commander requirement of sustaining combat power using high-altitude, precision airdrop, as a direct and theater delivery method, into a dynamic, dispersed, and nonsecure battlespace. Precision airdrop supports the full spectrum of military operations from humanitarian relief/low-intensity conflict to major theater war. Special operations, force protection, and resupply are all examples of supportable military operations. Accurate aerial delivery minimizes both the logistic footprint and vulnerability to enemy attack due to inaccurate delivery. The capability to conduct unilateral, joint, and other DOD combat, resupply, and humanitarian high altitude airdrop operations with accuracy standards that meet Army requirements (100 meter accuracy) and enhance survivability of AMC assets via standoff drop capability at high altitude. This capability will reduce lost or damaged resupply material.

C-130 Deficiencies/Solutions | **MAF Deficiencies/Solutions** | **Reference Documents**

Joint Cargo Aircraft (JCA) Roadmap

OPR: AMC/A58

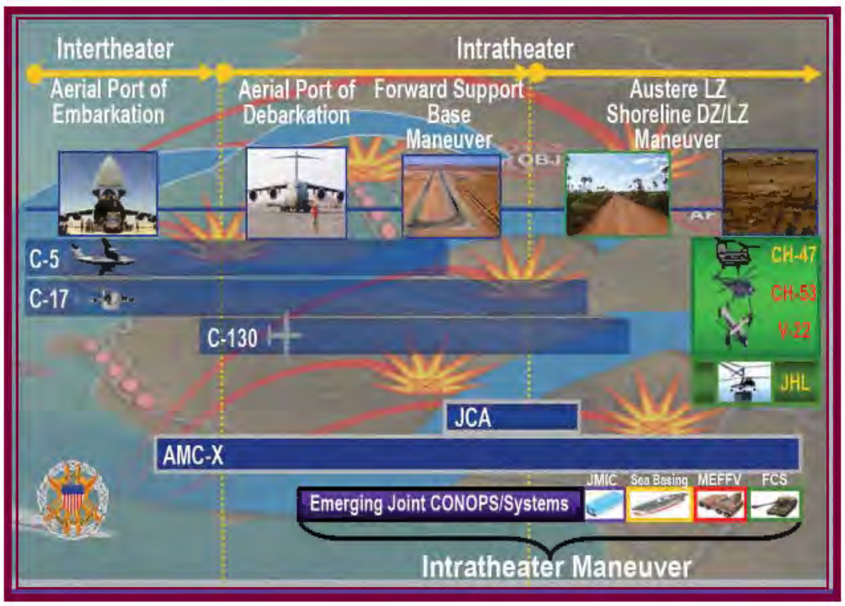
Weapon System Assessment

The Capability Gap

Service transformation has changed the Army's doctrinal concept of arraying forces in large contiguous formations to smaller dispersed operations over greater tactical and operational distances. An unintended consequence of this transformation is a light intratheater airlift capability gap to remote austere locations. In operational terms, Army cargo fixed- and rotary-wing aircraft lack the combined speed, range, and payload to organically provide time-sensitive sustainment to forward deployed and dispersed combat forces in remote austere locations. In contrast, Air Force fixed-wing aircraft possessing the required speed, range, and payload, lack Short Takeoff and Landing (STOL) and/or Vertical Takeoff and Landing (VTOL) capability required to routinely sustain combat forces in these same locations.

Capability Assessment

The JCA payload requirement is approximately 3 pallet positions/18,000 lbs which is easily attainable with the current Air Force airlift fleet. However, the capability gap, as described, requires very short take-off and landing operating parameters into austere locations, which are typically unattainable by today's airlift fleet of C-130s and C-17s. Furthermore, the C-130 intratheater airlift fleet is showing signs of fatigue. Thus, the conceptualized JCA would provide a joint light intratheater airlift capability supporting numerous wartime and peacetime missions in the midst of catastrophic, traditional, disruptive, and irregular challenges. It could execute overt and clandestine (with proper equipment) intratheater wartime and peacetime airlift missions. These missions would include airdrop and airland delivery, casualty and aeromedical evacuation, forward arming and refueling point (FARP) operations, combat support, and SOF infil/exfil/resupply. The JCA could augment larger intratheater and intertheater mobility aircraft performing similar missions while simultaneously bridging the light airlift capability gap by operating into and out of much shorter and more austere landing zones. In fact, access to littoral nations could dramatically increase by incorporating the JCA's STOL capability with seabasing concepts. In short, the JCA could increase wartime effectiveness by delivering cargo/personnel directly to the "foxhole."



Light intratheater airlift may be especially important to counter growing irregular challenges. Terrorism, insurgencies, and civil war nullify many of the asymmetric air and space advantages the United States maintains over other nations and result in further dispersion of combat forces. In fact, the most important and effective airpower operations when facing irregular challenges may be support missions such as transport, reconnaissance, and resupply. Furthermore, these irregular challenges will likely erupt in second and third world countries with limited infrastructure. Thus, the additional capabilities the JCA provides (speed, range, payload, small footprint) could be especially useful both today and in the future.

In addition to OCONUS missions, the JCA could support Homeland Security mobility operations moving quick reaction forces and first responders for national emergencies and natural disasters. JCA could also support peacetime missions such as CONUS distribution process support, Joint Airborne/Air Transportability Training (JA/ATT), Joint Chiefs of Staff (JCS) exercises, opportune aeromedical evacuation, humanitarian airlift, and operational support airlift.

The Road Ahead

The Air Force acknowledges the light intratheater airlift capability gap in austere regions identified by Army analysis. However, the Air Force recognizes that intratheater airlift of joint forces incorporates more than Army limited organic delivery of time sensitive critical cargo. Consequently, the Air Force supports further analysis to fully quantify the capability gap and evaluate potential solutions that might fill the gap. Studies are currently underway and will be incorporated into future Joint Capability Integration and Development System (JCIDS) documents.

MAF Deficiencies/Solutions | MAF Capabilities | Reference Documents

KC-10 Roadmap

OPR: AMC/A58

Weapon System Assessment

The Global Mobility Concept of Operations (CONOPS) requires the Mobility Air Forces (MAF) to provide air refueling capability worldwide, day or night, in adverse weather, with probe/drogue and boom on the same sortie for US, allied, and coalition military aircraft. Air refueling operations may be used to support global attack; air bridge; deployment; redeployment; homeland defense; theater support to joint, allied, and coalition air forces; and specialized national defense missions. The KC-10A is uniquely capable of meeting these capability demands; it is used to conduct simultaneous cargo and air refueling missions using the centerline air refueling drogue or boom, or wingtip drogues. With its receiver capability, it can be used for force extension operations—the refueling of one tanker by another tanker—and thus reduce the number of tankers used for deployment support.

The KC-10A represents approximately 10% of the AF tanker fleet. The KC-10A is a commercial derivative of the McDonnell Douglas DC-10-30 that had 88% of its design and components in common when delivered in 1981. There are 59 KC-10s in the fleet, assigned to McGuire AFB and Travis AFB.

USAF has 12 KC-10 aircraft that are command and control module (CCM)-capable. These 12 aircraft have been modified to accept the Commander-Joint Task Force portable CCM. They provide deploying commanders an en route, immediate communications-type platform with the range and speed to arrive on scene with deploying USAF forces.

The KC-10 has provided outstanding service to the warfighter; however, upgrades are necessary to meet known capability shortfalls. The fleet is on average over 20 years old, and obsolescence issues are surfacing. The current KC-10 configuration does not provide the capabilities to meet future Federal Aviation Administration (FAA)/International Civil Aviation Organization communication, navigation, surveillance/air traffic management (CNS/ATM) requirements. KC-10 availability has been decreasing due to maintenance and modification requirements of an aging fleet, while costs continue to increase. A primary MAF goal, as described in the AMC Night Vision Devices (NVD) CONOPS, is for "NVDs to become a normal part of night tactical training and operational missions." The KC-10 is not night vision device-capable nor does it have any defensive systems capabilities. The KC-10 does not currently support net centric operations, and only limited real-time information in the cockpit (RTIC) capability exists. These capabilities are being addressed during the KC-10 Aircraft Modernization Program (AMP).

The KC-10 CNS/ATM program was originally designed to address some of the shortfalls mentioned above. However, continued delays and cost growth in the CNS/ATM program, coupled with evolving requirements and obsolescence issues, led AMC to reassess the modernization plans for the KC-10 fleet. While the original CNS/ATM architecture provided processor growth and throughput to support selected CNS/ATM modifications, a significant follow-on development effort would still have been required to take the platform beyond 2010. The resulting architecture would have also retained much of the legacy analog equipment and would have created a unique DC-10-based configuration, limiting commonality with similar commercial fleets. This modification approach did not address the obsolescence issues and significantly limited the platform's growth path (life expectancy estimated to 2040). Following a comprehensive Business Case Analysis (BCA), the AMC Commander approved the termination of the KC-10 CNS/ATM program and directed the initiation of KC-10 AMP. This program will provide net centric communications with growth capability, meet CNS/ATM requirements, and improve the aircraft's reliability and maintainability.

More efforts are planned to ensure the KC-10 can provide the required mission capabilities. Defensive systems are required for operations in threat conditions. With the wide spread use of night vision devices, KC-10s need to be modified with NVD-compatible interior and external lighting. The proliferation of weapons of mass destruction drives the need to conduct operations following the employment of chemical, biological, radiological, nuclear, or high-yield explosives (CBRNE) (see C-CBRNE Roadmap).

- First Flight: 1979
- First Operational Aircraft Delivered: 1981
- Last Operational Aircraft Delivered: 1990
- Average Age of Fleet: 20 years
- Range (Unrefueled): More than 11,500 miles
- Crew Ratio: Active, 2.0; Associate Reserve, 1.5

Key Capability Improvements

Numerous capability improvement programs are ongoing or planned for the KC-10 fleet with HQ AMC priorities identified by the Requirements and Planning Council Process.

KC-10 Program/Modifications

Program/Modification	(b)(5)
Thrust Reverser (TR) Modification	[redacted]
CNS/ATM (Stop Gap)	
Defensive Systems	
Night Vision Imaging System (NVIS)	
RTIC (ABI, Combat Track II, Link 16, UHF SATCOM Antenna) (AMP)	
KC-10A AMP (Capabilities Listed Below)	

(*Under consideration for inclusion in AMP)

Modification Explanations

Thrust Reverser Modification

The TR modification is required by the FAA to prevent unwanted deployment of TRs. Modification consists of three separate FAA Service Bulletins (SBs). The first SB repositions indication lights to the pilot station and is completed. The remaining two SBs (wiring and installation of an additional locking system) must be completed by October 2006 and are fully funded. Acceleration of this modification using KC-10 Global Air Traffic Management (GATM) termination funds was approved by AMC/A5 and SAF/AQ. An additional $2.5 million in FY05 will be used to purchase long lead-time kits. Purchase of kits in FY05 allows increase from 35 to 49 aircraft installs in FY06 with projected completion of the modifications by the FAA mandate of 1 October 2006. Expectation is that a time-compliance waiver to Air Force Program Directive (AFPD) 62-4 will not be required.

Communication, Navigation, Surveillance/Air Traffic Management Stop Gap

The original CNS/ATM solution for the KC-10 installed the minimum equipment required to comply with near-term CNS/ATM requirements. Original cost estimates did not take into account the additional effort required to integrate the new (digital) equipment with the old (analog) cockpit. This technological challenge significantly increased the original cost for KC-10 CNS/ATM and made the original CNS/ATM program underfunded, unique in design, and inadequate for future requirements of the KC-10. As a result, CNS/ATM was terminated. A stop-gap effort is under way to meet near-term requirements until a new modernization solution is selected. The stop-gap matrix below (present to FY09) will address the following capabilities:

KC-10 Stop Gap Matrix:

Description	*AMC OPR*	*Need Date*	*Funding*	*Requirements Document*	*Project Plan*

(b)(5)

[redacted]

Defensive Systems

A system to protect KC-10 from infrared and radio frequency threats to reduce vulnerability from hostile systems is required. The plan is to provide a growth path for this capability in the initial KC-10 AMP increment.

Night Vision Imaging System (NVIS)

The MAF lacks a standard NVIS for MAF tanker cockpits and boom operator positions. KC-10 exterior lighting is not night-vision compatible, limiting the receiver's ability to utilize their existing night vision systems. This limits the ability to perform lights-out AR operations at night. All KC-10 aircraft must have NVD-compatible cockpit, boom pod, and external lighting. Plan is to include these capabilities in KC-10 AMP Capabilities Development Document.

Real-Time Information to the Cockpit (RTIC) (Airborne Broadcast Intelligence [ABI], Combat Track II, Link 16, Ultra High Frequency [UHF] Satellite Communications [SATCOM] Antenna)

RTIC was identified as a requirement during the Operation IRAQI FREEDOM hot wash. RTIC provides the following: enhanced situational awareness on crew-friendly display with threat detection, identification, and location; capability to share common threat data among warfighters (Combat Air Forces, Air Force Special Operations Forces, intelligence, surveillance, and reconnaissance and command and control (C2) centers [Air and Space Operations Centers and 18 AF/Tactical Airlift Control Center]; Global Positioning System position on moving map with continuous electronic order of battle updates; and ability to send/receive/display secure text/files aircraft to aircraft and to/from C2 centers). The impact of not attaining this capability is: MAF cannot successfully execute threat avoidance tactics in a combat environment with active infrared and radio frequency threats; no protection against "pop-up" threats; inability to send/receive secure updates to/from C2 centers on threats, airspace changes, tanker track changes, etc.; and lack of real-time situational awareness to aircrews. The production units of ABI and CT II are available for operational use. ABI and CT II interface to SATCOM antenna on 12 of the 59 aircraft. The stop-gap plan is to install UHF SATCOM antennas and Iridium phone antennas on all 59 KC-10 aircraft and integrate RTIC capability into the cockpit as part of the KC-10 AMP.

KC-10 AMP

AMC, 327 CLSG/GFLT, and Air Staff representatives conducted a benefit/cost analysis which recommended a competitive acquisition strategy for the KC-10 AMP. The capability envisioned for AMP will meet CNS/ATM requirements and will posture the aircraft for future upgrades. This acquisition approach requires development of an initial capabilities document, a capabilities development document, refinement of cost estimates, and AMC and AF support in the FY06 program objective memorandum (POM). The competition could benefit the AF by reducing costs and could produce new technology solutions (e.g., open architecture; color multifunction control display units; digital local area network).

KC-10 AMP Supports the Four Main Requirement Areas:

- Airspace access capabilities (mandated National Airspace System and International Airspace Requirements-CNS/ATM)
- Safety capabilities (FAA-mandated safety requirements)
- Military capabilities (command, control, communications, computers, and intelligence; ABI; multimission payload; aeromedical evacuation; and aircraft survivability)
- Reliability/maintainability/supportability capabilities (to counter failure rates, nonmaintainable, and obsolescence issues)

Capabilities for inclusion in AMP increment one are:

- Integrated On-Board Aircraft Network
- Enhanced Flight Management System to include Auto-Flight
- Air Refueling Electronics Upgrade
- Mobility for 21st Century
- NVIS Cockpit
- Digital Weather Radar
- Cockpit Digital Instrument Upgrade
- Selective Availability Antispoofing Module
- Precision Area Navigation Approaches
- Flight Data Recorder/Cockpit Voice Recorder
- Electronic Library
- INS Replacement
- RTIC Integration
- Aircraft Information Program, Joint Tactical Radio System, Network Centric Operations, Multimission Payload, and Military Flight Operations Quality Assurance

KC-10 Deficiencies/Solutions | MAF Deficiencies/Solutions | Reference Documents

KC-135 Roadmap

OPR: AMC/A58

Weapon System Assessment

The KC-135 Stratotanker is Air Mobility Command's primary platform for air refueling and provides approximately 90% of the command's air refueling capability. The aircraft provides support to receiver-capable US, allied, and coalition military aircraft. The KC-135 is employed to support global attack, air bridge, deployment, redeployment, homeland defense, theater support to joint, allied, and coalition air forces, and specialized national defense missions. It also supports special operations and US nuclear forces. To fully support nuclear and special operations, aircraft are equipped with additional capabilities such as electromagnetic pulse protection and specialized communication equipment. Although not its primary mission, the KC-135 is employed for opportune airlift and aeromedical evacuation.

The KC-135 fleet is aging and undergoing modernization to extend its life cycle well into the twenty-first century. At the same time, AMC is currently pursuing a recapitalization effort with the intent to retire the aging and maintenance-expensive KC-135E model aircraft and add a modern tanker aircraft to the inventory. KC-135 availability has been decreasing due to maintenance and modification requirements of an aging fleet, while costs continue to increase. To ensure the aircraft's viability into the twenty-first century, we completed one major modification to the KC-135 fleet and are currently conducting another major improvement program. Additionally, a series of smaller modification programs are also being worked presently or are planned for in the upcoming years.

First, we completed the Block 30 modification that is commonly referred to as the Pacer Compass, Radar, and Global Positioning System (Pacer CRAG) modification in FY02. This was a comprehensive cockpit avionics modernization program that replaced most of the obsolete electromechanical cockpit instrumentation and radar with state-of-the-art equipment and displays. The compass replacement program provided an additional inertial navigation unit, and the radar replacement program included a color weather radar and electronic horizontal situation indicators. The modification program added a Global Positioning System (GPS) capability with a receiver, antenna, flight management computer, smart control display units, and a data loader. In addition, the Pacer CRAG program included installation of a Traffic Alert and Collision Avoidance System, standby attitude directional indicator, reduced vertical separation minima (RVSM), and nav safety enhancements to include a new cockpit voice recorder, flight data recorder, and emergency locator transmitter. The RVSM modification is very significant since it provides the KC-135 unrestricted access to all global vertical altitudes.

Next, the Block 40 modification is ongoing and consists of the Global Air Traffic Management System (GATM) modification and a circuit breaker/transformer rectifier replacement program. The KC-135 GATM program modifies communications, navigation, and surveillance systems to meet future global airspace requirements. To meet future communications requirements, GATM adds satellite communications voice for direct pilot/controller communication, and data link supporting aircraft to air traffic control communications, flight management services, and command/control communications between the aircraft and Tanker Airlift Control Center. It also adds a second high frequency radio with data link capability. To meet the navigation requirement, GATM upgrades the dual flight management system with a second integrated GPS/Inertial Navigation System to allow continued access to global airspace by improving the required navigation performance capabilities of the aircraft. To meet surveillance requirements, GATM adds new and upgraded equipment allowing the aircraft to automatically transmit its GPS position to air traffic control. The AMC Commander declared initial operational capability on 30 April 2004.

Several studies are completing, or are ongoing, to determine the KC-135 fleet's viability and add a modern tanker to the AMC inventory. More efforts are planned to ensure the KC-135 can provide the required mission capabilities. Defensive systems are required for operations in threat conditions. With the widespread use of night vision devices (NVDs), KC-135s need to be modified with NVD-compatible interior and external lighting. The proliferation of weapons of mass destruction drives the need to conduct operations following the employment of chemical, biological, radiological, nuclear, or high-yield explosives. A primary MAF goal, as described in the AMC Night Vision Devices CONOPS, is for "NVDs to become a normal part of night tactical training and operational missions." The KC-135 is not NVD-capable, nor does it have any defensive systems capabilities. The KC-135 does not currently support net centric operations and does not have real- time information in cockpit (RTIC) capability due to the lack of proper antennas.

A recent KC-135 aging aircraft study addressed the aircraft's life in terms of three variables—usage, age, and utility. Aircraft usage is measured in flight hours. As the aircraft structure flexes during flight, it eventually begins to crack; this can be termed "fatigue." Age can also be simply measured chronologically in years. Exposure to the environment over time induces corrosion and material degradation; this variable requires repairs. The third variable is utility, assessed in usefulness. As the operational environment changes, aircraft capabilities and availability become insufficient to meet mission needs. This variable drives aircraft modifications. Consequently, as the Air Force considers recapitalization of the KC-135 fleet, it is important to understand the combination of these variables—usage, age, and utility—results in an increase in maintenance, an increase in costs, and a decrease in aircraft availability.

(b)(5)

[redacted]

Additionally, the 327th Tanker Sustainment Group is moving forward to address risks highlighted by the September 2004 Fleet Viability Board. Briefed to the Air Force Chief of Staff (CSAF) in March 2005, the System Program Office (SPO) identified five areas of risk: fire from fuel-related failures, flight control failure, landing gear failure, environmental control failure, and structural failure. Air Mobility Command and Air Force Material Command are currently in the process of developing and funding a "campaign plan" to mitigate identified risks.

Fleet Facts:

- First Flight: 1956; first operational aircraft delivered: 1957
- Total Aircraft Delivered: 732; average age of fleet: 45 years
- Range (unrefueled): 6,300 nautical miles (NM); 1,500 NM with 150,000 pounds transfer fuel
- Crew Ratio: Active and Air Force Reserve Command is 1.75; Air National Guard is 1.8

(b)(5) [redacted]

Key Capability Improvements

Numerous capability improvement programs are ongoing or planned for the KC-135 fleet with the most critical programs shown in the chart below. Use the chart, in concert with the modification explanations shown immediately following. For additional details on capability deficiencies or for background material on the various modification explanations, use the link immediately following the explanation.

KC-135 Program/Modifications

Program/Modification

(b)(5)

- Control Column Actuated Brake
- GATM Modification
- Control Column Potted Yoke Switches
- Large Aircraft Infrared Countermeasures (LAIRCM)
- Mode S Elementary Surveillance
- Mode S Enhanced Surveillance and Mode 5
- Airborne Network Integration (ANI)
- Roll-On Beyond-Line-of-Sight Enhancement (ROBE)
- Wheel and Brake System Improvement
- Airborne Broadcast Intelligence (ABI)/Combat Track II (CTII)

Modification Explanations

Control Column Actuated Stabilizer Trim Brake

The control column actuated brake program installs a control column stabilizer trim brake to prevent stabilizer trim runaway. This stabilizer trim brake mechanically arrests stabilizer movement opposite of column movement, similar to commercial 707 installation. This program is based upon a KC-135E Class A mishap at Geilenkirchen Air Base in January 1999. The mishap safety board recommended modification to the pitch trim control system. It is currently on contract at a cost of $45.2 million. (b)(5) The contract modifies 450 aircraft.

Global Air Traffic Management Modification

The future air traffic control system will require significant upgrades to today's aircraft to increase system capacity and flight efficiency while continuing to meet flight safety standards. New architecture takes advantage of emerging technologies in communication, navigation, and surveillance to improve air traffic management. The ability to reduce aircraft separation and implement other new ATM procedures, while maintaining or improving safety standards, is based on the use of new technology. (b)(5)

Control Column Potted Yoke Switches

This initiative addresses the design of existing stabilizer trim switch installation in the control wheel, which has maintainability problems and can induce short circuits. Two design approaches have been provided: switches potted with individual wire splices, or switches potted with integral wire disconnect block. Installation is complete on one prototype aircraft. Currently this program is valued at $13.6 million with probable Program Depot Maintenance installation.

Defensive Systems

This effort will install a system to protect the KC-135 from infrared (IR) and radio frequency threats to reduce vulnerability from hostile threats. LAIRCM provides a highly effective defensive capability for transport and tanker aircraft against IR surface-to-air missiles. The system consists of a missile warning system and directed laser countermeasures. Current plans call for equipping all KC-135s with defensive systems, beginning with LAIRCM installation on 22 KC-135s to support special missions.

Mode S Elementary and Enhanced Surveillance/Mode 5

The current KC-135 APX-100 Mode S transponder does not meet Eurocontrol requirements for elementary surveillance established by International Civil Aviation Organization Standards and Recommended Practices (SARPs), Annex 10, Amendment 73. To meet elementary surveillance requirements, a software upgrade to the currently installed APX-100 is required. Air Staff provided funding in FY04/05 to upgrade the APX-100 to meet the Elementary Mode S requirement. However, the KC-135 APX-100 Mode S analog transponder does not meet anticipated Eurocontrol requirements for enhanced surveillance (anticipated for FY09), nor the DOD requirement (per HQ USAF/XO message 15 May 2002) to upgrade Mode 4 to Mode 5, encrypted military identification friend or foe (IFF) systems. (b)(5) (b)(5) The recommended solution is to procure a new transponder such as the APX-119.

Airborne Network Integration

AMC has a global secure and nonsecure communications requirement to meet AMC missions in support of the USAF CONOPS. The ANI upgrade will provide integrated access to the global information grid (GIG) to support C2 voice and data requirements, transfer aircraft status, accurate health and fault/diagnostics information, and position information to secure Tactical Data Link (TDL), and provide aircraft internet protocol addressability within the GIG for sharing of operational data. AMC's plan is to use Joint Tactical Radio System (JTRS) Program radios to provide required capabilities not provided by Global Air Traffic Management modifications or Avionics Modernization Programs (e.g., airborne networking, wide-band applications, etc.). ANI will enable RTIC AMC MNS 002-93, Global Mobility CONOPS (Sec 5.3); JTRS ORD Version 3.2; JROCM 087-03, 9 April 2003; and Advanced Situational Awareness and Countermeasures (ASACMS) Capability Development Document (draft in Air Force Requirements Oversight Council coordination). ANI development is contingent upon availability of JTRS low-rate initial production projected (b)(5)

Roll-On Beyond-Line-of-Sight Enhancement

The ROBE program modifies 40 KC-135s with tactical data link (Link 16) to enable the tanker to act as an airborne node with relay and "gateway functions." The airborne gateway mission is adjunct to the air refueling/mobility mission. It will be tasked by the Air Component Commander for the theater of operation. The primary objective is to connect battle directors to Link-16 participants in theater or en route. KC-135 ROBE is the first generation of the Scalable, Multi-function, Automated Relay Terminals (SMART) tanker gateway initiative. This is a SECAF/CSAF-directed Air Force transformational effort to increase the utilization/effectiveness of tankers that are "always there" and give these tankers an adjunct command and control, intelligence, surveillance and reconnaissance mission.

Wheel and Brake System Improvement (WBSI)

The KC-135 WBSI replaces the current steel brakes and incorporates a commercial, off-the-shelf carbon brake system similar to that already in use on the C-17. The WBSI also incorporates an improved wheel assembly that features removable heat-shield segments, is compatible with radial tires, and is expected to increase service life and improve overall reliability and maintainability. The improved system is expected to perform 1,000 sorties before scheduled preventive maintenance compared to 100 sorties for the current system. This improvement has the potential to save $598 million in life-cycle costs.

Future Enhancements/Modifications

The KC-135 Requirements and Planning Council (R&PC) was initiated in May 2004. Its purpose is to provide a forum for common initiatives, new requirements, and planning activities; it bridges the AMC requirements definition process with the SPO implementation process to foster unity of direction and continuity among all C/KC-135 stakeholders. Held on a semiannual basis, the R&PC highlights additional enhancements and modifications needed for the aircraft: aircraft environmental systems, aeromedical evacuation mission modifications, Night Vision Imaging System, aircraft latrine, wheel and brake initiative, radio altimeter replacement, RTIC (ABI/Combat Track II, Moving Map Display), and a digital ARC-190 HF radio upgrade.

Night Vision Imaging System (NVIS)

The MAF lacks a standard NVIS for MAF tanker cockpits and boom operator positions. KC-135 exterior lighting is not night-vision compatible, limiting the receiver's ability to utilize their existing night vision systems. This limits the ability to perform lights-out AR operations at night. All KC-135 aircraft must have NVD-compatible cockpit, boom pod, and external lighting.

Real-Time Information to the Cockpit

RTIC was identified as a requirement during the Operation IRAQI FREEDOM hot wash. RTIC provides the following: enhanced situational awareness on a crew-friendly display with threat detection, identification, and location; capability to share common threat data among warfighters (Combat Air Forces; Air Force Special Operations Forces; Intelligence, Surveillance, and Reconnaissance) and command and control (C2) centers (Air and Space Operations Centers, 18 AF/Tactical Airlift Control Center); Global Positioning System position on moving map with continuous electronic order of battle updates; and ability to send/receive/display secure text/files aircraft-to-aircraft and to/from C2 centers.

Multipoint Refueling System (MPRS)

The Multipoint Refueling System provides the capability to air-refuel receptacle and probe-equipped receivers on the same mission. Twenty KC-135s are equipped with a wing-mounted MPRS capability.

Special Air Mission Roadmap

OPR: AMC/A58

Weapon System Assessment

Very important person special air mission (VIPSAM) aircraft provide safe, comfortable, and reliable air transportation for the President, Vice President, Cabinet, Members of Congress, and other high-ranking American and foreign dignitaries. Flying worldwide, VIPSAM aircraft represent the highest level of distinguished visitor travel and must meet stringent schedule and protocol requirements under intense media scrutiny. AMC provides this service as lead command with 18 aircraft dedicated to VIPSAM: C-9C, C-20B/H, C-37, C-32A, C-40B/C, and VC-25.

VIPSAM aircraft are especially essential in wartime when diplomacy and negotiation become critical elements of the national security strategy. World events may, at any given time, require the Nation's leaders to be dispatched simultaneously on diplomatic missions around the world. VIPSAM passengers conduct highly sensitive business while en route, and their objectives must not be compromised. Because VIPSAM aircraft are the official transportation for leaders of the United States Government, they are a highly visible symbol of the United States of America. National pride dictates these aircraft portray the highest American standards.

To that end, following the events of September 11, 2001, an increase in the communications capability of the VIPSAM fleet was put on the fast track. The VC-25, C-32A, and C-40B are receiving an "office in the sky" upgrade. This provides passenger access to office local area networks, e-mail, and the World Wide Web. The C-20B, C-37, and C-9C received mission computer and aircraft radio modifications allowing a more robust communication capability. In addition, the VC-25 has completed an Avionics Modernization Program (AMP) upgrade. AMP replaces aging equipment and introduces systems that enhance situational awareness such as an onboard electronic library that includes navigation charts and airport maps and an enhanced Terrain Awareness and Warning System. This program represents an extension of existing programs to upgrade cockpit displays and navigation capabilities begun under the Air Force's communication, navigation, surveillance/air traffic management (CNS/ATM) initiative; and it parallels comprehensive cockpit modernization programs for other airlift aircraft. Also, the Airborne Information Management System (AIMS) upgrade for the VC-25 addresses specific deficiencies

(b)(5)

for current communications systems. The AIMS program will identify specific requirements for communications switching and delivery of services to the passengers traveling onboard the VC-25. The AIMS architecture should not only meet current needs and deficiencies, but also provide a growth path for future technology upgrades during the remainder of the aircraft's service life.

In the years to come, we plan to add three C-40Cs to this fleet, retire the last C-9Cs by FY11, and look at replacing the VC-25s.

Special Air Mission Program/Modifications

Program/Modification	(b)(5)
C-20 Airworthiness Directives/Service Bulletins	
VC-25 CNS/ATM	
VC-25 Airworthiness Directives/Service Bulletins	
C-37 Airworthiness Directives/Service Bulletins	
C-32A Communications Upgrade	
C-32A Airworthiness Directives/Service Bulletins	
C-40B Defensive System	
C-40B/C Airworthiness Directives/Service Bulletins	

Modification Explanations

C-20 Airworthiness Directives/Service Bulletins
The C-20 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

VC-25 CNS/ATM
This modification includes the installation of equipment to bring the aircraft into full CNS/ATM compliance.

VC-25 Airworthiness Directives/Service Bulletins
The VC-25 is an FAA-certified aircraft and must comply with all FAA Airworthiness Directives.

C-37 Airworthiness Directives/Service Bulletins
The C-37 is an FAA-certified aircraft and must comply with all FAA Airworthiness Directives.

C-32A Communications Upgrade
The communications upgrade consists of installing a communications management system and integration with the Communication System Operator functions. The upgrade will allow management of secure and nonsecure voice, data, and facsimile (transmit and receive) for 42 telephone stations within the aircraft. These aircraft support the President, Vice President, the Secretary of State, the Secretary of Defense, and other senior government officials, as well as their staffs, allowing them to conduct business while airborne, utilizing the on-board communications system.

C-32A Airworthiness Directives/Service Bulletins
The C-32A is an FAA-certified aircraft and must comply with all FAA Airworthiness Directives.

C-40B/C Airworthiness Directives/Service Bulletins
The C-40B/C is an FAA-certified aircraft and must comply with all FAA Airworthiness Directives.

SAM Deficiencies/Solutions | MAF Deficiencies/Solutions | Reference Documents

C-12 Roadmap

OPR: AMC/A58

Weapon System Assessment

The aircraft provides on-call, rapid-response, modern air transport for high-priority supply and movement of key personnel. Specifically, it is used to transport very important persons (VIPs); to deliver repair parts and equipment; and also to transport technical, crash investigation, and accident investigation teams wherever needed and in any environment including chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) (see C-CBRNE Roadmap). Its support role also includes such functions as range clearance, medical evacuation, and administrative movement of personnel, transportation connections, and courier flights.

As a worldwide-deployed aircraft, the C-12 lacks the necessary equipment to be compliant with current and future global airspace requirements. Primarily used for embassy support, the aircraft operates in a wide range of environments. From landing on unimproved runways at austere locations to working out of international airports, the C-12 needs the right equipment to navigate through all extremes. The C-12 does not meet communications, navigation, surveillance/air traffic management (CNS/ATM) and Air Force Navigation Safety (nav safety) Master Plan requirements; the fleet has reliability, maintainability, and supportability (RM&S) issues that need to be worked.

The Electronic Flight Instrumentation System (EFIS) upgrade meets USAF and long-term CNS/ATM requirements such as Required Navigation Performance (RNP), Precise Positioning Service (PPS), Global Positioning System (GPS), Traffic Alert and Collision Avoidance System (TCAS) II, and Terrain Awareness and Warning System (TAWS). It also employs a high-fidelity, large-format display system, data link-based flight management system, and radio tuning system. It retains existing baseline avionics recently modified by the USAF that satisfy specified USAF and CNS/ATM requirements, thereby maximizing USAF investment in these avionics. Other capability enhancements would be a modification to install electronic countermeasures (ECM) and engine exhaust suppression devices on C-12C/D aircraft to reduce infrared (IR) signature and provide electronic countermeasures protection against IR missiles. Lastly, the Raisbeck Enhanced Performance Package is a commercial modification that could significantly improve the aircraft in these areas: payload, range, block speed, operational flexibility, economy, and style. It consists of quiet turbofan propellers, ram air recovery system, high-floatation gear doors, nacelle wing lockers, enhanced performance leading edges, and dual-aft body strakes.

AMC is lead command for the C-12, but owns no C-12 aircraft. Air Force Materiel Command pays for operations of the aircraft, while AMC maintains lead command responsibilities for configuration management.

- First Operational Aircraft Delivered: 1974
- Average Age of Fleet: approx. 30 years
- Range/Payload: 1,974 nautical miles (NM)/8 passengers/2,647 pounds of cargo (56 cubic feet)
- Crew Ratio: 2.0

C-12 FORCE STRUCTURE:

(b)(5)

REPLACEMENT/MODERNIZATION FORECAST

There is currently no requirement document/initiative to begin a replacement effort, and there has been no analysis done to identify when a replacement effort should begin. Taking into account average flight hours and the Service Life Extension Plan by Raytheon at the 30,000-hour point, the C-12 is a long way from meeting a major overhaul requirement. However, this point should be identified, along with major modifications and future requirements, in order to frame an accurate picture of the C-12 fleet. The EFIS "glass cockpit" avionics upgrade will meet and exceed known future requirements, but technology moves rapidly and thus a continued look into future requirements is needed. A more formal study should be done that takes into account current/future modernization efforts and parts obsolescence.

C-12 Program/Modifications

Program/Modification

Electronic Flight Instrument Program (EFIS)
Countermeasures
Raisbeck Enhanced Performance Package
Simulator Upgrades
Low-Cost Modifications
Service Bulletins

(b)(5)

Modification Explanations

Electronic Flight Instrument Program

This approach meets USAF and long-term CNS/ATM requirements such as RNP, PPS, GPS, TCAS II and TAWS. It also employs a high-fidelity, large-format display system, a data link-based flight management system, and a radio tuning system. It also retains existing baseline avionics recently modified by the USAF that satisfy the USAF and CNS/ATM requirements specified, thereby maximizing the USAF investment in these avionics.

Countermeasures

This modification installs ECM and engine exhaust suppression devices on the C-12C/D to reduce IR signature and to provide electronic countermeasures protection against IR missiles.

Raisbeck Enhanced Performance Package

This commercial modification significantly improves the aircraft in these areas: payload, range, block speed, operational flexibility, economy, and style. It consists of quiet turbofan propellers, ram air recovery system, high-flotation gear doors, nacelle wing lockers, enhanced-performance leading edges, and dual-aft body strakes.

Low-Cost Modifications

These modifications use aircraft procurement (3010) funds for small aircraft modifications where costs do not exceed $2.0 million each year.

Service Bulletins

The C-12 fleet requires funding to comply with contractor product improvements incorporating Raytheon and other outside organizations' service bulletins, identified as items recommended for USAF compliance. This program funds 27 aircraft.

C-12 Deficiencies/Solutions | MAF Deficiencies/Solutions | Reference Documents

C-21 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-21's primary mission is to provide training and to experience the crew force through the transportation of critical personnel and cargo with time, place, or mission-sensitive requirements in any environment including chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) (see C-CBRNE Roadmap). This mission satisfies high-priority, small-volume airlift requirements that cannot be efficiently moved by other means. AMC is lead command for the (b)(aircraft assigned to the MAF.

The fleet is actively engaged worldwide to meet operational mission taskings; and, as a result, the C-21 is beginning to fall behind in meeting current and future communications, navigation, surveillance/air traffic management (CNS/ATM) requirements. Aircraft are currently restricted from operating in designated reduced vertical separation minimum (RVSM) airspace across the globe, delaying distinguished visitor travel due to the increased need for fuel stops. Also, transponder (Mode S and Mode 5) changes are restricting C-21 operations in various regions of the world. The capabilities provided by these upgrades will allow the aircraft to fly unrestricted in the congested airspaces of Europe, the North Atlantic, and the Pacific. The C-21 training simulator is a one-of-a-kind contractor-owned FAA-certified Level C simulator and is located at the Dallas-Fort Worth airport.

The C-21 has been in service for 21 years. At this time, there are no plans to replace the C-21 in the years to come; no requirement document or initiatives are under way to begin a replacement effort for the C-21. That said, AMC used a 2004 RAND study, "Investigating Optimal Replacement of Aging Air Force Systems" to assist in determining a methodology on which to base future replacement decisions. RAND's objective for the study was not to come to a definitive conclusion, but rather to present an analytic methodology to be used as part of a more detailed analysis—a tool for replacement decisions. This study is available on line at www.rand.org/publications/MR/MR1763.

If we take into account average flight hours and the cost involved for a Service Life Extension Program by Learjet at the 20,000-hour point, we should begin procurement of another commercial derivative aircraft around 2012.

- First Operational Aircraft Delivered: 1984
- Average Age of Fleet: 22 years
- Range/Payload: 2,306 nautical miles/8 passengers/3,153 pounds of cargo (42 cubic feet)
- Crew Ratio: 1.13

C-21 Program/Modifications

Program/Modification
Service Bulletins
RVSM
Fuel Imbalance
Flight Data Recorder (FDR)
Enhanced Mode S/Mode 5
Secure Communications
Simulator Upgrades
Low-Cost Modifications

(b)(5)

Modification Explanations

Service Bulletins

The C-21 fleet requires funding to comply with contractor product improvements incorporating Learjet and other outside organizations' service bulletins, identified as items recommended for USAF compliance. This program funds 76 aircraft.

Reduced Vertical Separation Minimums

This modification is required by the Air Force Navigation Safety (Nav Safety) Master Plan and CNS/ATM mandates, which are necessary for worldwide, unrestricted airspace access. (b)(5)
(b)(5)
(b)(5)

Fuel Imbalance

This program modifies the existing C-21 fuel system to warn the flight crew of a hazardous fuel imbalance condition before the imbalance affects the aerodynamic stability of the aircraft and leads to loss of flight control authority.

Flight Data Recorder (FDR)

Currently, the FDR installed on the C-21 is facing obsolescence and safety issues related to recent mishaps. It needs to be replaced in order to comply with nav safety equipment mandated by the Secretary of Defense and the Chief of Staff of the Air Force.

Enhanced Mode S/Mode 5

Mode S Elementary Surveillance is defined as the carriage of a Level 2 Mode S transponder that can support air-ground reporting of aircraft identification (radio call sign) and data link capability via the Mode S ground-initiated Comm-B protocol. The European Civil Aviation Authorities and other International Civil Aviation Organization regions require this. Implementation is mandated by 2005 with military waivers until 2008.

Secure Communications

This effort modifies the C-21 fleet with a stand-alone system with a supporting satellite infrastructure that can provide genuine independent and global secure connection worldwide, if necessary. This upgrade will provide combatant commanders the capability to stay in contact with senior leaders and forces under their command.

Simulator Upgrades

No additional information available.

Low-Cost Modifications

There are aircraft procurement (3010) funds set aside for small aircraft modifications where costs do not exceed $2 million each year. Examples include reconfiguration of the passenger seats to stow the Emergency Passenger Oxygen System and the modification of certain aircraft to accommodate the SPECTRUM patient transport module.

UH-1 Roadmap

OPR: AMC/A58

Weapon System Assessment

The UH-1N is a light-lift Air Force utility helicopter used for support of Department of Defense contingency plans. The helicopter has a number of uses. Its primary mission includes airlift of emergency security and disaster response forces; medical evacuation; and security surveillance of off-base movements of nuclear weapons convoys and test-range areas during launch conditions in any environment including chemical, biological, radiological, nuclear, and high-yield explosives. It is also used for space shuttle landing support, priority maintenance dispatch support, and search and rescue operations. Other uses include airlift of missile support personnel, airborne cable inspections, and distinguished visitor (DV) transport.

The movement of key government officials around the National Capital Region in support of contingency operations requires a quick-reaction airlift capability. AMC is responsible for this mission and provides the capability with the UH-1Ns stationed at Andrews AFB. Unfortunately, the UH-1N is 34-plus years old and falls short of meeting operations plan requirements for range, speed, and payload capacity. It also has many tactical shortfalls, necessitating a replacement aircraft. Modification with a Traffic Alert and Collision Avoidance System is necessary to meet mandated navigation and safety requirements.

- First Operational Aircraft Delivered: 1970
- Average Age of Fleet: 36 years
- Range/Payload: 200 nautical miles (NM)/6-8 pax
- Crew Ratio: 1.23

(b)(5)

AFSOC, as the command with the greatest number of helicopters to be replaced, is leading the effort to develop a requirements document to replace its aging MH-60 fleet. AFSPC is lead command for the UH-1N. An AFSPC/AMC analysis and replacement study is underway and expected to be complete by Spring 2006; this will coincide with AFSOC's H-60 replacement source selection, providing a consolidated Air Force Helo way ahead.

The overall plan is to replace these aircraft with a more-advanced, vertical-lift platform, similar to AFSOC's personnel recovery vehicle (PRV). This will replace the HH-60 and will not only meet but exceed all requirements that AMC has for DV lift requirements around Washington DC. The Chief of Staff of the Air Force directed Air Combat Command to produce a vertical-lift roadmap, with results showing a $600 million savings by moving toward an Air Force-wide, common medium-lift replacement. AMC plans to replace its 19 aircraft under this program. AMC/A58, in conjunction with AFSPC/DRM, created separate AMC and AFSPC annexes to the AFSOC PRV capabilities development document (CDD) that dictates a medium-lift replacement for the UH-1N beginning in the FY09 time frame. The draft Capability Development Document and annexes are in coordination to complete validation and allow for an FY06 milestone B decision.

Reference Documents

Chapter 4 - Support Roadmaps

Installations and Expeditionary Combat Support Roadmap

OPR: AMC/A75

MAF Capability Statement

Provide critical installations and expeditionary combat support services (civil engineering, services, chaplain, contracting, personnel, staff judge advocate, etc.) to continental US and deployed locations, across the full range of military operations and in all operating environments.

Roadmap Assessment

The champion of installations and expeditionary combat support is AMC/A7, the Directorate of Installations and Mission Support. This directorate expands beyond providing functional policy to the engineering and services communities. AMC/A7 will work to enhance combat support capabilities by improving integration; will serve as the principal advocate for achieving installation excellence; will integrate AMC force protection planning and execution; and will work cross-functional issues within the mission support arena. Arguably, the most important benefit of this new agency will be to serve as the staff focal point for integrating the 22 functional areas included in expeditionary combat support (ECS), as well as closely coordinating and staffing issues with the Air Mobility Warfare Center. HQ AMC now includes an Air Force-unique major command division, the AMC Expeditionary Combat Support Division, specifically chartered and staffed to develop and integrate the command's cross-functional efforts through the gamut of doctrine-, organization-, training-, materiel-, leadership-, and personnel-related ECS issues. Installations and Expeditionary Combat Support will have challenges in recruiting and retaining a balanced civilian workforce. Approximately 36% of AMC civilians can retire within the next 5 years. Proactive strategies must be implemented in order to meet the manpower skills, standards, and levels required to meet the challenges and needs of AMC's mission.

Installations and expeditionary combat support will also experience significant challenges in the short term because of the impact of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) deficiencies. Reliable, effective, real-time CBRNE detection capabilities do not exist against the full range of CBRNE threats at the sensitivity levels required. Current decontamination systems are resource-intensive and require excessive time to be effective. Also, collective protection capability is limited and does not provide integrated protection against all CBRNE threat agents and ballistic threats.

The AF Personnel community will be downsized over the next 5 years. With the advent of personnel services delivery transformation, personnel support of AMC members will be moderately diminished over the short term until technology replaces the transactional processes currently being completed by our Airmen.

Installations and expeditionary combat support infrastructure will continue to face significant challenges for the following reason: current shortfalls in funding are expected to lead to increased infrastructure/facilities degradation. In FY04, the Annual Planning and Programming Guidance (APPG) committed to eliminating/repairing installation readiness report (IRR) command, control, and communications (C3) and command, control, communications, and computers (C4) facilities by 2010. During the FY05 APPG, this commitment was weakened to just "accelerating" the elimination/

repair of IRR C3 and C4 facilities. During the FY05 Program Budget Directive (PBD), AMC faced a $47 million cut in FY06 and $46 million cut in FY07 "Current Mission" military construction. These cuts drive high operations and maintenance expenses trying to keep older facilities and infrastructure operational.

In the mid-term, funding is not projected to reach a level that will enable the overall condition of infrastructure to improve.

Milestones

(b)(5)

[redacted]

Mid-Term (FY14-20)

(b)(5)

[redacted]

Long-Term (FY21-30)

(b)(5)

[redacted]

Installations & ECS Deficiencies/Solutions | MAF Deficiencies/Solutions | Installations Capabilities | MAF Capabilities | Reference Documents

Logistics Roadmap

OPR: AMC/A45

Capability Statement

Provide the capability to prepare units for deployments, maintain supplies and equipment, and manage personnel and equipment movement in support of air and space and other DOD forces, across the range of military operations and in all operating environments.

Roadmap Assessment

Logistics will face significant challenges in the short term for the following reasons: 1) logistics maintenance manpower shortages resulting from a significant expansion in the role of conventional air refueling; 2) increasing mission demands upon operational aircraft requiring the MAF to modernize aircraft technical data presentation/distribution to electronically operate in a com/com-out environment at the point of maintenance; 3) the necessity to develop maintenance training systems for a blended solution that includes maintenance training devices, interactive multimedia instruction, and part-task trainers to significantly reduce on-aircraft maintenance training certification and to support ever increasing mission impacts; 4) C-130 defensive systems support equipment for ground checks before missions; 5) ground cooling for KC-135s to support aeromedical evacuation missions and standard ground operations; 6) necessary technology for alternate fuel for aerospace ground equipment (AGE) and increased spares for existing AGE; 7) congressionally added C-130Js without sufficient funds for associated spares and necessary logistics support; 8) obsolete capabilities for anti-icing aircraft that do not support MAF requirements for high-throughput locations; 9) continually aging materials handling equipment and special-purpose and base maintenance fleets which require replacement at a rate exceeding the ability of the laid-in funding line to procure new assets; 10) loss of general purpose (GP) vehicle lease funding, hindering the MAF's ability to replace an aging GP vehicle fleet; 11) inadequate connectivity between flightline, supply, data bases, and source documents. In addition, we need to have the capability to flow information between command and control, logistics data bases, and control centers (see C4I & IO Roadmap).

Improvements are projected for the mid- and long-term; however, without adequate funding to overcome deficiencies, MAF logistics capability could deteriorate rather than improve.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Logistics Deficiencies/Solutions | MAF Deficiencies/Solutions | Logistics Capabilities | MAF Capabilities | Reference Documents

Command, Control, Communications, Computers, Intelligence, and Information Operations (C4I & IO) Integrated Roadmap

OPR: AMC/A25/A38/A39/A45/A55/A66

Capability Statement

Provide the ability to reliably and securely deliver the commander's intent to every echelon and all elements of the command (airborne, fixed, and mobile) across the entire spectrum of operations. Provide integrated and responsive command, control, communications, computers, intelligence, logistics, security, weather, finance, information assurance, and information operations functions. Perform effective and agile air mobility mission monitoring, analyzing/assessing, prioritizing, planning, allocating, scheduling, coordinating, and directing MAF operations execution supported by an assured, flexible, secure, survivable, integrated, and interoperable global information infrastructure.

Roadmap Assessment

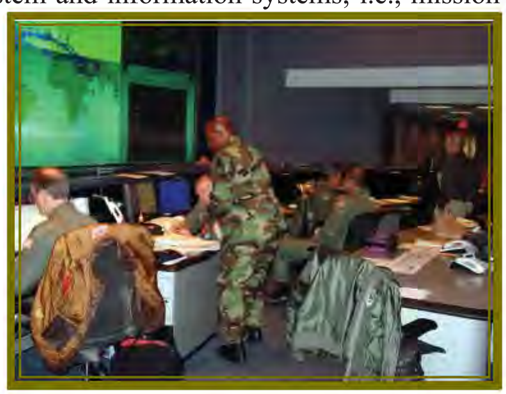
Tomorrow's decision-makers will need greater access to fused information, greater situational understanding, and need to be able to decide faster and more accurately than what can be achieved today. Current organizational models and methods to control forces will need greatly improved agility, robustness, responsiveness, information sharing, and innovation to create a decision cycle faster than that of our potential enemies. The MAF has taken good initial strides in this direction by establishing a foundation where proactive net-centric operations are collaborative, enterprise-oriented and part of an integrated C4I and IO system. However, MAF C4I and IO integration still faces significant challenges in the near-, mid-, and long-terms. One key challenge will be to fully integrate the traditional MAF command and control (C2) arena with value added disciplines like IO, information assurance (IA), knowledge management, intelligence, logistics, aeromedical, and finance into an expanded holistic C2 approach. Additionally, the MAF C2 environment must enhance ways to coordinate and synchronize all operations processes and mission disciplines; they must easily connect all echelons vertically and horizontally by deliberate design. All of this will challenge our most basic assumptions about command and control; yet the basic function remains the same: make the most of the situation and the resources at hand. There will be numerous technical challenges to work through as well. A crucial one, achieving C2 system interoperability, must start at the data level, with accurate automated data capture the first time, clear consistent data standards designed to support well-defined mission workflow processes. Initial efforts should focus on MAF and Combat Air Force (CAF) systems being actively and dynamically connected and interoperable at the data level. Another key will be data security and enterprise-wide secure information management with IA and IO designed in from the start, not as "add-ons." The MAF must leverage network-centric capabilities and net-centric enterprise services (NCES) to ensure effective and secure information systems and knowledge management enterprise wide. As more information is pushed to the operational edge, including understanding of commander's intent, improved

- **Integrated, Automated Mission Planning. Scheduling & COA Analysis**
- **Mission Execution Monitoring**
- **Global MAF Mission Situational Awareness—Tailorable Situational Displays**

abilities—to collaborate in planning, operations execution, and situational awareness; to assimilate mission relevant data; and to synchronize functional workflow actions—will noticeably enhance MAF mission agility and responsiveness. It will be essential that concept of operations and policy development keep pace with technology and procedural developments to provide the necessary support and guidance required to acquire new capabilities timely and effectively.

Command and Control

The MAF must continue to improve its capability for flexible and responsive global command and control to where it can quickly adjust to new, unexpected demands; redirect missions, as necessary, in response to those changes; and deliver effective results. For the foreseeable future, the 18th Air Force Tanker Airlift Control Center (18 AF/TACC) and Contingency Response Groups (CRGs) will remain MAF C2 system focal points. The 18 AF/TACC must continue to mature and evolve as the MAF's central global mobility Air and Space Operations Center (AOC) with the Air Mobility Operations Centers (AMOCCs), Air Mobility Divisions (AMDs), the CRGs, and the Contingency Response Elements (CREs) as key MAF units employing net-centric operations concepts. In employing net-centric operations, the use of new technologies to enable improved mission workflow processes interrelation and integration for key functions poses certain challenges. The first is to ensure key functions are synchronized throughout the MAF C2 system and information systems; i.e., mission planning; resource allocation; operational intelligence; logistics support; force protection; and weather, medical, financial, and mission execution. The continual fine-tuning of operations processes will result in the steady convergence of planning and execution functions to the point that they are no longer separate activities once a mission starts. The second challenge lies in building organizational relationships and a collaborative information environment between the MAF C2 system, the CAF C2 system, US Transportation Command (USTRANSCOM), its other components, the Joint C2 community and combatant commands, various Civilian Reserve Air Fleet (CRAF) operations control centers (OCCs), international airspace control centers (i.e., Euro Control), and appropriate government, and nongovernmental agencies (i.e., National Geospatial-Intelligence Agency), in order to achieve a totally new level of operations effectiveness.



In the future, MAF C2 will progress from an aircraft sortie-centric management approach to a proactive, holistic air mobility system management of resources, warfighting requirements, and missions to provide a balanced optimizing approach of all transportation elements and resources in meeting required delivery dates and end-to-end payload delivery (airlift and air refueling). MAF C2 will move forward to develop closely "integrated operations" with other Air and Space Operation Centers (AOCs): falconer, tailored, functional or combined AOCs; Joint Operations Centers; CRAF OCCs; international airspace control centers (i.e. Euro Control); the USTRANSCOM Defense Transportation System Deployment and Distribution Operations Center; and appropriate government and nongovernmental agencies. The MAF needs to continue to work toward flattening the C2 organizational hierarchies while reducing layers of decision-making to speed the decision process, while enhancing live and virtual training to increase warfighting skills and permit mission rehearsal that is unconstrained by geography of forces and/or theaters. These flattened C2 organizational hierarchies will use robust collaboration tools, integrated process, network connectivity, and interoperable data to routinely plan, optimize delivery, and synchronize operations to quickly deal with missions as diverse as international humanitarian relief and stability operations, to major coalition and joint military operations.

Communications and Computers

The MAF must capture the necessary authoritative data while performing the mission, then readily share and aggregate this data across functions to enhance situational awareness and predictive analysis, and to form information elements into precise decision quality information. It is critical for the MAF to acquire and deploy an effective blend of secure global long-range and tactical data link, identification friend-or-foe mode S, voice, and video communications, networking, antennas, and other required equipment needed to ensure uninterrupted worldwide connectivity (air-, space-, ground-, and maritime-based) between the MAF C2 system, both fixed and mobile, its aircraft fleet, and all mission support elements (all operating as network nodes). This communications connectivity, embodied in MAF Real-Time Information to the Cockpit (RTIC) and the Advanced Situational Awareness and Countermeasures (ASACM) programs, is needed to efficiently move high-volume flows of mission-relevant data, in near real time, to the MAF C2 system where high-speed, computational intensive-computing resources are required to handle information processing and dissemination.

> - **Interoperable Data, High-Speed Data Processing and Search**
> - **Persistent Global Secure Voice, Data, Imagery, and Video Communications**

New data link and network connections are essential to enable access to key sources of MAF mission-pertinent information to build improved mission responsiveness, management, operational situational awareness (SA), and predictive battlespace awareness. An interim period using "legacy" non-Joint Tactical Radio System (JTRS)-compatible technologies solutions may well be needed to provide the initial MAF basic long-range data link connectivity for flexible C2 and SA and fill the void until JTRS-based solutions can be fielded. In parallel, the MAF must continue to update and support a coherent RTIC program to get information to the crews, to include support for aircraft "back end" missions such as aeromedical evacuation, tactical airdrop/air assault and special missions. RTIC- and ASACM-like program solutions must reach a point where they are interoperable with the USAF Airborne Network Integration, AF C2 Constellation, Multi-Mission Payload Program, and global communication, navigation, surveillance/air traffic management communications infrastructures. Additionally, the MAF needs to ensure critical technical issues like antenna designs and placement, signals interference avoidance, and power demands, are effectively addressed to support data link communications.

> **Integrated Collaborative Work Spaces**
> **-- Weather/Finance/Medical/ Security Force/Logistics/Etc.**

Understanding what the essential pieces of data are and their relationship to the various systems and data sources of the MAF C2 system is a key aspect in effectively developing the MAF enterprise information technology (IT) architecture. Another key in data development is data mining in new ways to find previously undiscovered cross-functional geospatial correlations necessary to support analysis, reports generation, and displays. The global information grid, as it develops, will create a vast array of opportunities to reengineer processes and develop new, more-secure enterprise IT resources; however, the resources required to capitalize on them may be severely limited. MAF development of C2 communications and computer networking supporting infrastructures will need to employ a synergistic approach with compatible standards that effectively address important security concerns and satisfy the governing standards from higher authorities such as: the DOD Architecture Framework, Joint Technical Architecture, and Command and Control Enterprise Reference Architecture.

Intelligence

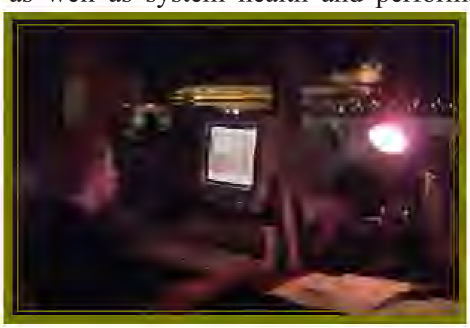
The intelligence function must further develop a more active integrated presence within the global mobility AOC execution and planning spaces. The application of operationally oriented, actionable "intelligence" must become routine in MAF C2 operations. An important capability to develop will be predictive battlespace awareness processes that can efficiently use real-time, dynamic, multi-source information fusion to generate order-of-battle and intent prediction. Using automated knowledge-based reasoning, multi-user information, fusion technologies offer the promise of increased speed of command, increased time for C2 operator analysis that focuses on improved course of action responses, and operational initiatives even under adverse conditions. Intelligence must have improved capability to process, analyze, and disseminate timely, operations-relevant, and actionable information on potential hostile capabilities, activities, or intentions for it to directly support planning, execution, and force protection within the MAF operational environment across the range of military and stability operations. The MAF intelligence elements will have to adjust to an increased level of operations concerning tasking, exploiting, and disseminating standard and nonstandard institutional intelligence, and sensor information required for daily support of the wide range of global MAF operations and these newly developed processes within the MAF C2 system.

Integrated Operations
Focused Intelligence, Mission Referenced
-- Threat Forecasts and Warnings
-- Data Collection
-- Analysis and Assessment

Logistics

Data communications capabilities are also essential to support real-time and near-real-time exchange of time-critical logistics operations information throughout the AMC C2 system from major commands' headquarters to our CREs in the field. It will be particularly important to extend communications capability to every element from the moment they go operational in the field. This communications capability must be easy to deploy and set up under an hour. It must also double the existing transmission capacity. MAF C2 system access to this mission support information becomes the accelerant to improve next-station aircraft turn-around and to increase logistics and aircrew productivity, aircraft throughput, and intransit visibility; thereby improving aircraft mission productivity. Specifically, our vision for the twenty-first century requires that the aircraft on-board fault and diagnostic capabilities, as well as system health and performance, and mission data (cargo and passenger on/offloads, A/R offloads, flight times, etc.) be captured as part of the on-board component reporting capabilities and transmitted to a ground C2 system node such as the 18 AF/TACC. In turn the ground C2 system node transmits this data to the appropriate logistics system's shared data repository. Once transmitted to the logistics systems, this information would be used to plan the aircraft recovery or throughput operations, enable simulations that conduct quick sensitivity analysis of sortie generation capability, evaluate likely outcomes, and quickly see the effects of reduced or increased resource levels on sortie capability at the arrival base. Even if it is at an austere or forward-deployed location, connectivity should be available with either maintenance or logistics recovery teams that would report required and completed actions directly to the ground C2 system node.

Integrated Operations
Logistics Mission Support
-- ITV/TAV



The MAF must interrelate and integrate logistical, operational, and financial mission data, then feed this data into analysis tools to better understand and manage air mobility operations costs. The ability to access, retrieve, process, discover, and analyze key operational-related financial information as an integral part of real-time C2 processes will improve Transportation Working Capital Fund revenue management, speed up billing cycles, and deliver a profound impact on mobility productivity, decision quality, speed, access, and accuracy of handling records, and ultimately will improve operational and resource stewardship.

Knowledge Management

A main goal of knowledge management is to develop and mature blended operations such as intelligence, weather, logistics, etc., with a computational analysis capability

Personnel Training and Simulation

at the operational level in the 18 AF/TACC to generate forecasting and predictive products/reports. Key focus areas will be on operational mission execution, airspace control, maintenance, logistics, financial developments, automated risk assessments, modeling and simulation validation for mission and support concepts, and automated high-fidelity planning that can work mission operations which span more than one theater. These drill-through analysis services must be easy to use, customizable to the user's needs, and able to search, find, and fuse, in a flexible manner, information from many sources and cross-functional disciplines. The MAF must consider high-performance computing concepts like grid-computing or other technologies that can support computational intensive arenas such as integrated operational weather forecasting, logistics trends, operational impact analysis, real-time alerting tools, prioritized information management, and information assurance layers required to effectively deliver mission-critical information where and when needed.

To quickly access lessons learned and corporate knowledge when planning and executing MAF missions, and to support training, the MAF must develop an automated ability that can be accessed globally through standard web browsers and web services incorporated into its core C2 systems.

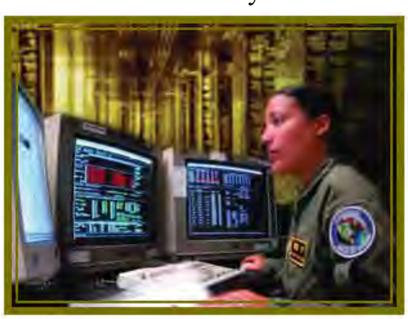
MAF Enterprise Information Management—Knowledge Management

We will encourage initiatives to better gather and share the expertise of both people and corporate knowledge emphasizing the use of information, not just collection of it. Expertise-location tools can link people working on related projects, even if they are not searching for each other. Collaboration tools such as online workspaces, messaging, and web conferencing will make it easier to connect people to one another. Improving search technologies will make it easier to sort through massive amounts of data and match a query not only to the requester, but also with a person(s) who have the desired expertise to work the issue. A global interactive corporate knowledge management capability facilitates the collection of knowledge from across the organization so that new knowledge can be quickly accessed and applied to solve real-world air mobility operational problems, accelerate learning and enhance planning and C2 execution performance of people and systems at all levels.

Information Operations and Assurance

Integrate IO & IA
-- Mission Risk and Support Assessment/ Information Attack/Notification/ Containment/Counter/Assess

Current infrastructure is inadequate to meet present and future MAF IA and IO needs. To counter the constantly evolving, disruptive capabilities of potential adversaries and rapidly developing technologies that continue to pose new network security and defense challenges, the MAF, in conjunction with the USAF and DOD, must effectively address IO and IA as critical focus areas recognized as integral and continual parts of any development efforts. MAF IA and IO must be capable of providing security of the MAF C2 information infrastructure, utilizing intrusion detection, immediate threat recognition, isolation, and self-defense/ repair of the system(s) while also providing understandable indicators of related IT and communications systems status with analysis for forecasting and anticipating attack trends. This capability is critical to assure uninterrupted operations. A capability must be developed to counter threats both in synchronized, independent or automated, and human-directed modes, and be capable of responding with the appropriate mix of defensive and counteroffensive operations.



Security of information must include operator-friendly encryption of data during transmission and when being accessed or residing on either fixed or portable electronic devices. Computer security must also address the difficult proposition of supporting data flows from low (unclassified) to high side (classified) and high-to-low side while meeting security requirements to function in changing coalition operational environments. The MAF must explore effective ways to extract and distribute unclassified, actionable information from classified sources that is affordable, expeditious, and consistent. This will require that information is properly and consistently classified and managed, and is shared only with those who are authorized to use it. Information resource management must effectively handle multi-level security data movements and leverage NCES core services as they become available to enable enterprise-level views and self-synchronizing collaboration capabilities while keeping data secure.

An additional issue for MAF networks will be the need to interconnect with those in the civilian sector; and using similar commercial, off-the-shelf hardware or software to the maximum extent possible will require the MAF to deal with the associated risk of being susceptible to any vulnerability in these other networks or technologies. Thus, cyber security in the civilian and MAF systems is intrinsically linked. Vulnerabilities in the civilian network systems substantially compound the cyber security problem and require improved security built into MAF applications and IT infrastructure. Wireless communications and the associated mobile devices that will be essential for reliable mobile access to mission-critical information, whether at fixed or deployed locations and especially areas where classified information will be used, pose unique challenges for protecting information. Wireless communications operations will further drive the need for encryption during transmission and on all portable electronic devices with power-on passwords; encryption of data at rest while residing on the portable electronic devices; the ability to remotely zero the data on a device; and the ability to rapidly delete the data if tampered with.

Finally the MAF C2 system and information infrastructure must be able to operate with a full-up continuity of operations and disaster recovery capabilities employing multiple server and storage elements able to support rollout, distributed and mobile operations, and a geographically separated alternate to ensure degradation of operations is gradual when under attack or environmental stress conditions. The MAF global mobility AOC must be able to transfer workload to its alternate and/or the AMCCs while moving operations to either the alternate or rollout facility.

MAF C4I and IO Continuity of Operation and Disaster Recovery
- **-- Roll-Out**
- **-- Alternate**
- **-- Failover Systems Backups**
- **-- Network Resilience**

Operations Centers/Force Protection

Technology Insertion and Research and Development

The MAF must lead and support a sound and consistent research and development effort tailored to the air mobility domain. The MAF must effectively team with Air Force Research Laboratories, Air Force Battle Labs, the other service labs, Defense Advanced Research Projects, academia, and industry to coordinate, leverage, and influence technical development efforts and foster an environment that continually accesses and adopts process and technology advancements to improve information-sharing across jurisdictions and command lines. It is imperative that the MAF explore how new technologies and methods can enhance current or generate new processes and capabilities through a carefully crafted series of advanced technology demonstrations and technology initiatives focused on finding solutions for identified C4I and IO priority capability gaps and MAF strategic C4I and IO goals. Future MAF technical and process development strategies and concepts supporting C4I and IO will create a continuum of efforts to explore promising high-payback technologies and processes to continually advance information-sharing in a strategic enterprise framework that promotes synchronized MAF operations. Active participation in Joint Expeditionary Force Experiment and Advanced Process and Technology Experiments will provide forums to evaluate the potential of technological advancements in the wider USAF context. The MAF road ahead will be supported by operational workflow, process-oriented,

MAF enterprise architecture development and documentation that align with USTRANSCOM and DOD C4I and IO modernization efforts. The constant advancements in technology and information concepts areas of interest for the future include: web services and service-oriented architecture; open web standards; grid, cluster, distributed and quantum computing; high-performance computing; holographic storage; streaming databases; nanotechnologies; publish/subscribe/broker information management, reconfigurable logic; self-learning information extraction; four-dimensional, flexible information displays with cognitive enhancements; intelligent dynamic software agents; Semantic web markup converter; high-speed information and enhanced text search to include accessing images and multiple databases simultaneously; high-speed scheduling and planning algorithms; data fusion tools; highly organized rapid retrieval of multiple data types storage; high-speed with high-volume voice, data, imagery, and video-integrated communications for fixed, mobile, and forward-deployed operations; smart conformal and multiple-input, multiple-output antennas; advanced modeling and simulation and secure wireless computing language translation; radiation-hardened microprocessors; and picture archive communications systems with electronic signatures capability. We urgently need to expand our focus to include longer-term development of new methods for designing and engineering secure systems. Addressing cyber security for the longer term requires a vigorous, ongoing program of fundamental research to explore and develop the technologies necessary to design security into computing, networking systems, and software from the ground up.

Technical Development

(b)(5)

Organizational/Facilities Development

(b)(5)

[redacted]

Milestones

Short-Term (FY06-13)

(b)(5)

[redacted]

Institutionalize Human Systems Integration considerations for all MAF C4I and IO operations and incorporate in all systems application development from the start by employing Work Centric Support System concepts and other advanced cognitive approaches.

Provide an integrated MAF Common Operational Display (COP).

(b)(5)

(b)(5)

[redacted]

Mid-Term (FY14-20)

(b)(5)

[redacted]

(b)(5)

Long-Term (FY21-30)

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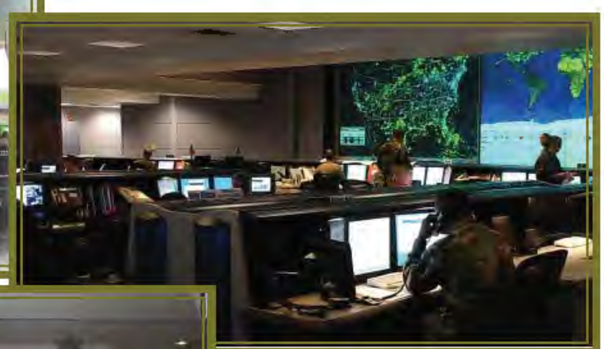


Counter-CBRNE Roadmap

OPR: AMC/A35

MAF Capability Statement

Provide worldwide capability to fully support combatant commanders' wartime and peacetime mobility operations in a chemical, biological, radiological, nuclear, and high-yield explosive (CBRNE) contaminated environment.

Roadmap Assessment

"The entire mobility system...must be able to operate following enemy use of chemical, biological, radiological, or nuclear weapons."

General John W. Handy, Former Commander USTRANSCOM and AMC

The MAF C-CBRNE Roadmap complements the USAF Counter-Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive Master Plan, dated 30 June 2004. Its vision is to ensure the combatant commanders have the ability to counter the CBRNE threat and to continue to apply air and space power in the execution of their missions despite a CBRNE environment.

Global proliferation of CBRNE weapons presents serious, yet doable, challenges to air mobility operations. Although much progress has been made in the past few years, significant progress needs to be made to understand and communicate the specific threat to AMC, then to mitigate that threat through passive defense capabilities of sense, shape, shield, and sustain. These capabilities include educating AMC personnel on recent developments such as those found in the Large Frame Aircraft Decontamination Demonstration (LFADD); supporting research leading to increased detection capability and agreements on safe levels of contamination; the benefits of avoiding contaminated areas (if possible); and the ability to sustain forces through the development of rapidly deployable transfer sites such as an Exchange Zone.

Threat

(b)(5)

[redacted]

(b)(5)

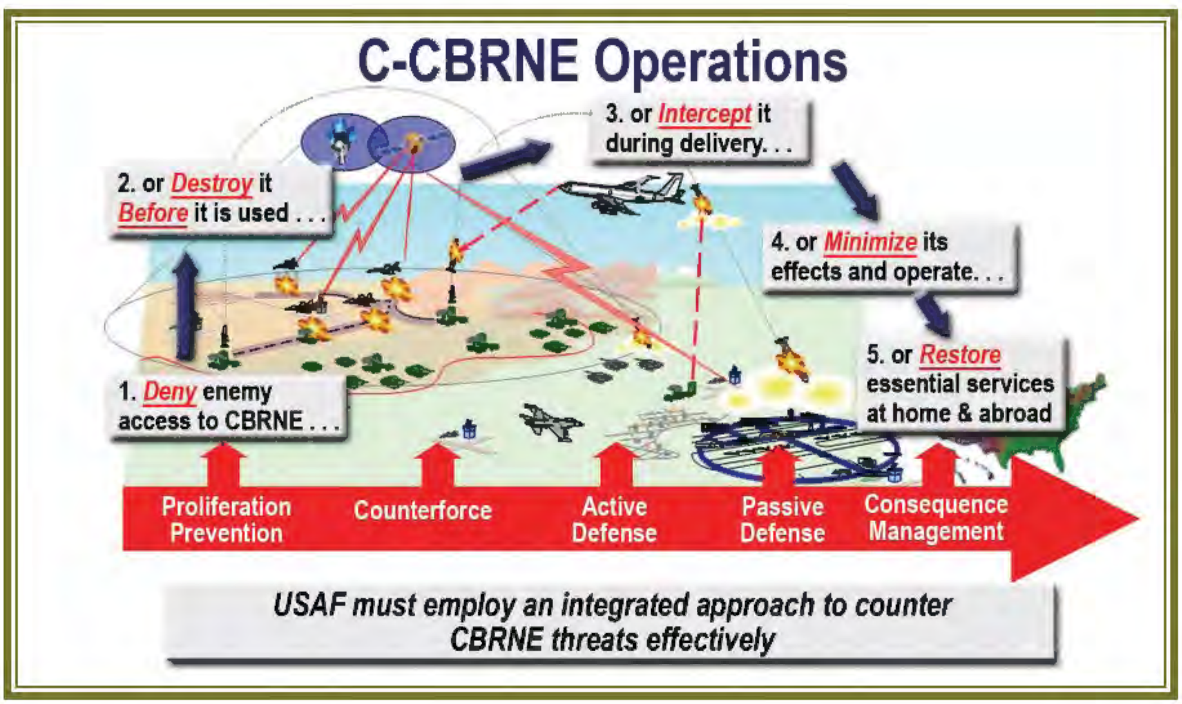
To reduce this threat to AMC personnel in low- to medium-CBRNE-threat areas, AMC is advising that personnel should consider varying routines of where they eat and sleep at off-base establishments. During a time of high threat, personnel are being advised to remain at on-base establishments that provide increased levels of security of meals as well as quarters.

"It is easier and more effective to destroy the enemy's aerial power by destroying its nests and eggs on the ground than to hunt his flying birds in the air."

General Giulio Douhet, 1921

Mitigation of the Threat

Counter-CBRNE operations fall under proliferation prevention, counterforce, active defense, passive defense, and consequence management. MAF forces are necessary for the successful execution of those elements through the delivery of equipment, personnel, and fuel (both air and some ground requirements). However, Counter-CBRNE operations of the MAF are primarily concerned with passive defense and consequence management. According to the USAF C-CBRNE Master Plan, "…passive defense capabilities are those that enable the Air Force to survive and sustain an acceptable level of operations in post CBRNE attack environments." An assessment of MAF capabilities involves an analysis of the passive defense operational capabilities of shape (collection of information), sense (detect and identify agents), shield (protect), and sustain (restoration of pre-attack operational capability).



Shape. The MAF is proactively striving to enhance its ability to characterize the CBRNE hazard to commanders at all levels to ensure a clear understanding of the current and predicted CBRNE situation. It is achieving this by participating in studies to identify the specific CBRNE threat to AMC missions; providing formal C-CBRNE awareness instruction at AMC's Air Mobility Warfare Center conducting numerous "outreach" initiatives to bring the AMC C-CBRNE message to the command's senior military leaders and operators; and participating in C-CBRNE operational tests.

(b)(5)

[redacted]

Therefore, once an LFA is contaminated, it may remain contaminated at some level resulting in a once-contaminated MAF aircraft:

1) Being denied landing/overflight permission by continental US (CONUS)/ outside of the CONUS (OCONUS) agencies.
2) Requiring aircrews to fly in protective clothing/masks.
3) Requiring support personnel to maintain a level of Mission-Oriented Protective Posture (MOPP).
4) Being restricted in transportation of cargo/personnel.
5) Being removed from routine missions indefinitely.

To reduce this concern, the Office of the Joint Chief of Staff is supporting an Office of the Secretary of Defense-led group that is accelerating and coordinating DOD research efforts on the effects of low-level chemical warfare (CW) agent exposure. This research, when completed, will assist in defining the CW agent concentrations ranges of physiological and toxicological significance.

Sense. The MAF is concerned about having the capability to provide accurate, timely information about the CBRNE environment and detecting, identifying and quantifying CBRNE hazards in the air, on land, and to personnel and equipment/facilities; specifically needed is the establishment of "cleanliness" standards for development of effective detectors and decontamination operations.

The establishment of a national and international agreement on what level of remaining contamination is "safe" is necessary. In April 2002, interim guidance was provided within the Multi-Command Manual (MCM) 0026-02, subject: "Chemical Warfare Agent Exposure Planning Guidance." It stated that if a chemical contamination level falls below the sensitivity of fielded chemical detection equipment, and personnel in the area are not experiencing symptoms, then commanders could assume a noncontaminated environment. It concedes, however, that "data on operationally relevant health effects need to be developed and evaluated to establish acceptable exposure limits."

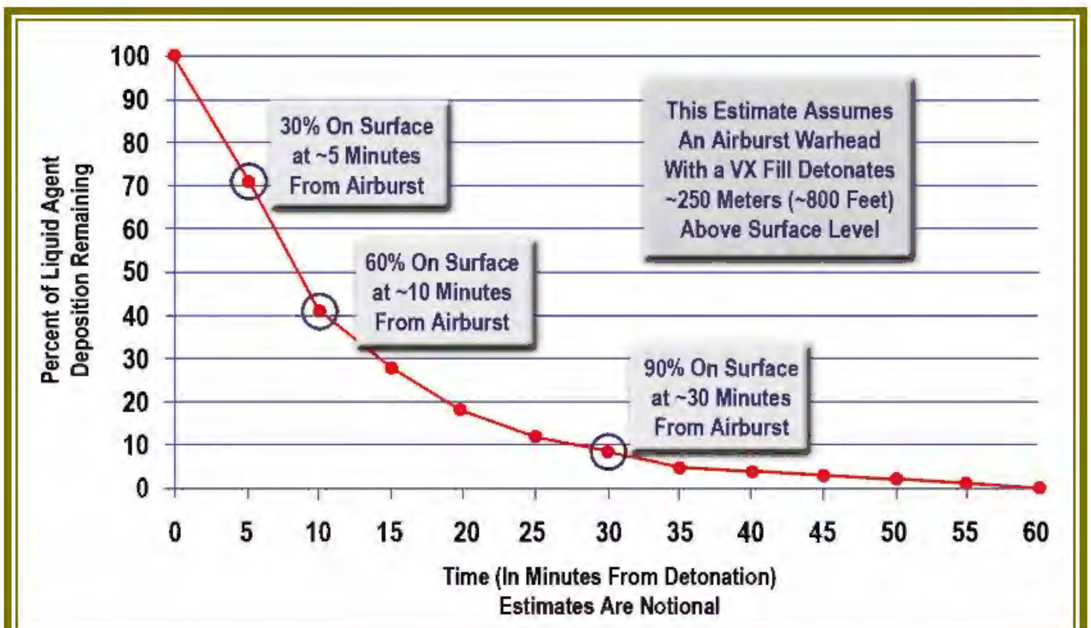
AMC continues to encourage research and development organizations to develop agent detection and identification capabilities. Currently, approved fielded detectors "detect-to-treat" personnel located in a contaminated area. The desired stand-off detectors would "detect-to-warn" personnel in time to avoid a contaminated area or to vacate an area about to become contaminated (e.g., vapor cloud). In addition, currently fielded chemical detectors' sensitivity varies by individual detectors, and biological detectors normally require samples be sent to laboratories to confirm the presence of biological warfare agents (BWA) and to identify the type of agent.

Current decontamination systems are resource-intensive and require excessive time to complete, yet fail to fully decontaminate LFA. Currently, approved decontamination agents, especially for interior decontamination, are limited to hot soapy water (HSW) with the preference being HSW Type IV. Proposed decontamination agents over the years include DF-100, DF-200, GD-5, and most recently vaporous hydrogen peroxide. However, to date, HSW remains as the only approved decontamination agent that is safe for aircraft surfaces and personnel. In addition, some corrosive agents release a hydrogen compound that can accelerate the embrittlement of high-strength steel, possibly resulting in the catastrophic failure of aircraft components such as landing gear struts and engine pylons.

Technology is making notable strides in solving the complex problems of detecting from a safe distance a wide variety of chemical warfare agents and in reducing the false-positive indications of biological detectors, despite the large amount of naturally occurring biological material in the air (fertilizers, etc.). Also, vaporous decontamination agents are being tested that promise to permeate even the smallest areas of a sealed aircraft, destroying contaminants without damaging sensitive components, and are noncorrosive.

Shield. The ability to protect personnel, equipment, and facilities from CBRNE contamination and effects within the worldwide mission of MAF lies in following the USAF elements of avoidance, protection, and contamination control. Of these, avoidance offers the greatest return in a risk-assessment evaluation to ensure the continued, unrestricted utility of AMC aircraft. Several types of avoidance are available:

- **In-flight Diversion.** When advised that a destination airfield is under CBRNE attack or has been contaminated, the aircrew should divert to an uncontaminated airfield, depending on mission criticality. Authority to land at a contaminated airfield is outlined in the controlling operations order. If diversion is not possible, crews should attempt to delay arrival to allow contaminates to settle and be absorbed into airfield surfaces. Once the chemical agent has fallen, it is then absorbed into the ground or equipment at various rates, normally taking seconds to a few minutes. However, absorption rates for glass, unpainted metal, and similar material are very slow, presenting a contact hazard until manually decontaminated. Delaying arrival for an hour, under optimal conditions, may eliminate most airborne agents and provide time for agent absorption. The following figure provides a guide for agent dispersion following a typical attack scenario (estimated VX liquid agent deposition time following a SCUD).



- **Launch to Survive.** If caught on the ground during attack warning, crews will make every reasonable effort to launch to avoid the attack. Upon proper clearances, aircraft may launch to survive if they have sufficient fuel and unrestricted, safe access to the runway. In practice, this option may only be practical for aircraft that have just landed or aircraft at or near the end of the runway. If launch is not possible, the crew should taxi to approved parking (covered parking if possible), shut down engines, and avoid running environmental control systems. This limits the spread of contamination inside the aircraft. Crews will close aircraft doors/hatches/ramps and seek personal protective cover on the base.

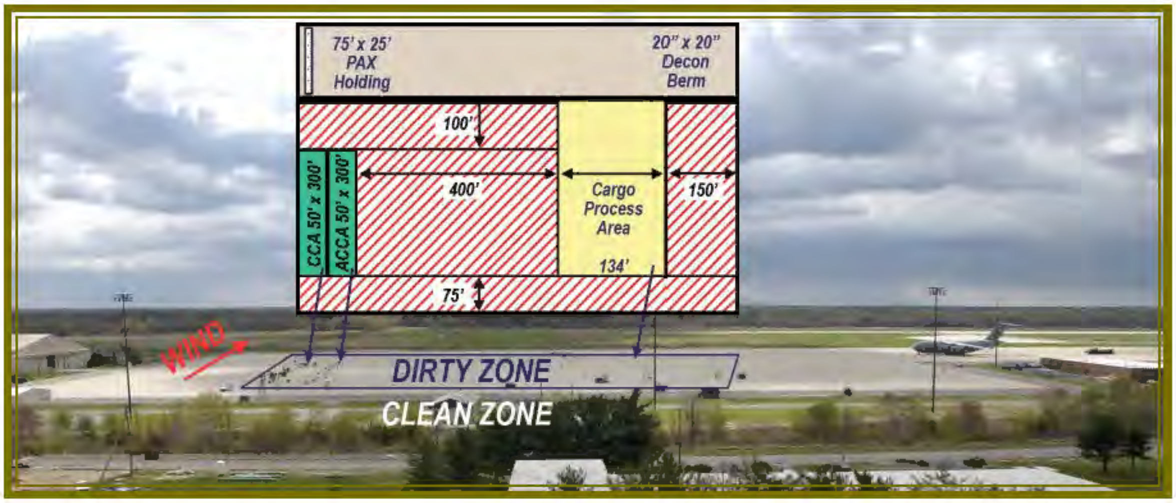
- **Split Mission Oriented Protective Posture (Split MOPP) Construct.** Following CBRNE attack, the installation commander may use the split MOPP construct to identify and mark contaminated and uncontaminated sectors of the airfield. Split MOPP facilitates contamination avoidance for air mobility crews by identifying areas unaffected by the attack. Upon arrival at a contaminated airfield or prior to taxiing for departure from an airfield under split MOPP conditions, the aircrew will query Ground Control regarding the feasibility of operating on uncontaminated portions of the ramp, taxiway, and runway. Wind conditions will also be considered to avoid operations downwind of a heavily contaminated sector.

- **Minimizing Ground Exposure.** Contact with contaminated or formerly contaminated aerospace ground equipment (AGE), materials handling equipment (MHE), and cargo poses an exposure risk to air mobility aircraft and crews. Formerly contaminated means that decontamination has been completed and a "zero" reading is achieved using currently fielded agent detectors. Unfortunately, it has been found that harmful off-gassing may continue from residual contamination below detectable levels. AF tactics, techniques, and procedures (AFTTP) (I) 3-2.33 specifies that all formerly contaminated equipment and cargo must be marked to facilitate contamination avoidance and the use of protective measures.

Sustain. MAF capability must include conducting decontamination and medical actions that enable the quick restoration of combat power, maintain/recover essential functions that are free from the effects of CBRNE hazards, and return to pre-attack operational capability. The use of the exchange zone (EZ) is a validated and effective technique to facilitate the transfer of cargo and passengers while servicing a contaminated aerial port of debarkation (APOD), without the threat of cross contamination.

AMC has the mission to deliver and return cargo and passengers to the combat commander's area of responsibility (AOR) despite a CBRNE attack on an APOD. This ability to quickly establish a transfer area to resupply a contaminated airfield or remove critical items is paramount to keeping the warfighter operationally effective. The exchange zone provides such an area and is defined as an area established at an uncontaminated, intermediate location where cargo and passengers can be transferred to or from an aircraft, servicing a contaminated APOD, without threat of cross contamination (former terms include chemical-biological transload).

Initial assessments derived from Exchange Zone I, at Charleston AFB SC, in 2003 and Exchange Zone II, at McGuire AFB NJ, in April 2005 validate the tactics, techniques, and procedures (TTPs) of the EZ concept. In general, the concept is that an aircraft will remain in a closed loop between a contaminated APOD and the EZ. The aircraft will pick up needed equipment and personnel from the EZ for delivery to the contaminated APOD while returning critical cargo and passengers from the contaminated APOD to the EZ. The exchange zone acts as a buffer separating the downwind "dirty" cargo/pax, MHE, and aircraft from the upwind "clean" cargo/pax, MHE, and aircraft by a minimum distance of 475 feet. Separate support personnel and MHE are used to service the "dirty" cargo/pax area, the movement across the exchange zone, and the "clean" cargo/pax area. The Contamination Control Area (CCA) and Aircrew Contamination Control Area (ACCA) for personnel would stretch across the EZ as would a cargo process area located a least 400 feet away. The actual aircraft do not need to be located adjacent to the EZ as long as MHE can transport cargo between the aircraft and the EZ. Although the minimum size of the transload area of EZ would remain the same, the MOG would determine the size of the clean zone and dirty zone for aircraft parking, as well as holding areas for cargo holding, aeration of cargo, and passengers holding areas.



The EZ could be used for an unlimited period of time. However, equipment and personnel needed to support each of the three zones would be significant. Estimates needed to load 350 tons of cargo and 2,000 passengers per day range from 653 to 1,544 personnel, depending on the level of MOPP gear needed and subsequent turnover of personnel due to heat exhaustion. Current planning envisions that the EZ would probably be a one or two MOG emergency procedure that needs to be functional within hours in order to keep a critical APOD supplied with minimal essential equipment and personnel while preventing further contamination of critical assets. This concept is in response to the AF Chemical Warfare Concept of Operations (AF counter-chemical warfare [C-CW] concept of operations [CONOPS]) that a contaminated APOD poses a significant contamination threat only for a few hours or, at most, days following an attack. A quick-reaction EZ will keep the APOD operational despite the use of CBRNE.

To establish this quick response capability, additional analysis will be conducted to determine the need for an Exchange Zone Unit Type Code for a MOG of one or two aircraft listing all required equipment and personnel needed.

Planning Operations

- **Crew Rest Procedures.** Operational necessity may require the aircrew to operate in a contaminated environment. If the mission is not being staged by another aircrew or preflight crews are not available, the aircrew will normally preflight, load, and secure the aircraft prior to entering crew rest. The departing aircrew will perform necessary crew preparations and preflight briefings. Then they will report to the ACCA for processing and Aircrew Chemical Defense Ensemble donning with assistance from Aircrew Life Support personnel.

- **Airlift of Retrograde Cargo.** Only critical retrograde cargo will be moved from a contaminated to an uncontaminated airbase. Critical requirements are predesignated in theater war plans (Reference Air Force Manual (AFMAN) 10-2602, para 1.7.8). Onload cargo will be protected prior to and while being transported to the aircraft. Protective covers will be removed just prior to placing the cargo on the aircraft. It is the user's responsibility to decontaminate cargo for air shipment. The airlift of contaminated or formerly contaminated cargo requires the approval of the senior transportation commander.

- **Passenger/Patients.** Contaminated patients will not be transported on board AMC or AMC-procured aircraft without first being decontaminated. However, the AMC/CC is the waiver authority to this policy. In extreme circumstances, if a waiver is approved, AMC will commit to providing the capability to move a small number of contaminated/contagious casualties (approximately 50) (Reference Policy for Movement of Contaminated/Contagious Casualties/ Personnel, October 20, 2003).

- **Approval Authorities.** The approval authority for landing contaminated aircraft at uncontaminated locations in areas outside of the OCONUS, territory, or possession is the Department of State. The approval authority for landing locations within the CONUS, territory, or possession, is the DOD (Reference AFMAN 10-2602, para 1.7.9).

- **Documenting Aircraft Contamination.** When it is suspected or known that an aerospace vehicle or piece of equipment has been contaminated with a nuclear, biological, or chemical contaminant, a Red “X” will be entered on the applicable forms in accordance with technical order (TO) 00-20-1, Table 4-1, and an annotation will be made in historical records for the life cycle of the equipment. Directions for downgrading a Red ”X,” thus allowing the aircraft to be flown or equipment used, are also contained in TO 00-20-1 (Reference TO 00-20-1).

- **Civil Reserve Air Fleet (CRAF).** Civil aircraft that are under DOD contract and the CRAF may conduct flights into nuclear, biological, chemical, conventional (NBCC) high- and medium-threat areas. They will not conduct operations into an airbase that is under attack or contaminated at the time of flight arrival (Reference AFMAN 10-2602, para 1.7.6). Civil carriers will not operate into airfields contaminated by enemy attack, regardless of the level of contamination, unless national standards are implemented, approved, and accepted by DOD, the Federal Aviation Administration, and the carriers, and then only on a volunteer basis. (Transportation Command Commander approved this policy in April 1998). Civil carriers may not be willing to risk aircraft contamination by airfield condition or by transporting contaminated or potentially contaminated cargo or passengers.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Force Protection Roadmap

OPR: AMC/A7F

MAF Capability Statement

Provide the capability of activities that prevent or mitigate successful hostile actions against Air Force people and resources when they are not directly engaged with the enemy. Force protection is accomplished by a commander program designed to protect service members, civilian employees, family members, facilities, and equipment in all locations and situations. Force protection must exist across the range of military operations and in all operating environments.

Roadmap Assessment

Force Protection is an area that cuts across virtually every MAF mission category and support process. Each category and support process must consider the impact force protection has on the ability to successfully conduct its particular mission. Some of the major deficiencies considered during this review are included in other roadmaps; i.e., MAF Weapon Systems, Installations and Expeditionary Combat Support, Aeromedical Evacuation, Combat Delivery, and Command, Control, Communications, Computers, and Intelligence and Information Operations.

Force protection lacks nonlethal weapons for use in stability operations and an armored tactical vehicle for use during contingency /humanitarian /peacekeeping operations. Personal protective equipment for security forces (such as ballistic vests that provide both ballistic and flak protection), portable defensive fighting positions, intersquad communication capability, counter-battery capability, and a countersniper capability are needed. Advanced small arms capable of defeating current and advanced enemy personal protective equipment are also lacking. There are insufficient training simulators for conducting force-on-force training. MAF security forces lack a regional training center to train deployable forces on in-depth contingency skills and to train deployable and home-station forces on military operations in urban terrain/close-quarter battle. The Air Force Office of Special Investigations (OSI) is responsible for counterintelligence collections in the effort to support force protection and antiterrorism. OSI lacks the needed personnel and equipment to fulfill this mission. The need for contingency flyaway kits and proper unit type codes containing the required equipment is a necessity for agents to provide counterintelligence support for force protection while deployed. With OSI and AMC transitioning to the Air Force Contingency Response Group concept, this problem will be corrected. Flyaway kits contain the equipment necessary for agents providing counterintelligence support for force protection while deployed.

Force Protection will face funding challenges in the short term to overcome vulnerability assessment deficiencies, including inadequate perimeter fencing, perimeter security lighting, standoff distances from key buildings, and fragment-retention film on windows at AMC bases; all have yet to be resolved. There is also a lack of a Force Protection Red Team to conduct a realistic assessment of installation vulnerabilities. AMC also lacks sensor systems for protection of Air Force Level 1, 2, and 3 resources, as required by Air Force instructions; MAF security forces do not possess all the equipment and resources to conduct offensive and defensive operations to deny enemy access to these resources. Supporting forces and owner/ user personnel provide internal control and surveillance for aircraft parking areas. There is no intrusion detection and surveillance at the restricted area boundary. AMC lacks a real-time chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) battle management system, including warning and reporting, local weather, and intelligence. Protection systems do not provide integrated protection against all CBRNE threats. Collective protection capability is limited and does not provide integrated protection against all CBRNE threat agents and ballistic threats. Aeromedical crewmember masks are not standard across MAF. MAF aircraft need to capitalize on low-observable technologies to reduce emissions and the probability of detection, and to improve the capabilities of aircraft self-protection countermeasures. MAF aircraft lack an autonomous capability to airdrop equipment and personnel precisely, and current CBRNE detection systems are resource-intensive and require excessive time to be effective.

Capability is projected to improve in the mid- and long-term, as force protection challenges, force protection equipment challenges, and infrastructure deficiencies are overcome.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

Medical Roadmap

OPR: AMC/SGS

MAF Capability Statement

Provide a managed community health care system that delivers a seamless uniform health benefit that focuses on disease prevention, health promotion, force health protection, and personnel physical fitness with medically appropriate access to the right level of care, at the right time, and at a reasonable cost, commensurate with the operation of a dual peacetime/readiness-capable infrastructure.

Roadmap Assessment

(b)(5)

(b)(5). As a function, Medical Logistics is maturing technologies and methodologies to support downrange resupply processes. The Air Force Medical Service (AFMS) has successfully applied—and learned—Expeditionary Medical Logistics (EML) in direct support of Operations ENDURING FREEDOM and IRAQI FREEDOM. EML is focused, intense, supply chain management that manages time-definite delivery, resupply using a "pull" process, minimal on-hand inventory, increased ownership by contracted and commercial vendors, and reduced airlift requirements. Continued funding is needed in development, acquisition, and Joint research to overcome threats posed by the use of weapons of mass destruction (WMD). AFMS information management/information technology is responsible for supporting the management of information for the medical readiness and managed care missions. Funding support is vital to allow the AFMS to keep pace with the latest in technology, through research, development, and procurement. In the mid-term, funding shortfalls identified in Short-Term Milestones should be rectified by FY09. Proper funding will allow the AFMS to keep current in equipment and WMD threat protection technologies. In the long term, assumed funding will allow the AFMS access to the latest in development and technology.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

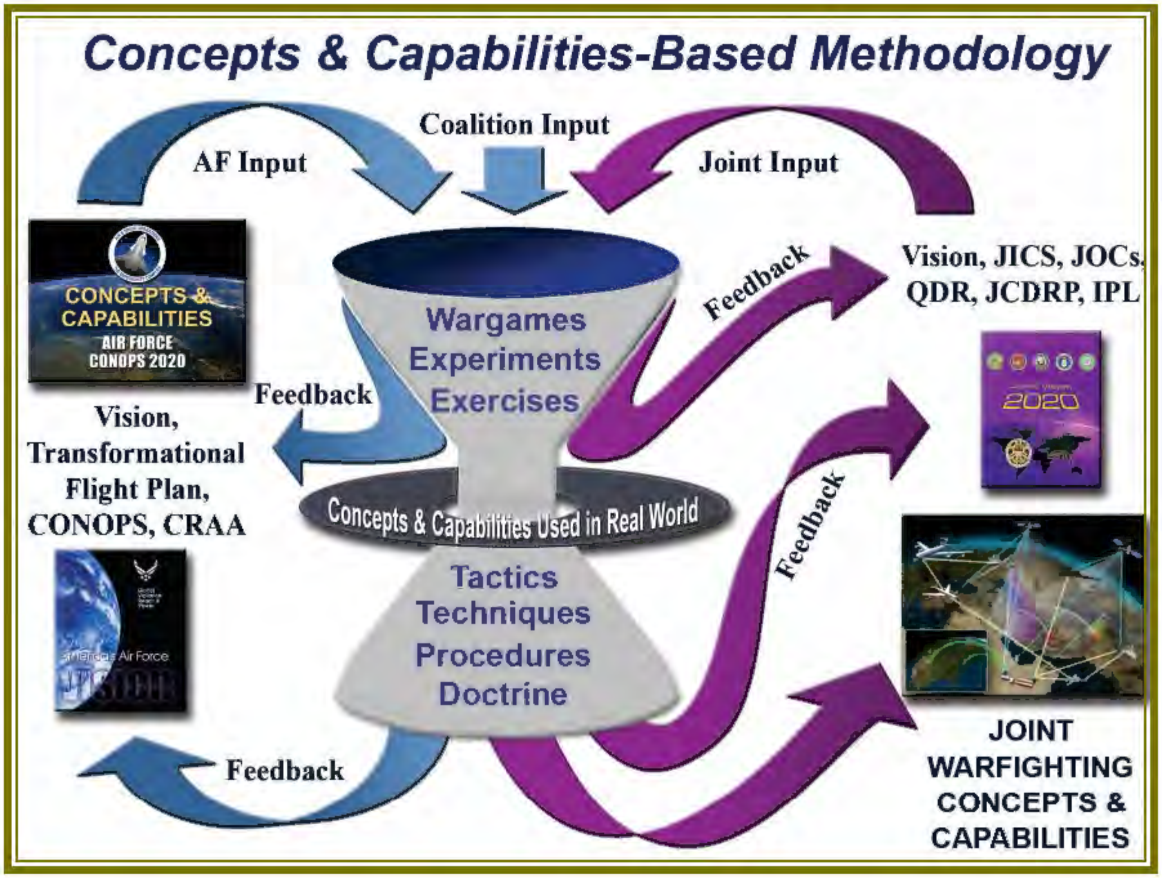
(b)(5)

Modeling, Simulation, and Analysis Roadmap

OPR: AMC/A59

MAF Capability Statement

Provide capability for modeling, simulation, and analysis (MS&A) support to analyze worldwide mobility operations, moving through established or expeditionary en route airfields able to support sustained mobility operations using in-place infrastructure or deployable assets and personnel. Capability must provide MS&A support to decision-makers and warfighters to predict and assess effects-based operations across the full spectrum of mobility operations and in all operating and training environments, to include those in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment (see C-CBRNE Roadmap) live, virtual, and constructive simulations. Capability must also provide MS&A support to commanders at all levels, war games, exercises, planning, operations, distributed mission operations (DMO), experimentation, and acquisitions. Capability must also provide support to Capability Based Planning (CBP) efforts by developing and maintaining an AMC/MAF value hierarchy using Value Focused Thinking (VFT). In conjunction with the value hierarchy, the capability must incorporate VFT results into an investment program such as the Aerospace Integrated Investment Software (ASIIS) in order to support Planning, Programming, Budgeting and Execution (PPBE) processes. MS&A outputs must enable robust and timely analyses to support decision-makers, support effects-based operations, and assure the most effective decisions for utilization of MAF forces. This MS&A capability should prepare, equip, and transform MAF forces through net-centric, on-demand components, and provide the world's best air and space capabilities to both the MAF and the Joint warfighter. MAF MS&A must align with AF MS&A capabilities in supporting four principal communities of interest: Air Force operators; capabilities based planning and acquisition communities; Air Force leaders; and combatant commanders.



Roadmap Assessment

Current MS&A capability allows for answering senior leadership's questions in exploring policy and various decision options. In addition, MS&A is extensively used in exercises and war games for mobility and tanker simulations, and visualizations for both red and blue players. The near-term vision for mobility MS&A is to provide a more detailed and robust capability for analysis of material and personnel movement, force structure (i.e., number of airframes), fuel, crews, infrastructure support, command and control, information flow, integration of airlift and tanker operations, etc. These additional details, then, on a daily basis, support war games, exercises, planning and operations, and should explore the possibility of tight-coupling within Air Force DMO efforts.

Milestones

Short-Term (FY06-13)

(b)(5) [redacted]

Mid-Term (FY14-20)

(b)(5) [redacted]

Long-Term (FY21-30)

(b)(5) [redacted]

MS&A Deficiencies/Solutions | MAF Deficiencies/Solutions | MS&A Capabilities | MAF Capabilities | Reference Documents

Global En Route Support Roadmap

OPR: AMC/A49

MAF Capability Statement

Provide worldwide capability to support combatant commanders' wartime and peacetime mobility requirements through established or expeditionary en route airfields, capable of supporting sustained mobility operations, where possible, by MAF assets from point of upload to point of download at any point on the globe, across the full range of military operations and in all operating environments.

Roadmap Assessment

Global en route support (GERS) is a critical enabling element of rapid global mobility, but must be capable of supporting peacetime operations worldwide. In this respect, GERS operates at any airfield—military, commercial, or remote location—where mobility aircraft can transit in support of national objectives. Peacetime facilities range from bases with fully manned air mobility squadrons, small commercial air terminal operations, or commercial airports with no AMC presence, but can include locations where aircraft cargo operations or passenger services are provided by commercial vendors. While peacetime GERS is critical to daily rapid global mobility operations, the focus of this Master Plan is on the wartime GERS—that system required to support the National Military Strategy (NMS) and the movement of combat forces from the Continental US (CONUS) to the theater of operations.

Global en route support sustains worldwide mobility operations through 13 established, robust, strategically located en route bases. These bases enable mobility operations and deployable mobility assets/personnel, capable of rapid response to open and operate austere, bare-base location to assist forward air mobility expeditionary airfields. GERS must be capable of supporting operations across the full range of military operations day and night, in adverse weather, and in CBRNE conditions. GERS includes the ability to provide MAF services such as aircraft refueling, air mobility command and control, aerial port operations, and aircraft maintenance.

GERS will face the following challenges in the short-term: insufficient maintenance manpower to support aircraft defensive systems; inadequate materials handling equipment to meet wartime closure; an inability to meet Global Reach Laydown-deployable equipment requirements including communications, weather, intelligence, intransit visibility, vehicles, shelters, and workspace. Obsolete command and control systems are currently used to communicate between deployed units and aircraft. Deploying single-function aerospace ground equipment consumes valuable airlift space. Infrastructure projects are programmed for construction, but are deficient in military construction recapitalization rate and real property maintenance for preservation and maintenance. Improvements are expected in the mid-term; however, significant challenges in Europe and the Pacific areas of responsibility will continue throughout the long-term.

Significant DOD downsizing and budget constraints reduced the en route airfields available to support contingency operations. The remaining en route airfields' infrastructure—fuel hydrants, storage tanks, pipelines, ramps, and runways—has deteriorated, jeopardizing AMC's and the United States Transportation Command's (USTRANSCOM) ability to provide adequate support to the war fighter. AMC and USTRANSCOM have proactively surveyed, analyzed, planned, and programmed improvements to GERS to meet the requirement as defined by Mobility Requirements Study 2005

(MRS-05). The formation of the European En Route Infrastructure Steering Committee (EERISC) and the US Pacific Command (PACOM) En Route Infrastructure Steering Committee (PERISC) provides a joint, general officer-led oversight committee to monitor the National Military Strategy, analyze GERS ability to support the strategy, and make recommendations to the appropriate unified commands for implementation. With over a billion dollars of programmed improvements, it is vital that a single agency provide oversight and guidance. USTRANSCOM, the Defense Transportation System (DTS) single manager, should provide that oversight through the EERISC and PERISC. USTRANSCOM, charged with getting the warfighter to the fight, is in the best position to fully understand the implications that limitations in the GERS system can have on force closure. Using the EERISC and PERISC as the analysis, planning, and programming body for GER strategy execution provides the proper forum for program implementation and funding changes through the appropriate Service components. Inclusion of the GERS requirements and deficiencies in USTRANSCOM and AMC planning documents provides the venue for periodic review among all the mobility forces that use the GERS. Future planning efforts involving GERS should include mobility tanker assets requirements as well as strategic airlift.

Following the 9/11 attack on the United States, several key things changed in the overarching documents guiding the two en route system committees (EERISC and PERISC). The FY02 Defense Planning Guidance was not published. In FY03, the Defense Planning Guidance changed to become the FY03 Strategic Planning Guidance. The Integrated Priority List (IPL) changed dramatically from a combination of paragraphs identifying critical projects at installations, to a two- to three-page document with broad, nonspecific objectives at the theater level. The Commander's Posture Statement to Congress maintained the basic profile of overarching issues to weapon system procurement.

During Operation ENDURING FREEDOM (Afghanistan operation), most of the forces involved moved through Europe to support the operation. The initial operations concept used by 18 AF/TACC primarily bypassed the six strategic airlift en routes in Europe. Several factors affected the decision, the most significant being that the construction on the hydrant system at Moron (Phase I) and improvements at Navy Station Rota were not yet completed. In addition, overflight issues in Europe and the Stans limited basing choices. The primary routing for the first 8 months of Operation ENDURING FREEDOM (OEF) was primarily mid-Atlantic using Lajes AB, NAS Sigonella, and Incirlik AB. The Pacific routing was used to support naval and air operations out of Diego Garcia supporting OEF and Operation IRAQI FREEDOM (OIF). The routing for OIF focused on the North Atlantic route using Rhein-Main, Ramstein, and Moron ABs. (Moron: In January 2003, Phase II construction at Moron was delayed for approximately 5 months to utilize the ramp without hydrants. Phase I was complete and used significantly.)

From 9/11 until post-OIF (May 2003), the en route strategy was in an evolutionary stage. Direction had been given to US European Command (USEUCOM) by the Secretary of Defense (SECDEF) to look south of the Alps and Eastern Europe for future areas of interest. PACOM was directed into Southeast Asia (SEA). Our biggest customer, the Army, was starting a significant transformation to the Stryker Brigade concept and was involved in significant relocations from Europe and the Pacific Rim to CONUS. With the direction from the SECDEF, the most affected area in the European Theater was sub-Saharan Africa and the Caucuses. In the Pacific, the most affected area was SEA. Each of these areas has significant reason for concern over infrastructure for strategic airlift and air refueling assets.

As of 9/11, the following installations had construction projects ongoing in support of the global en route infrastructure capability validated by MRS-05:

	Wide Bodied Spots		Narrow Bodied Spots	
Ramstein	18	or	26	
Spangdahlem	13	or	13	
Moron	12	or	16	Plus 21 Air Refueling
Rota	16	or	16	
Fairford	8	and	12	
Mildenhall	4	and	10	

NOTE: Lajes AB in the Azores is a tanker beddown and has 21 tanker spots for support to fighters, bombers, and self-deployers. It is not considered one of the strategic airlift en route installations, but supports the mobility mission.

	Wide Bodied Spots		Narrow Bodied Spots	
Hickam	12	or	18	Plus 32 Air Refueling
Elmendorf	10	and	12	
Andersen	12	or	19	Plus 19 Air Refueling
Kadena	8	and	8	Plus Theater Refueling
Yokota	4	and	14	
Misawa	9	or	9	
Iwakuni	4	Requested at Present		

NOTE: Eielson AFB AK is a tanker beddown and has 43 tanker spots for support to fighters, bombers, and self-deployers. It is not considered one of the strategic airlift en route installations, but supports the mobility mission.

NOTE: This project identification is to document the efforts to provide the warfighter-identified requirements in the Planning, Programming, Budgeting, and Execution as directed by the Joint Chiefs of Staff through the Joint Requirements Oversight Council process. In no way is this intended to restrict the warfighter in utilization of assets at his/her disposal. This is an identification process documenting the strategic airlift and air refueling en route efforts.

Following completion of major combat operations in OEF, the EERISC reviewed the actual data from the first 9 months of the operation. After close review and inputs from the installations and the Global Decision Support System mission log, all evidence indicated we used Lajes, Sigonella, and Incirlik significantly more than prewar plans indicated. The EERISC took briefs from each installation and evaluated the added value brought to the table. Several key decisions resulted from this review. First, continued high usage of these facilities without improvements is not possible. Second, the added capability and flexibility going South and East with these three installations (brought up to adequate support standards) were absolutely necessary to continue to support global operations. Rather than bring these installations in to the basic six in Europe representing the US Central Command AOR, they were advocated as required in support of the Global War on Terrorism. This designation is being used to identify the additional locations separate from the basic six en routes until all of the projects justified in MRS-05 are complete. The intermediate goal is to have the global en route—Europe/ Pacific. The long-term goal is to have the global en route network as one system interdependent and indistinguishable from a theater perspective: a true global network in support of the war fighter worldwide.

In support of the global en route system, the EERISC and PERISC have adopted an advocacy program for projects that impact GERS. In EUCOM, three projects have resulted in combatant commander letters, IPL, Posture Statements, and EERISC advocacy. The initial projects are (1) breakwater at Lajes (protecting the fuel pier); (2) the expansion of the Americas Ramp in the Sigonella base plan 3.0.; (3) and the expansion of the Mildenhall strategic ramp and hydrant system. At present, no projects have been identified for PACOM advocacy.

The Way Ahead

Since September 11, 2001, the refocus of the strategic airlift and air refueling en routes from dual-MTW-centric to a more global focus has reflected the DOD's global posture strategy. The changing posture, which will result in large legacy forces returning to the CONUS and lighter, more mobile forces stationed overseas, has driven a requirement to identify cooperative security locations (CSLs). These locations will be used on an as-needed basis to support deploying forces, and will not normally be used as bases to permanently station troops. Our vision is to use the existing en routes, as well as newly identified CSLs, to support global deployment and sustainment of forces. Most of these new locations will be used as-is, although some may require minor infrastructure improvements to maximize throughput capability. The intent is to use existing infrastructure at the CSLs through political agreements and only build infrastructure on a low-cost/maximum-impact basis. Military construction is expected to be used in a limited fashion to enhance current capabilities.

The way ahead is one of identification, verification, and validation of CSLs. As these CSLs are verified for throughput and agreements reached, this will extend the global network into the global en route system (an ultimate goal). USTRANSCOM will visit each location, perform a throughput analysis on each field, and determine if one or more of the locations are needed to meet the theater's anticipated requirements (passenger, cargo, and timeline). After AMC and USTRANSCOM validate the CSLs for throughput, the theater command will engage in negotiations with proper authorities to reach a mutual agreement for support on a contingency basis.

To better enable the CSL process and advocate for joint en route infrastructure projects, USTRANSCOM is standing up an additional advocacy forum, the Global En Route Infrastructure Steering Committee.

Milestones

Short-Term (FY06-13)

(b)(5)

Mid-Term (FY14-20)

(b)(5)

Long-Term (FY21-30)

(b)(5)

GERS Deficiencies/Solutions | MAF Deficiencies/Solutions | GERS Capabilities | MAF Capabilities | Reference Documents

Open the Airbase Roadmap

OPR: AMC/A35

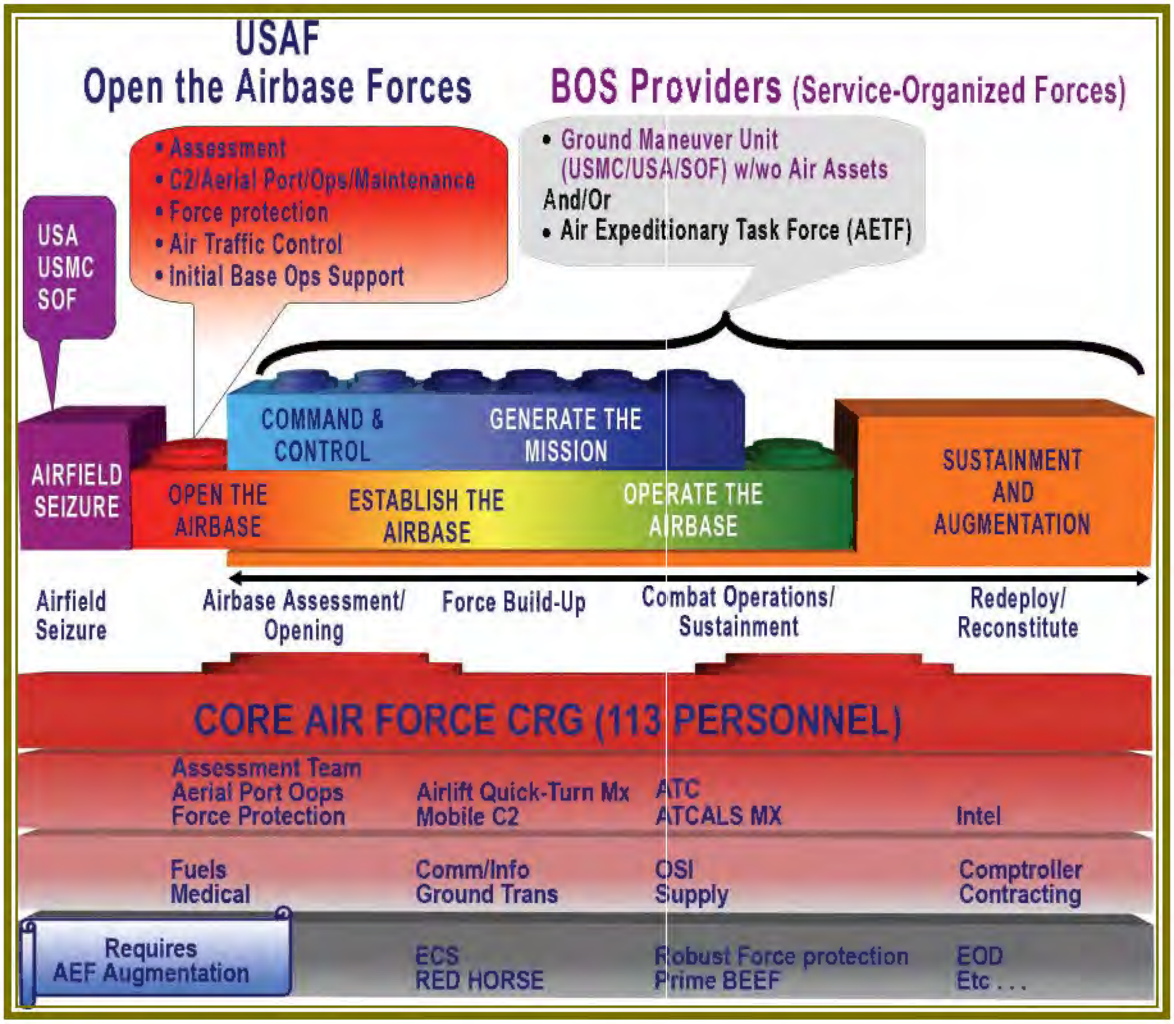
MAF Capability Statement

Provide the rapid response capability to open airbases globally across the full range of military operations and in all operating environments, regardless of follow-on mission or aircraft type. This capability should seamlessly bridge the gap between seizure forces and follow-on forces, whether they are Air Force or other Service forces.

Assessment

Historically, the global projection and employment of US forces almost inevitably involves the establishment of bases within the area of operations. A number of these may formally develop into airbases or become hubs from which significant air operations occur in support of joint combat missions. In these cases, securing, opening, and providing initial airfield and airbase operations is critical to follow-on operations. Although "Open the Airbase" is new to the AMMP, the Air Force has been opening airbases around the world for many years—all the way back to the "airheads" established by the Army Air Corps in the Burmese jungles during World War II.

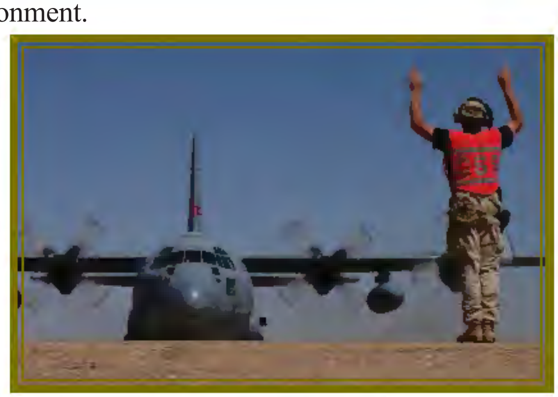
Airbase opening capabilities require a wide range of functional areas. Opening an airbase and establishing operations has historically been accomplished on an ad hoc basis by the forces that were going to use the airbase. In response, using the lessons learned from operations ENDURING FREEDOM and IRAQI FREEDOM, the Air and Space Expeditionary Task Force (AETF) Force Module concept preidentifies personnel assigned to respond during regional contingencies to open and establish airbases. Its objective is to quickly respond to any developing situation or contingency by rapidly deploying right-sized supporting forces and capabilities. These forces will consist of unit type codes (UTCs) specifically right-sized and sequenced for function and/or location. They comprise the building blocks to rapidly open and stand up an airbase to support sustained air operations. The five modules are outlined in the AETF Force Module Construct.



Air Force contingency response groups (CRGs) provide the Open the Airbase capability and can be augmented by regular Air and Space Expeditionary Force (AEF) specialties, as required. AMC is the major command (MAJCOM) lead for developing "Open the Airbase" capabilities. These forces can be tailored to meet the specific requirements of each deployment. Mobility, force protection, intelligence, threat assessment, civil engineering, command and control, reachback, and airfield terminal control operations form the CRG's core capability set. In addition, each CRG may maintain skill sets/UTCs that augment base-opening capability and/or fulfill MAJCOM-specific requirements.

Fundamental Operating Characteristics for a CRG Include:

- Ability to operate in a permissive or uncertain environment.
- Ability to successfully operate in an austere environment.
- Ability to operate where deployment and redeployment speed is of the essence.
- Capability to rapidly respond: organized, trained, and equipped to address short-notice tasks (the CRG will be capable of responding within 12 hours from receipt of a deployment order).



CRGs will be light, lean, and quick to deploy and employ. The unit will be composed of multiskilled personnel who are both warfighters and functional experts. CRGs will be equipped with state-of-the-art equipment to facilitate airfield assessment, command

and control, force protection, reach-back communications, timely intelligence, initial airfield operations and limited mobility operations, and rapid redeployment. Given that the CRG may be providing the initial deployment location leadership and be responsible for establishing preliminary operations tempo until arrival of the designated regional combatant commander/task force/ sustainment force leadership, the CRG Assessment Team must include a senior field grade officer (O-6) to assume this critical role.

The airbase assessment consists of thorough predeployment planning (both deliberate and crisis-action planning), as well as rapid verification and completion of required assessment information. The potentially rapid transitions between the seizure forces, assessment team/CRG, and follow-on force modules are not inherently seamless, especially in light of the fact that command will likely be handed off between Services (e.g., Army seizure forces to AF assessment team). Close coordination of these transitions will be paramount. With more specific Joint doctrine, it will be possible to conduct appropriate training and field exercises to further develop the tactics, techniques, and procedures for the transition between airbase seizure forces and base opening forces.

CRGs will typically provide the "first-in" airfield operations and force protection (resource protection and weapons system security) when opening airfields. Although a CRG is normally tasked to support a single location, it may support multiple locations if the scope of operations is limited enough and necessary logistics are available. The CRG is not designed for forcible entry or airfield seizure operations, but must have the capability to integrate into and interface with these operations.

The Road Ahead

The Air Force has eight CRGs—one under US Air Forces, Europe, at Ramstein AB and one under Pacific Air Forces at Anderson AFB. AMC has two contingency response wings, each with three CRGs, that report to their respective Expeditionary Mobility Task Forces at McGuire and Travis AFBs.

Challenges ahead to implement AF "Open the Airbase" capabilities include: identifying manpower and equipment resources necessary to align this capability in the newly established units; selecting and resourcing the CRG field training unit (FTU) location; and codifying "Open the Airbase" concepts and best practices into Air Force and Joint doctrine. Efforts are currently underway between AMC, Air Staff, Air Force Doctrine Center, and Joint Forces Command to insert these concepts into existing doctrine publications. AFDD 2-6, Air Mobility Operations, released 1 Mar 06, contains descriptions of CRG capabilities and procedures. JP 3-17, Air Mobility Operations, will be released soon, with CRG verbiage as well.

Milestones

Short-Term (FY06-13)

(b)(5)

[redacted]

(b)(5)

[redacted]

Mid-Term (FY14-20)

(b)(5)

[redacted]

Long-Term (FY21-30)

(b)(5)

[redacted]

Acronym	Definition
AAA	Anti-Aircraft Artillery
AALC	Autonomous Approach and Landing Capability
ABI/CTII	Airborne Broadcast Intelligence/Combat Track II
ACARS	Aircraft Communications Addressing And Reporting System
ACC	Air Combat Command
ACCA	Aircrew Contamination Control Area
AE	Aeromedical Evacuation
AEF	Air and Space Expeditionary Force
AEFC	AE Flight Qualification Course
AETC	Air Education and Training Command
AETF	Air and Space Expeditionary Task Force
AF	Air Force
AFCIS	Air Force Capabilities and Investment Strategy
AFMAN	Air Force Manual
AFMC	Air Force Materiel Command
AFMS	Air Force Medical Service
AFPD	Air Force Program Directive
AFRC	Air Force Reserve Command
AFRL	Air Force Research Laboratory
AFSC	Air Force Specialty Code
AFSOC	Air Force Special Operations Command
AFSOF	Air Force Special Operations Forces
AFSPC	Air Force Space Command
AFTTP	AF Tactics, Techniques, and Procedures
AGE	Aerospace Ground Equipment
AIMS	Airborne Information Management System
AMC	Air Mobility Command
AMC-X	Air Mobility Concept-X
AMMP	Air Mobility Master Plan
AMOS	Air Mobility Operations Simulation
AMP	Aircraft Modernization Program
AMP	Avionics Modernization Program
ANG	Air National Guard
ANI	Airborne Network Integration

Acronym	Definition
AoA	Analysis of Alternatives
AOC	Air and Space Operations Center
AOR	Area of Responsibility
APOD	Aerial Port of Debarkation
APOM	Amended Program Objective Memorandum
APPG	Annual Planning and Programming Guidance
AR	Air Refueling
ASACM	Advanced Situational Awareness and Countermeasures
ASC	Aeronautical Systems Center
ATM	Air Traffic Management
AWFCS	All Weather Flight Control System
BCA	Business Case Analysis
BFT	Blue Force Tracking
BRAC	Base Realignment and Closure
BWA	Biological Warfare Agents
C2	Command and Control
C3	Command, Control, and Communications
C4	Command, Control, Communications, and Computers
C4I	Command, Control, Communications, Computers, and Intelligence
C4I & IO	C4I and Information Operations
CAF	Combat Air Forces
CBRNE	Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives
CCA	Contamination Control Area
CCM	Command and Control Module
C-CW	Counter-Chemical Warfare
CDD	Capabilities Development Document
CIP	Core Integrated Processor
CNS/ATM	Communication, Navigation, Surveillance/Air Traffic Management
COA	Course of Action
CONOPS	Concept of Operations
CONUS	Continental United States
COP	Common Operational Display
COTS	Commercial, Off-the-Shelf
CRAF	Civil Reserve Air Fleet

Acronym	Definition
CRG	Contingency Response Group
CRE	Contingency Response Element (Formerly TALCEs)
CRRA	Capabilities Review and Risk Assessment
C-RW	Counter-Radiological Warfare
CRW	Contingency Response Wing
CSAF	Air Force Chief of Staff
CSL	Cooperative Security Location
CW	Chemical Warfare
CWB	Center Wing Box
DE	Directed Energy
DFDR/CVR	Digital Flight Data Recorder/Cockpit Voice Recorder
DMO	Distributed Mission Operations
DOD	Department of Defense
DSB	Defense Science Board
DTS	Defense Transportation System
DV	Distinguished Visitor
ECM	Electronic Countermeasures
ECS	Expeditionary Combat Support
EDS	Embedded Diagnostic System
EERISC	European En Route Infrastructure Steering Committee
EFIS	Electronic Flight Instrument Program
EML	Expeditionary Medical Logistics
ER	Extended Range
ERS	En Route System
EZ	Exchange Zone
FAA	Functional Area Assessment
FAA	Federal Aviation Administration
FARP	Forward Arming and Refueling Point
FDR	Flight Data Recorder
FFS	Formation Flight System
FLAN	Flying Local Area Network
FNA	Functional Needs Analysis
FSA	Functional Solutions Analysis
FTU	Field Training Unit

Acronym	Definition
FYDP	Future-Years Defense Program
GAO	General Accounting Office
GATM	Global Air Traffic Management
GDSS	Global Decision Support System
GERS	Global En Route Support System
GIG	Global Information Grid
GP	General Purpose
GPS	Global Positioning System
GWOT	Global War on Terrorism
HFDL	High-Frequency Data Link
HSW	Hot Soapy Water
IA	Information Assurance
IADS	Integrated Air Defense System
IFF	Identification Friend or Foe
IO	Information Operations
IP	Internet Protocol
IPL	Integrated Priority List
IR	Infrared
IRR	Installation Readiness Report
IT	Information Technology
ITV	Intransit Visibility
JCA	Joint Cargo Aircraft
JOC	Joint Operations Centers
JPADS	Joint Precision Airdrop System
JTRS	Joint Tactical Radio System
KVA	Kilovolt-Ampere
LAIRCM	Large Aircraft Infrared Countermeasures
LFA	Large Frame Aircraft
LFADD	Large Frame Aircraft Decontamination Demonstration
LOX	Liquid Oxygen
LPI/LPD	Low Probability of Intercept/Low Probability of Detection
LRU	Line Replaceable Unit
MAF	Mobility Air Forces
MAGTFEFFV	Marine Corps Action Group Task Force Expeditionary Family of Fighting Vehicles

Acronym	Definition
MAJCOM	Major Command
MANPADS	Man-Portable Air Defense Systems
MC	Mission Capable
MCM	Multi-Command Manual
MCS	Mobility Capabilities Study
MHE	Materials Handling Equipment
MOPP	Mission-Oriented Protective Posture
MS&A	Modeling, Simulation, and Analysis
MST	Mission Support Team
MTM/D	Million Ton-Miles Per Day
MWS	Missile Warning System
MYP	Multi-Year Procurement
NASA	National Aeronautics and Space Administration
Nav-Safety	Navigation Safety
NAVSTA	Navy Station
NBCC	Nuclear, Biological, Chemical, Conventional
NCES	Net-Centric Enterprise Services
NDS	National Defense Strategy
NGA	National Geospatial-Intelligence Agency
NM	Nautical Miles
NMC	Not-Mission-Capable
NMS	National Military Strategy
NSS	National Security Strategy
NVD	Night Vision Device
NVG	Night Vision Goggle
NVIS	Night Vision Imaging System
OBIGGS II	Second-Generation On-Board Gas Generating System
OCC	Operations Control Center
OCONUS	Outside of the CONUS
OEF	Operation ENDURING FREEDOM
OIF	Operation IRAQI FREEDOM
OPTEMPO	Operations Tempo
OSA	Operational Support Airlift
OSI	Office of Special Investigations

Acronym	Definition
PACAF	Pacific Air Forces
Pacer CRAG	Pacer Compass, Radar, and Global Positioning System
PACOM	US Pacific Command
PDM	Programmed Depot Maintenance
PERISC	PACOM En Route Infrastructure Steering Committee
PLAID	Precision Location and Identification
POE	Point of Embarkation
POM	Program Objective Memorandum
PPS	Precise Positioning Service
PRV	Personnel Recovery Vehicle
QDR	Quadrennial Defense Review
R&D	Research and Development
R&PC	Requirements and Planning Council
RERP	Reliability Enhancement and Re-Engining Program
RF	Radio Frequency
RM&A	Reliability, Maintainability, and Availability
RNP	Required Navigation Performance
RNPI	Required Navigation Performance Improvement
ROBE	Roll-On Beyond-Line-Of-Sight Enhancement
RSP	Readiness Spares Packages
RSS	Radar Signal Simulator
RTA	Replacement Tanker Aircraft
RTIC	Real-Time Information to the Cockpit
RVSM	Reduced Vertical Separation Minima
SA	Situational Awareness
SARP	Standards and Recommended Practice
SATCOM	Satellite Communications
SB	Service Bulletin
SBA	Strategic Brigade Airdrop
SCA	Software Communications Architecture
SDDCTEA	Surface Deployment & Distribution Command Transportation Engineering Agency
SEA	Southeast Asia
SECDEF	Secretary of Defense
SECOMP-I	Secure En Route Communications Package-Improved

Acronym	Definition
SHORAD	Short-Range Air Defense
SKE	Station Keeping Equipment
SMART	Scalable, Multi-Function, Automated Relay Terminals
SOF	Special Operations Forces
SPO	System Program Office
SSC	Small-Scale Contingencies
TALCE	Tanker Airlift Control Element (No longer used—see CRE)
TAV	Total Asset Visibility
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Alert and Collision Avoidance System
TCAS II	Traffic Alert and Collision Avoidance System II
TDL	Tactical Data Link
TO	Technical Order
TR	Thrust Reverser
TRADOC	Training and Doctrine Command
TTP	Tactics, Techniques, and Procedures
TWCF	Transportation Working Capital Fund
UARRSI	Universal Aerial Refueling Receptacle Slipway Installation
UHF	Ultra High Frequency
USAFE	US Air Forces, Europe
USEUCOM	US European Command
USSOCOM	US Special Operations Command
USSTRATCOM	US Strategic Command
USTRANSCOM	US Transportation Command
UTC	Unit Type Code
VIPSAM	Very Important Person Special Air Mission
WBSI	Wheel and Brake System Improvement
WMD	Weapons of Mass Destruction

Reference Documents

National Guidance

National Defense Strategy (NDS)

National Military Strategy (NMS)

National Security Strategy (NSS)

Quadrennial Defense Review (QDR)

Joint Guidance

Joint Operations Environment

Joint Vision 2020

Capstone Concept for Joint Operations (CCJO)

Joint Operating Concepts (JOC)

Joint Functional Concepts (JFC)

Joint Integrating Concept (JIC)

Air Force Guidance

Air Force Vision

Air Force Vision 2020

Air Force Posture Statement

Air Force Strategic Planning Directive

The Edge

Air Force Capstone Concept for Joint Operations (AFCCJO)

AF CONOPS

Global Strike CONOPS

Global Persistent Attack CONOPS

Nuclear Response CONOPS

Homeland Security CONOPS

Global Mobility CONOPS

Space and C4ISR CONOPS

Agile Combat Support CONOPS

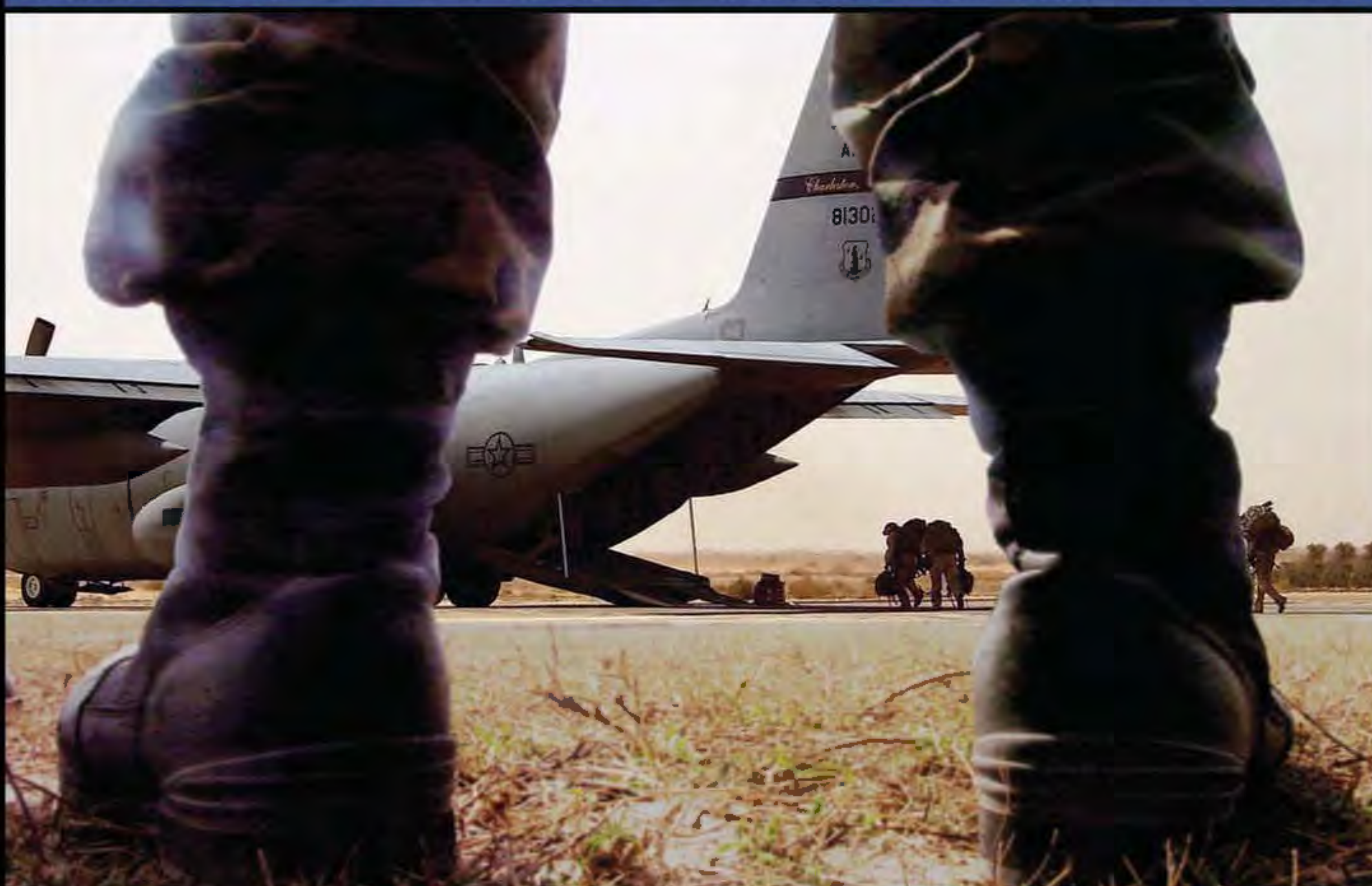
Specific Topics

Autonomous Approach and Landing Capability - CONOPS Briefing | CONOPS Point Paper

Configurable Air Transport (CAT) AIAA Paper 24261

Effects Base Operations & Mobility Operations - EBO Strategic Plan | White Paper

AIR MOBILITY MASTER PLAN



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